Monroe County
LOCAL MITIGATION STRATEGY

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1 INTRODUCTION

Section 1 provides a general introduction to hazard mitigation and an introduction to the Monroe County Local Mitigation Strategy. This section contains the following subsections:

1.1 Background
1.2 Purpose and Authority
1.3 Scope
1.4 References
1.5 Plan Organization

1.1 BACKGROUND

This document comprises a Local Mitigation Strategy for Monroe County, Florida.

Each year in the United States, natural and human-caused hazards take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters because additional expenses incurred by insurance companies and non-governmental organizations are not reimbursed by tax dollars. Many natural hazards are predictable, and much of the damage caused by hazard events can be reduced or even eliminated.

Hazards are a natural part of the environment that will inevitably continue to occur, but there is much we can do to minimize their impacts on our communities and prevent them from resulting in disasters. Every community faces different hazards, has different resources to draw upon in combating problems, and has different interests that influence the solutions to those problems. Because there are many ways to deal with hazards and many agencies that can help, there is no one solution for managing or mitigating their effects. Planning is one of the best ways to develop a customized program that will mitigate the impacts of hazards while accounting for the unique character of a community.

A well-prepared hazard mitigation plan will ensure that all possible activities are reviewed and implemented so that the problem is addressed by the most appropriate and efficient solutions. It can also coordinate activities with each other and with other goals and activities, preventing conflicts and reducing the costs of implementing each individual activity. This plan provides a framework for all interested parties to work together toward mitigation. It establishes the vision and guiding principles for reducing hazard risk and proposes specific mitigation actions to reduce identified vulnerabilities.

In an effort to reduce the nation's mounting natural disaster losses, the U.S. Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) to invoke new and revitalized approaches to mitigation planning. Section 322 of DMA 2000 emphasizes the need for state and local government entities to closely coordinate on mitigation planning activities and makes the development of a hazard mitigation plan a specific eligibility requirement for any local government applying for federal mitigation grant funds. These funds include the Hazard Mitigation Grant Program (HMGP), the Building Resilient Infrastructure and Communities (BRIC) program (formerly the Pre-Disaster Mitigation (PDM) program), and the Flood Mitigation Assistance (FMA) Program, all of which are administered by the Federal Emergency Management Agency (FEMA) under the Department of Homeland Security. Communities with an adopted and federally approved hazard mitigation plan thereby become pre-positioned and more apt to receive available mitigation funds before and after the next disaster strikes.

This plan was prepared in coordination with FEMA Region 4 and the Florida Division of Emergency Management (FDEM) to ensure that it meets all applicable federal and state planning requirements. A Local Mitigation Plan Review Tool, found in Appendix A, provides a summary of FEMA and FDEM's current minimum standards of acceptability and notes the location within this plan where each planning requirement is met.

1.2 PURPOSE AND AUTHORITY

The Board of County Commissioners directed the Monroe County Emergency Management Department to coordinate and facilitate the development of the LMS, and subsequent 5-year updates, in conformance with state and federal guidelines. This plan was developed in a joint and cooperative manner by members of a Local Mitigation Strategy Working Group (LMSWG) which included representatives of County and City departments, federal and state agencies, citizens, and other stakeholders. This plan will ensure all jurisdictions in Monroe County remain eligible for federal disaster assistance including the FEMA HMGP, BRIC, and FMA programs.

This plan has been prepared in compliance with Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act or the Act), 42 U.S.C. 5165, enacted under Section 104 of the Disaster Mitigation Act of 2000, (DMA 2000) Public Law 106-390 of October 30, 2000, as implemented at CFR 201.6 and 201.7 dated October 2007. Additionally, this plan meets the requirements set forth by the Florida Administrative Code Chapter 27P-22.

This plan will be adopted by each participating jurisdiction in accordance with standard local procedures. Copies of adoption resolutions are provided in Section 9 Plan Adoption.

1.3 SCOPE

This document comprises a Multi-Jurisdictional Local Mitigation Strategy for Monroe County. The planning area includes all incorporated municipalities and unincorporated areas in the region. All participating jurisdictions, along with additional local entities, are listed in Table 1.1.

Table 1.1 – Participating Jurisdictions in the Neuse River Regional Hazard Mitigation Plan

Participating Jurisdictions	Participating Local Entities
Monroe County	Florida Keys Aqueduct Authority (FKAA)
City of Key Colony Beach	Florida Keys Electric Cooperative (FKEC)
City of Key West	KEYS Energy Services
City of Layton	College of the Florida Keys
City of Marathon	
Islamorada Village of Islands	

The focus of this plan is on those hazards deemed "high" or "moderate" priority hazards for the planning area, as determined through the risk and vulnerability assessments. Lower priority hazards will continue to be evaluated but will not necessarily be prioritized for mitigation in the action plan.

Monroe County followed the planning process prescribed by FEMA, and this plan was developed under the guidance of a Local Mitigation Strategy Working Group (LMSWG) comprised of representatives of County, City, and Town departments; citizens; and other stakeholders. The LMSWG conducted a risk assessment that identified and profiled hazards that pose a risk to the planning area, assessed the planning area's vulnerability to these hazards, and examined each participating jurisdiction's capabilities in place to mitigate them. The hazards profiled in this plan are listed below:

- Flood
- Tropical Cyclones
- Severe Storms (Thunderstorm Wind, Lightning, Hail)
- Tornadoes and Waterspouts
- Wildfire
- Coastal Erosion
- Drought
- Extreme Heat
- Sea Level Rise and Other Climate Change Characteristics
- Radiological Incident
- Cyber Attack

1.4 REFERENCES

The following FEMA guides and reference documents were used to prepare this document:

- FEMA 386-1: Getting Started: Building Support for Mitigation Planning. September 2002.
- FEMA 386-2: Understanding Your Risks: Identifying Hazards and Estimating Losses. August 2001.
- FEMA 386-3: Developing the Mitigation Plan. April 2003.
- FEMA 386-4: Bringing the Plan to Life. August 2003.
- FEMA 386-5: Using Benefit-Cost Review in Mitigation Planning. May 2007.
- FEMA 386-6: Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning. May 2005.
- FEMA 386-7: Integrating Manmade Hazards into Mitigation Planning. September 2003.
- FEMA 386-8: Multijurisdictional Mitigation Planning. August 2006.
- FEMA 386-9: Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects. August 2008.
- FEMA. Local Mitigation Plan Review Guide. October 1, 2011.
- FEMA National Fire Incident Reporting System 5.0: Complete Reference Guide. January 2008.
- FEMA. Integrating Hazard Mitigation into Local Planning: Case Studies and Tools for Community Officials. March 1, 2013.
- FEMA Hazard Mitigation Assistance Program and Policy Guide. July 30, 2024.
- FEMA. Integrating Hazard Mitigation into Local Planning: Case Studies and Tools for Community Officials. March 1, 2013.
- FEMA. Mitigation Ideas. A Resource for Reducing Risk to Natural Hazards. January 2013.
- FEMA. FP 206-21-0002. Local Mitigation Planning Policy Guide. April 19, 2023.
- FEMA. Local Mitigation Planning Handbook. May 2023.

Additional sources used in the development of this plan, including data compiled for the Hazard Identification and Risk Assessment, are listed in Appendix E.

1.5 PLAN ORGANIZATION

The Monroe County Multi-Jurisdictional Local Mitigation Strategy is organized into the following sections:

- Section 1: Introduction
- Section 2: Planning Process
- Section 3: Planning Area Profile
- Section 4: Hazard Identification & Risk Assessment
- Section 5: Capability Assessment
- Section 6: Mitigation Strategy
- Section 7: Mitigation Action Plans
- Section 8: Plan Maintenance
- Section 9: Plan Adoption
- Annexes
- Appendix A: Local Plan Review Tool
- Appendix B: Planning Process Documentation
- Appendix C: Mitigation Alternatives
- Appendix D: Mitigation Prioritization Process
- Appendix E: References

1.6 KEY TERMS AND ACRONYMS

1.6.1 KEY TERMS

The following common terms are used in the Local Mitigation Strategy:

- **Disaster** means the occurrence of widespread or severe damage, injury, loss of life or property, or such severe economic or social disruption that supplemental disaster relief assistance is necessary for the affected political jurisdiction(s) to recover and alleviate the damage, loss, hardship, or suffering caused thereby.
- **Flood Hazard Area** or **Floodplain** is the area adjoining a river, stream, shoreline, or other body of water that is subject to partial or complete inundation. The area predicted to flood during the 1% annual chance flood, sometimes referred to as the "100-year" flood.
- **Hazard** is defined as the natural or technological phenomenon, event, or physical condition that has the potential to cause property damage, infrastructure damage, other physical losses, and injuries and fatalities.
- **Mitigation** is defined as actions taken to reduce or eliminate the long-term risk to life and property from hazards. Mitigation actions are intended to reduce the need for emergency response – as opposed to improving the ability to respond.
- **National Flood Insurance Program (NFIP)**, located within the U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA), is charged with preparing Flood

Insurance Rate Maps, developing regulations to guide development, and providing insurance for flood damage.

- **Risk** is defined as the potential losses associated with a hazard. Ideally, risk is defined in terms of expected probability and frequency of the hazard occurring, people and property exposed, and potential consequences.

1.6.2 ACRONYMS

The following acronyms are used in the Local Mitigation Strategy:

- BOCC – Board of County Commissioners
- BRIC – Building Resilient Infrastructure and Communities grant program
- CRS – Community Rating System
- FBC – Florida Building Code
- FDEM – Florida Division of Emergency Management
- FEMA – U.S. Department of Homeland Security, Federal Emergency Management Agency
- FIRM – Flood Insurance Rate Map
- FMA – Flood Mitigation Assistance (FEMA)
- GIS – Geographic Information System
- HMGP – Hazard Mitigation Grant Program (FEMA)
- LMS – Local Mitigation Strategy
- LMSWG – Local Mitigation Strategy Working Group
- NFIP – National Flood Insurance Program (FEMA)
- NROGO – Non-Residential Rate of Growth Ordinance Allocation System
- ROGO – Rate of Growth Ordinance
- RLAA – Repetitive Loss Area Analysis
- SRL – Severe Repetitive Loss
- SFHA – Special Flood Hazard Area

2 PLANNING PROCESS

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan. To develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:
1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
2) An opportunity for neighboring communities, local and County agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and
3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.
Requirement §201.6(c)(1): The plan shall include the following:
1) Documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

This section provides a review of the planning process followed for the development of the Monroe County Multi-Jurisdictional Local Mitigation Strategy. It consists of the following sub-sections:

2.1 Purpose
2.2 What's Changed in the Plan
2.3 Preparing the Plan
2.4 Local Mitigation Strategy Working Group
2.5 Meetings and Workshops
2.6 Involving the Public
2.7 Outreach Efforts
2.8 Involving the Stakeholders
2.9 Documentation of Plan Progress

2.1 PURPOSE

As defined by FEMA, "hazard mitigation" means any sustained action taken to reduce or eliminate the long-term risk to life and property from a hazard event. Hazard mitigation planning is the process through which hazards are identified, likely impacts determined, mitigation goals set, and appropriate mitigation strategies determined, prioritized, and implemented.

The purpose of the Monroe County Multi-Jurisdictional Local Mitigation Strategy is to identify, assess, and mitigate hazard risk to better protect the people and property within the county from the effects of natural and human-caused hazards. This plan documents progress on existing hazard mitigation planning efforts, updates the previous plan to reflect current conditions in the county including relevant hazards and vulnerabilities, increases public education and awareness about the plan and planning process, maintains grant eligibility for participating jurisdictions, maintains compliance with state and federal requirements for local hazard mitigation plans, and identifies and outlines strategies that participating jurisdictions in Monroe County will use to decrease vulnerability and increase resiliency.

2.2 WHAT'S CHANGED IN THE PLAN

This plan is an update to the 2020 Monroe County Multi-Jurisdictional Local Mitigation Strategy, which included participation from all jurisdictions involved in this plan update: City of Key Colony Beach, City of Key West, City of Layton, City of Marathon, and Islamorada Village of Islands. The previous plan was approved by FEMA in January 2021.

This local mitigation strategy update involved a comprehensive review and update of each section of the existing plan and an assessment of the success of the County and participating jurisdictions in evaluating, monitoring and implementing the mitigation strategy outlined in their existing plans. Only the information and data still valid from the existing plans was carried forward as applicable into this update. The following requirements were addressed during the development of this County plan:

- Consider changes in vulnerability due to action implementation;
- Document success stories where mitigation efforts have proven effective;
- Document areas where mitigation actions were not effective;
- Document any new hazards that may arise or were previously overlooked;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate growth and development-related changes to inventories; and
- Incorporate new action recommendations or changes in action prioritization.

Changes by plan section are summarized as follows:

Section 1 provides an introduction to the Local Mitigation Strategy and remains largely unchanged from the previous update.

Section 2 has been updated to reflect the 2025 planning process. This section describes the combined CRS and DMA compliant planning process the consultants used to facilitate the LMSWG through this LMS update and summarizes public outreach and agency coordination efforts that were conducted throughout the plan update process to meet the more rigorous requirements of the 2017 CRS Coordinator's Manual, in addition to DMA requirements. Detailed documentation of the planning process is compiled separately in Appendix B. This section also presents summary data on the status of mitigation actions from the 2020 strategy as a way to report on implementation progress of the 2020 update.

Section 3 was updated to reflect the most up-to-date population, demographic, economic, and housing statistics. Details on land use and growth trends were updated to reflect recent changes in county-wide growth management strategies.

Section 4 presents the hazard identification, hazard profiles, and vulnerability assessment findings. Section 4.2 provides a comparison of the hazards addressed in the 2023 State of Florida Enhanced Hazard Mitigation Plan and the 2020 Monroe County Multi-Jurisdictional Local Mitigation Strategy and provides the final decision made by the LMSWG as to which hazards should be included in this 2025 plan update. Updated data has been incorporated into each hazard profile. New vulnerability analyses were performed based on updated parcel data and population estimates. Where still relevant, data from the 2020 LMS was carried forward and incorporated into this section. In addition to the specific changes in hazard analyses identified in Section 4.3 and 4.5, the following items were also addressed in this 2025 plan update:

- GIS was used, to the extent data allowed, to analyze the priority hazards as part of the vulnerability assessment.

- The discussion on growth and development trends was enhanced utilizing 2023 American Community Survey data.
- An effort was made to provide underserved communities and vulnerable populations with opportunities to participate in and contribute to the plan update process. Engagement opportunities were provided through the public survey, the plan website, and stakeholder coordination.

Section 5 was updated to reflect current local regulatory, administrative, fiscal, and other capabilities, including changes that have occurred in the last five years. This section was also updated to include a more detailed discussion of continued compliance with the NFIP, including how each jurisdiction manages substantial damage and substantial improvement.

Section 6 presents the mitigation strategy. The goals have been updated to reflect LMSWG and community priorities. This section also discusses the categories of mitigation alternatives considered and the process used to prioritize mitigation actions. For the LMS update, this process differs from the community's additional HMA prioritization process, which is detailed in Appendix D. This section also details completed and deleted actions from the 2020 strategy as a way to report on implementation progress and separate these removed actions from those that the county and participating jurisdictions will be pursuing moving forward.

Section 7 presents the Mitigation Action Plan which presents all continued and new actions that will be pursued by the participating jurisdictions. Mitigation action status updates are provided for actions that were carried forward from the 2020 plan to explain progress made or barriers to implementation.

Section 8 outlines the process for distribution, adoption, implementation, and maintenance of the plan. This section was updated to reflect recent and upcoming plan integration opportunities.

Section 9 contains all applicable documentation of plan adoption from all participating communities.

The plan annexes detail additional risk, capability, NFIP compliance, and mitigation strategy information for each participating community.

2.3 PREPARING THE PLAN

The planning process for preparing the Monroe County Multi-Jurisdictional Local Mitigation Strategy was based on DMA planning requirements and FEMA's associated guidance. This guidance is structured around a four-phase process:

1. Planning Process;
2. Risk Assessment;
3. Mitigation Strategy; and
4. Plan Maintenance.

Into this process, the planning consultant integrated a more detailed 10-step planning process used for FEMA's Community Rating System (CRS) and Flood Mitigation Assistance (FMA) programs. Thus, the modified 10-step process used for this plan meets the requirements of six major programs: FEMA's Hazard Mitigation Grant Program (HMGP); Building Resilient Infrastructure & Communities (BRIC) Program; CRS Program; FMA Program; Severe Repetitive Loss Program; and new flood control projects authorized by the U.S. Army Corps of Engineers (USACE).

Table 2.1 shows how the 10-step CRS planning process aligns with the four phases of hazard mitigation planning pursuant to the Disaster Mitigation Act of 2000.

Table 2.1 – Mitigation Planning and CRS 10-Step Process Reference Table

DMA Process	CRS Process
Phase I – Planning Process	
§201.6(c)(1)	Step 1. Organize to Prepare the Plan
§201.6(b)(1)	Step 2. Involve the Public
§201.6(b)(2) & (3)	Step 3. Coordinate
Phase II – Risk Assessment	
§201.6(c)(2)(i)	Step 4. Assess the Hazard
§201.6(c)(2)(ii) & (iii)	Step 5. Assess the Problem
Phase III – Mitigation Strategy	
§201.6(c)(3)(i)	Step 6. Set Goals
§201.6(c)(3)(ii)	Step 7. Review Possible Activities
§201.6(c)(3)(iii)	Step 8. Draft an Action Plan
Phase IV – Plan Maintenance	
§201.6(c)(5)	Step 9. Adopt the Plan
§201.6(c)(4)	Step 10. Implement, Evaluate and Revise the Plan

The process followed for the preparation of this plan, as outlined in Table 2.1 above, is as follows:

2.3.1 PHASE I – PLANNING PROCESS

Planning Step 1: Organize to Prepare the Plan

With the County's commitment to participate in the DMA planning process, community officials worked to establish the framework and organization for development of the plan. An initial meeting was held with key community representatives to discuss the organizational aspects of the plan development process. Monroe County Emergency Management led the effort to reorganize and coordinate for the plan update. Consultants from WSP assisted by facilitating the planning process and preparing the plan document.

Planning Step 2: Involve the Public

Public involvement in the development of the plan was sought using various methods, as detailed in Section 2.6.

Planning Step 3: Coordinate

The existing LMSWG, formed for development of the 2020 Monroe County Multi-Jurisdictional Local Mitigation Strategy, was reconvened for this plan update. Membership was updated where necessary to ensure each community had adequate representation from staff and stakeholders. More details on the LMSWG are provided in Section 2.4. Stakeholder coordination was incorporated into the formation of the LMSWG and was also sought through additional outreach methods. These efforts are detailed in Section 2.8 and documentation of additional stakeholder outreach is provided in Appendix B.

Coordination with Other Community Planning Efforts and Hazard Mitigation Activities

In addition to stakeholder involvement, coordination with other community planning efforts was also seen as paramount to the success of this plan. Mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's risk and vulnerability to hazards. Communities in the Monroe County use a variety of planning mechanisms, such as comprehensive plans, subdivision regulations, building codes, and ordinances to guide growth and development. Integrating existing planning efforts, mitigation policies, and action strategies into this plan establishes a credible and comprehensive plan that ties into and supports other community programs. As detailed in Table 2.2, the development of this plan

incorporated information from existing plans, studies, reports, and initiatives as well as other relevant data from neighboring communities and other jurisdictions.

These and other documents were reviewed and considered, as appropriate, during the collection of data to support the planning process and plan development. Data from these sources was incorporated into the risk and vulnerability assessment and was used in determining the capability of each jurisdiction to implement certain mitigation strategies. The Risk Assessment is presented in Section 4 and the Capability Assessment can be found in Section 5.

Table 2.2 – Summary of Existing Studies and Plans Reviewed

Resource Referenced	Use in this Plan
Local Comprehensive Plans	Where available, each community's comprehensive plan was referenced to develop the Planning Area Profile in Section 3. Local land use and comprehensive plans were also used to develop Mitigation Action Plans in Section 7 and were referenced in the Capability Assessment in Section 5.
Local Ordinances (Flood Damage Prevention Ordinances, Subdivision Ordinances, Zoning Ordinances, etc)	Local ordinances were referenced in the Capability Assessment in Section 5 and where applicable for updates or enforcement in Mitigation Action Plans in Section 7.
Monroe County and Incorporated Areas Flood Insurance Study (FIS) Report	FIS reports were referenced in the preparation of the flood hazard profile in Section 4.
Monroe County Comprehensive Emergency Management Plan (CEMP), January 2022	The CEMP was referenced in the preparation of the wildfire hazard profile in Section 4 and in the Capability Assessment in Section 5.
Florida Department of Environmental Protection Critically Eroded Beaches Report (2019) and Strategic Beach Management Plan: Florida Keys Region	These two plans were referenced in the preparation of the coastal erosion hazard profile in Section 4.
Monroe County Multi-Jurisdictional Local Mitigation Plan, 2020	The previous plan was referenced in compiling the Hazard Identification and Risk Assessment in Section 4 and in reporting on implementation status and developing the Mitigation Action Plans in Section 2 and Section 7, respectively.
Monroe County Post-Disaster Recovery Strategy	This is an operational framework intended to help Monroe County navigate resources that are available for long-term recovery; it was used to identify post-disaster mitigation policies and procedures, detailed in Section 5.
Monroe County Recovery Plan, October 2009	This plan was used to identify post-disaster mitigation policies and procedures, detailed in Section 5.

2.3.2 PHASE II – RISK ASSESSMENT

Planning Steps 4 and 5: Identify/Assess the Hazard and Assess the Problem

The LMSWG completed a comprehensive effort to identify, document, and profile all hazards that have, or could have, an impact on the planning area. Geographic information systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities. A draft of the risk and vulnerability assessment was made available on the plan website for the LMSWG, stakeholders, and the public to review and comment.

The LMSWG also conducted a capability assessment to review and document the planning area's current capabilities to mitigate risk from and vulnerability to hazards. By collecting information about existing government programs, policies, regulations, ordinances, and emergency plans, the LMSWG could assess those activities and measures already in place that contribute to mitigating some of the risks and vulnerabilities identified. A more detailed description of the risk assessment process and the results are included in Section 4 Risk Assessment.

2.3.3 PHASE III – MITIGATION STRATEGY

Planning Steps 6 and 7: Set Goals and Review Possible Activities

WSP facilitated a discussion with the LMSWG to review and revise the planning goals and objectives and consider a comprehensive range of mitigation alternatives. The LMSWG also discussed a method of selecting and defending recommended mitigation actions using a series of selection criteria. This information is included in Section 6 Mitigation Strategy.

Planning Step 8: Draft an Action Plan

A complete first draft of the plan was prepared based on input from the LMSWG regarding the draft risk assessment and the goals and activities identified in Planning Steps 6 and 7. This draft was shared for LMSWG, stakeholder, and public review and comment via the plan website. LMSWG, public, and stakeholder comments were integrated into the final draft for FDEM and FEMA Region 4 to review and approve, contingent upon final adoption by all participating jurisdictions.

2.3.4 PHASE IV – PLAN MAINTENANCE

Planning Step 9: Adopt the Plan

To secure buy-in and officially implement the plan, the plan will be reviewed and adopted by all participating jurisdictions. Resolutions will be provided in Section 9.

Planning Step 10: Implement, Evaluate and Revise the Plan

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. Up to this point in the planning process, the LMSWG's efforts have been directed at researching data, coordinating input from participating entities, and developing mitigation actions. Section 8 Plan Maintenance provides an overview of the strategy for plan implementation and maintenance, outlines the method and schedule for monitoring, updating, and evaluating the plan, and discusses plan integration and how to continue public involvement.

2.4 LOCAL MITIGATION STRATEGY WORKING GROUP

As with the previous plan, this LMS was developed under the guidance of a the LMSWG whose representatives included County and City departments, federal and state agencies, citizens, and other stakeholders. The LMSWG included 39 staff members and 43 outside stakeholders.

Table 2.3 lists the membership of the LMSWG, the agencies and jurisdictions they represented, and members' attendance at meetings. Many of these representatives were involved in the development of the 2020 LMS and have since participated in regular plan reviews and maintenance. Additional staff from each jurisdiction were invited to participate, as needed, to ensure representation from each community. An effort was also made to involve additional stakeholders who could represent or coordinate with underserved communities and vulnerable populations.

Table 2.3 – LMSWG Members

Jurisdiction	Representative	Agency	Position/Title or *Stakeholder	LMSWG Meeting Attendance			
				Mtg.1	Mtg.2	Mtg.3	Mtg.4
Islamorada	Alyssa Panzer	Planning & Zoning Dept.	Sustainability and Resiliency Coordinator		✓	✓	✓
Islamorada	Andrew Engelmeyer	Public Works Dept.	Director		✓		
Islamorada	Peter Frezza	Village Manager's Office	Environmental Resources Manager				
Islamorada	Terry Abel	Fire Dept.	Fire Chief	✓		✓	
Islamorada	Megan Rumbaugh	Building Dept.	Senior Floodplain / CRS Coordinator				✓
Islamorada	Rob Mather	Planning & Zoning Dept.	Planning Review Engineer				✓
Key Colony Beach	Tony Loreno	KCB Building Dept.	Building Official			✓	
Key Colony Beach	Kris DiGiovanni	KCB Police	Police Chief				
Key Colony Beach	Tom Harding	KCB City Commission	Secretary/Treasurer	✓	✓	✓	✓
Key Colony Beach	Freddie Foster	KCB City Commission	Mayor				
Key West	Alison Higgins	Planning Department	Resiliency Manager	✓	✓	✓	✓
Key West	Carolyn Sheldon	City Manager's Office	Senior Grants Administrator				
Key West	Elizabeth Ignoffo	Utilities Department	Contract & Permit Engineer				
Key West	John Parce	N/A	Citizen/Stakeholder*				
Key West	Martha Arencibia	City Manager's Office	Executive Administrator				
Key West	Raj Ramsingh	Building Dept.	Chief Building Official				
Key West	Steve Gardner	Utilities Dept.	Senior Project Manager				
Key West	Steve McAlearney	Port and Marine Services	Director				
Key West	Zoe Porter	Building Dept.	Development Review Manager	✓			✓
Key West	Matt Willman	Utilities Dept.	Director				✓
Layton	Mimi Young	Layton	City Clerk, Assistant to Building Official, PIO, Assistant to EM	✓		✓	✓
Layton	Shellie Cavalliere	Code Enforcement	Code Enforcement Officer	✓		✓	✓
Marathon	Maria Covelli	Grants	Grants Coordinator		✓		✓
Marathon	George Garrett	Administration	City Manager				
Marathon	John Johnson	N/A	Retired Fire Chief*	✓			
Marathon	Brian Shea	Planning Dept.	Director		✓		✓
Monroe County	Cory Schwisow	Emergency Management	Deputy Director/Interim Director	✓	✓	✓	✓

Jurisdiction	Representative	Agency	Position/Title or *Stakeholder	LMSWG Meeting Attendance			
				Mtg.1	Mtg.2	Mtg.3	Mtg.4
Monroe County	Kristen Livengood	Public Information Office	Public Information Officer		✓		✓
Monroe County	Adam Ferguson	Project Management	Sr. Coordinator Grants and Grants Finance				
Monroe County	Sheryl Graham	Social Services	Senior Director				
Monroe County	Susan Grant	Building Dept	Plans Examiner				
Monroe County	Christine Hurley	County Administrator's Office	County Administrator				
Monroe County	Kevin Wilson	County Administrator's Office	Assistant County Administrator			✓	
Monroe County	Mike Lalbachan	Sustainability	Administrator – Mitigation	✓		✓	✓
Monroe County	Lori Lehr	Community Rating System (CRS)	CRS Consultant	✓		✓	
Monroe County	Elizabeth Lustberg	Planning and Environmental Resources	Senior Planner	✓	✓	✓	✓
Monroe County	Julie Cheon	Planning and Environmental Resources	Special Projects Administrator – Environmental Resources	✓			
Monroe County	Emily Schemper	Growth Management	Director			✓	
Monroe County	Lisa Tennyson	Legislative Affairs	Director				
Monroe County	Judith Clarke	Engineering & Roads	Director				
Monroe County	Laura White	Sheriff's Office	Emergency Communications Division				
N/A	Kelcee Degraffenreid	FKAA	Budget and Special Projects Administrator*	✓	✓	✓	✓
N/A	Karla Garcia	FKAA	Stakeholder*	✓			
N/A	Christie Martin	FKAA	Stakeholder*			✓	✓
N/A	David Hackworth	FKAA	Stakeholder*				
N/A	Greg Veliz	FKAA	Stakeholder*				
N/A	Pam Albury	FKAA	Stakeholder*				
N/A	Lauren Wells	FKAA	Stakeholder*			✓	✓
N/A	Dan Sabino	Keys Energy	AGM and Director of Engineering & Control*	✓	✓	✓	✓
N/A	Brittani Harden	Keys Energy	Stakeholder*	✓			
N/A	Irina Baker	Keys Energy	Stakeholder*				
N/A	Scott Newberry	FKEC	CEO*				
N/A	Ray Rhash	FKEC	Stakeholder*				

Jurisdiction	Representative	Agency	Position/Title or *Stakeholder	LMSWG Meeting Attendance			
				Mtg.1	Mtg.2	Mtg.3	Mtg.4
N/A	Beren Lindenberg	College of the Florida Keys	Senior Director, Sponsored Programs*				✓
N/A	Greg Oflynn	College of the Florida Keys	Stakeholder*				
N/A	Angie Speir	FDEM	Stakeholder*				
N/A	Claudia Baker	FDEM	Stakeholder*				
N/A	Kristin Lentz	FDEM	Stakeholder*				
N/A	Armand Messina	Florida Keys Contractors Assoc.	Stakeholder*				
N/A	Carla Fry	DOH	Stakeholder*	✓	✓	✓	
N/A	Cali Roberts	Woman Kind	Stakeholder*				
N/A	Sheryl Schwab	FLDAS - Domestic Abuse Shelter	Stakeholder*		✓		
N/A	Meghan Bosi	Keys Health Ready Coalition	Stakeholder*	✓		✓	✓
N/A	Danielle Griffin	N/A	Stakeholder*				
N/A	Carolyn Hord	N/A	Stakeholder*				
N/A	Tony Hammon	Bell South	Stakeholder*				
N/A	Heather Carruthers	K2M Design	Stakeholder*	✓	✓	✓	
N/A	Janet Catani	Baptist Health, Mariners	Stakeholder*				
N/A	Susan Magner	Baptist Health	Stakeholder*				
N/A	Jeff Barrow	Keys Schools	Stakeholder*				
N/A	Lesley Thompson	Keys Schools	Stakeholder*				
N/A	Pat Lefere	Keys Schools, SafeSchools	Stakeholder*				
N/A	Jeff Manning	NAS Key West - EM	Stakeholder*				
N/A	Jon Rizzo	NWS	Stakeholder*				
N/A	Julie Dennis	Ovid Solutions	Stakeholder*				
N/A	Shawna Martin	Ovid Solutions	Stakeholder*			✓	✓
N/A	Taryn Parazo-Morrow	Ovid Solutions	Stakeholder*				
N/A	Lauren Thompson	Comcast	Stakeholder*				
N/A	Maghan Barber	N/A	Stakeholder*				
N/A	Norman Wartman	N/A	Stakeholder*				
N/A	Randi Cohen Brown	Southernmost Homeless Assistance League	Stakeholder*				
N/A	Reinol Hernandez	N/A	Stakeholder*				

*Asterisk indicates that the representative is a citizen or outside stakeholder not affiliated with the local government

The formal LMSWG meetings followed the 10 CRS Planning Steps. Agendas, minutes, and sign-in sheets for the LMSWG meetings are included in Appendix B. The meeting dates and topics discussed are summarized in Section 2.5 Meetings and Workshops. All LMSWG meetings were open to the public.

The DMA planning regulations and guidance stress that each local government seeking FEMA approval of their mitigation plan must participate in the planning effort in the following ways:

- Participate in the process as part of the LMSWG;
- Detail where within the planning area the risk differs from that facing the entire area;
- Identify potential mitigation actions; and
- Formally adopt the plan.

For the Monroe County LMSWG, "participation" meant the following:

- Providing facilities for meetings;
- Attending and participating in the LMSWG meetings;
- Collecting and providing requested data (as available);
- Providing an update on previously adopted mitigation actions;
- Managing administrative details;
- Making decisions on plan process and content;
- Identifying mitigation actions for the plan;
- Reviewing and providing comments on plan drafts;
- Informing the public, local officials, and other interested parties about the planning process and providing opportunity for them to comment on the plan;
- Coordinating and participating in the public input process; and
- Coordinating the formal adoption of the plan by local governing bodies.

Detailed summaries of LMSWG meetings are provided under Section 2.5 Meetings and Workshops, including meeting dates, locations, and topics discussed. During the planning process, the LMSWG members communicated through face-to-face meetings, email, and phone conversations. This continued communication ensured that coordination was ongoing throughout the entire planning process even though not all LMSWG members could be present at every meeting. Additionally, draft documents were distributed via the plan website so that the LMSWG members could easily access and review them and provide comments.

2.5 MEETINGS AND WORKSHOPS

The preparation of this plan required a series of meetings and workshops for facilitating discussion, gaining consensus, and initiating data collection efforts with local government staff, community officials, and other identified stakeholders. More importantly, the meetings and workshops prompted continuous input and feedback from relevant participants throughout the drafting stages of the plan.

Table 2.4 summarizes the key meetings and workshops held by the LMSWG during the development of the plan. In many cases, routine discussions and additional meetings were held by local staff to accomplish planning tasks specific to their department or agency such as reporting on changes to local capabilities, updating the status of mitigation actions, and identifying new actions. This includes data collection meetings held between the planning team and the participating jurisdictions. These meetings were informal and are not documented here.

Public meetings are summarized in subsection 2.6.

Table 2.4 – Summary of LMSWG Meetings

Meeting Title	Meeting Topic	Meeting Date	Meeting Location
LMSWG Mtg. #1 – Project Kick-Off	1) Introduction to DMA and CRS requirements and the planning process 2) Review of LMSWG responsibilities and the project schedule	January 30, 2025	Microsoft Teams
LMSWG Mtg. #2	1) Review the draft Hazard Identification & Risk Assessment 2) Discuss updates to local capabilities 3) Review problem statements and mitigation action ideas	March 26, 2025	Monroe County Emergency Operations Center & Microsoft Teams
LMSWG Mtg. #3	1) Review draft goals and objectives 2) Review mitigation alternatives and draft mitigation strategies	June 5, 2025	Microsoft Teams
LMSWG Mtg. #4	1) Review the draft Local Mitigation Plan 2) Solicit comments and feedback	July 1, 2025	Microsoft Teams

2.6 INVOLVING THE PUBLIC

An important component of any mitigation planning process is public participation. Individual citizen and community-based input provides the entire planning team with a greater understanding of local concerns and increases the likelihood of successfully implementing mitigation actions by developing community "buy-in" from those directly affected by the decisions of public officials. As citizens become more involved in decisions that affect their safety, they are more likely to gain a greater appreciation of the hazards present in their community and take the steps necessary to reduce their impact. Public awareness is a key component of any community's overall mitigation strategy aimed at making a home, neighborhood, school, business, or entire planning area safer from the potential effects of hazards.

Public involvement in the development of the plan was sought using various methods including open public meetings, an interactive plan website, a public participation survey, and by making copies of draft plan documents available for public review online and at government offices. Additionally, all LMSWG meetings were made open to the public.

All public meetings were advertised on the plan website, which was shared on local community websites. Where possible, advertisements were also posted on community websites and social media. Copies of meeting announcements are provided in Appendix B. The public meetings held during the planning process are summarized in Table 2.5.

Table 2.5 – Summary of Public Meetings

Meeting Title	Meeting Topic	Meeting Date	Meeting Location
Public Meeting #1	1) Introduction to the planning process and project schedule 2) Explanation of mitigation 3) Review of hazard identification	March 15, 2025 5pm	Microsoft Teams
Public Meeting #2	1) Review draft Hazard Mitigation Plan 2) Solicit comments and feedback	July 1, 2025 5pm	Microsoft Teams

2.7 OUTREACH EFFORTS

The LMSWG agreed to employ a variety of public outreach methods including established public information mechanisms and resources, such as press releases, creation of a website for the plan, a public survey, and the collection of public and stakeholder comments on the draft plan. Table 2.6 details public outreach efforts employed during the preparation of this plan.

Table 2.6 – Public Outreach Efforts

Location	Date	Event/Message
Plan website	Ongoing	Project specific website created to host meeting announcements, meeting materials; planning process schedule, and contact information to request additional information and/or provide comments
Community websites	March 2025	Announcement about plan update on local government websites including a link to the public survey and a link to direct users to the plan website
Community social media	March 2025	To reach community social media audiences, plan website and survey announcements posted with information about the planning process
Community websites and social media	March 2025, June 2025	Public meeting announcements posted with information about the planning process and requests for feedback
Local newspaper	March 2025	Information on the plan update shared, including links to the plan website and public survey
Public survey	February-May 2025	Survey hosted online and made available via shareable link
Draft HIRA	April 2025	Draft hazard identification and risk assessment section of the plan made available for review and comment online
Draft Capability Assessment	May 2025	Draft capability assessment section of the plan made available for review and comment online
Draft Plan	June 2025	Full draft plan made available for review and comment online

A public survey was made available on the plan website and remained open for response until February to April 2025. The public survey requested public input into the planning process, risk perception, past hazard events, and the identification of mitigation activities to lessen the risk and impact of future hazard events. The survey is shown in Appendix B. The survey was publicized online and made available on the plan website. In total, 126 survey responses were received. The following is a list of high-level summary results and analysis derived from survey responses:

- Most responses came from residents of Unincorporated Monroe County, followed by Islamorada and Key West.
- 86% of respondents have experienced a hazard event in the County in the past. Over two thirds of these experiences were related to hurricane and the remaining responses noted flooding events. Around 34% of respondents specifically mentioned Hurricane Irma.
- There is significant concern among respondents about future hazard impacts. On average, respondents rated their concern at 4.4 out of 5.
- Flood, Tropical Cyclone, and Sea Level Rise were rated the highest risk hazards. Wildfire, Drought, and Radiological Incident were rated the lowest risk hazards.
- About 73% of respondents have taken actions to protect their home and neighborhood from hazards. Some respondents reported property protection measures such as elevating their home, altering

drainage patterns on their property, installing hurricane roof brackets for wind protection, or applying for acquisition. Others reported preparedness actions such as raising furniture and valuables, having a backup generator, trimming trees, and keeping drainage ditches cleaned out.

- Respondents favored prevention, emergency services, and property protection projects for mitigation. Specific recommendations included, limiting development and impervious surface, drainage maintenance, drainage improvements, and natural resource and mangrove protection.

Detailed survey results are provided in Appendix B.

2.8 INVOLVING THE STAKEHOLDERS

In addition to representatives of each participating jurisdiction, the LMSWG included a variety of stakeholders. Stakeholders on the LMSWG included residents and business owners as well as representatives from Florida Keys Aqueduct Authority (FKAA), Florida Keys Electrical Cooperative Association (FKEC), and KEYS Energy Services, all of which are participating agencies in the plan, as well as other local and regional agencies and Florida Department of Emergency Management (FDEM). Input from additional stakeholders, including neighboring communities, non-profits, and other state and federal agencies, was solicited through invitations to the open public meetings and distribution of the public survey. However, if any additional stakeholders representing other agencies and organizations participated through the public survey, that information is unknown due to the anonymous nature of the survey.

2.9 DOCUMENTATION OF PLAN PROGRESS

Progress on the mitigation strategy developed in the previous plan is documented in this plan update. Table 2.7 below details the status of mitigation actions from the previous plan. More detail on actions being carried forward is provided in Section 7 Mitigation Action Plans.

Table 2.7 – Status of Previous Mitigation Actions

Jurisdiction	Completed	Deleted	Carried Forward
Monroe County	16	13	11
City of Key Colony Beach	2	-	5
City of Key West	12	-	78
City of Layton	1	-	4
City of Marathon	1	-	6
Islamorada Village of Islands	1	-	6
FKAA	11	1	1
FKEC	3	2	1
KEYS Energy Services	4	-	1
College of the Florida Keys	-	-	-
Total	**51**	**16**	**113**

Note: Some projects are multi-jurisdictional and may be counted more than once.

It should be noted that although some communities have few or no completed actions removed from their mitigation action plans, this does not convey that mitigation has not been completed. Many actions that have been carried forward into this plan update reflect ongoing implementation and progress achieved. Details on completed and deleted actions are provided in Section 6: Mitigation Strategy. See Section 7: Mitigation Action Plans for status updates on carried forward mitigation actions.

Community capability continues to improve with the implementation of new plans, policies, and programs that help to promote hazard mitigation at the local level. The current state of local capabilities for the participating jurisdictions is captured in Section 5: Capability Assessment. The participating jurisdictions continue to demonstrate their commitment to hazard mitigation and have proven this by meeting quarterly to implement and maintain the LMS, reconvening the LMSWG to update this multi-jurisdictional plan, and continuing to involve the public in the hazard mitigation planning process.

Moving forward, information in this plan will be used to help guide and coordinate mitigation activities and decisions for local plans and policies in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to communities and their residents by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruptions. This plan identifies activities that can be undertaken by both the public and the private sectors to reduce safety hazards, health hazards, and property damage.

— Respondents favored prevention, emergency services, and property protection projects for mitigation. Specific recommendations included, limiting development and impervious surface, drainage maintenance, drainage improvements, and natural resource and mangrove protection.

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3 PLANNING AREA PROFILE

This section provides a general overview of the current conditions in Monroe County and its participating municipalities. It consists of the following sub-sections:

3.1 Geography and Environment
3.2 Population and Demographics
3.3 Historic Properties
3.4 Housing
3.5 Infrastructure
3.6 Current and Future Land Use
3.7 Employment and Industry

3.1 GEOGRAPHY AND ENVIRONMENT

Monroe County is located at the southernmost tip of the State of Florida. The Florida Keys, which consist of an archipelago that sweeps southwesterly from southeastern Miami-Dade County for almost 150 miles, are located precariously between the Gulf of Mexico and the Atlantic Ocean. The area of Monroe County located on the Florida mainland is bordered by Collier County to the north and Miami-Dade County to the east. A location map is provided in Figure 3.1. The entire mainland portion of Monroe County is within Everglades National Park or Big Cypress National Preserves, with only 14 total residential buildings. The Florida Keys are characterized by long, narrow, and low-lying islands that average four to seven feet above mean sea level. The Florida Keys archipelago includes 74 named islands identified by the County's parcel data and detailed in Figure 3.2.

The planning area comprises a total land area of approximately 982.2 square miles of land area. Large areas of submerged lands associated with parks and preserves also fall within Monroe County, bringing the County's total area to approximately 3,738 square miles.

The total land area of each participating jurisdiction is listed in Table 3.1.

Table 3.1 – Total Land Area of Participating Jurisdictions

Jurisdiction	Total Area (sq. mi.)
Monroe County	**982.20**
City of Key Colony Beach	0.44
City of Key West	5.60
City of Layton	0.16
City of Marathon	8.45
Islamorada Village of Islands	6.45

Source: US Census Bureau, www.data.census.gov

Figure 3.1 – Monroe County Location Map

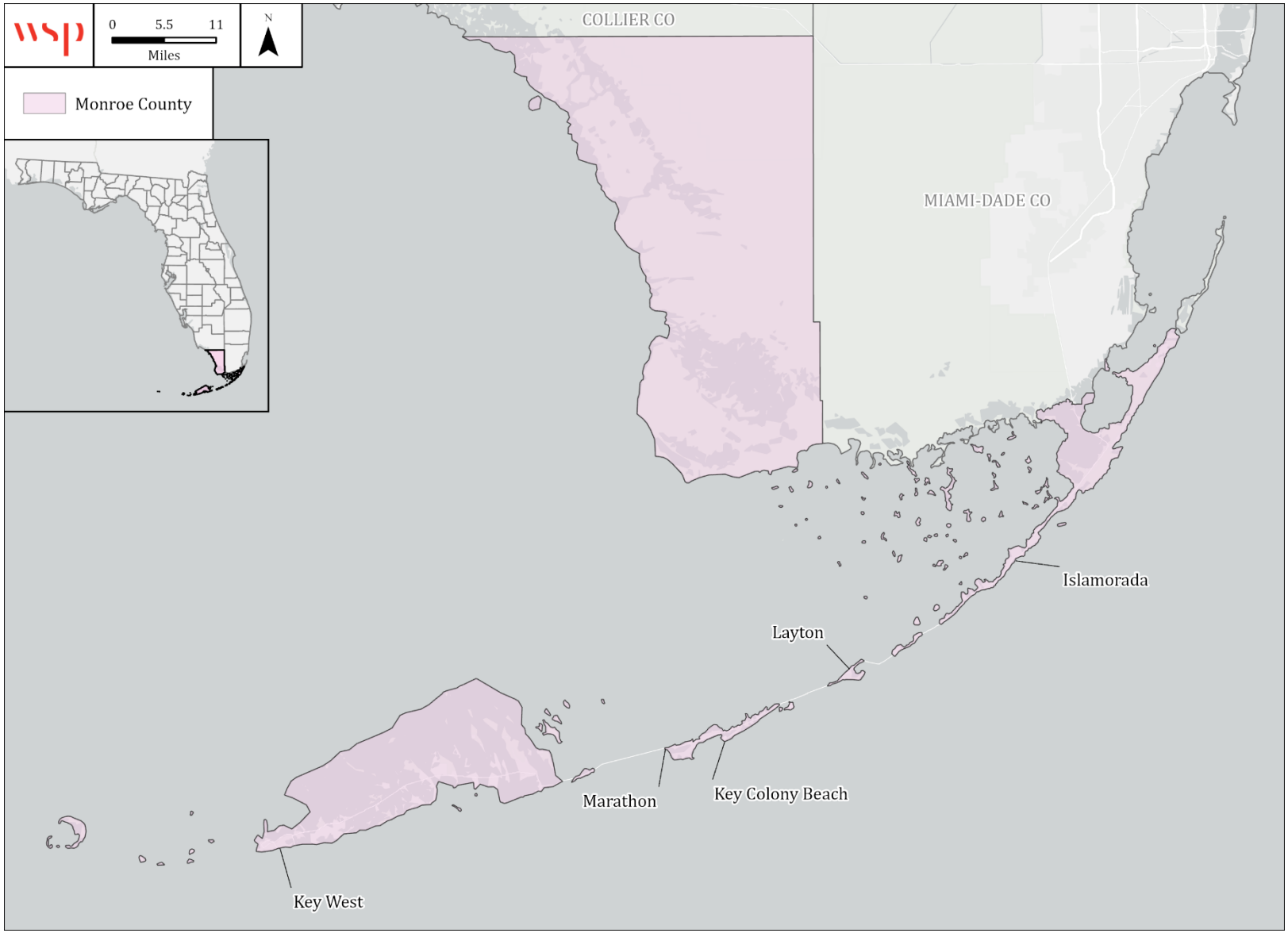
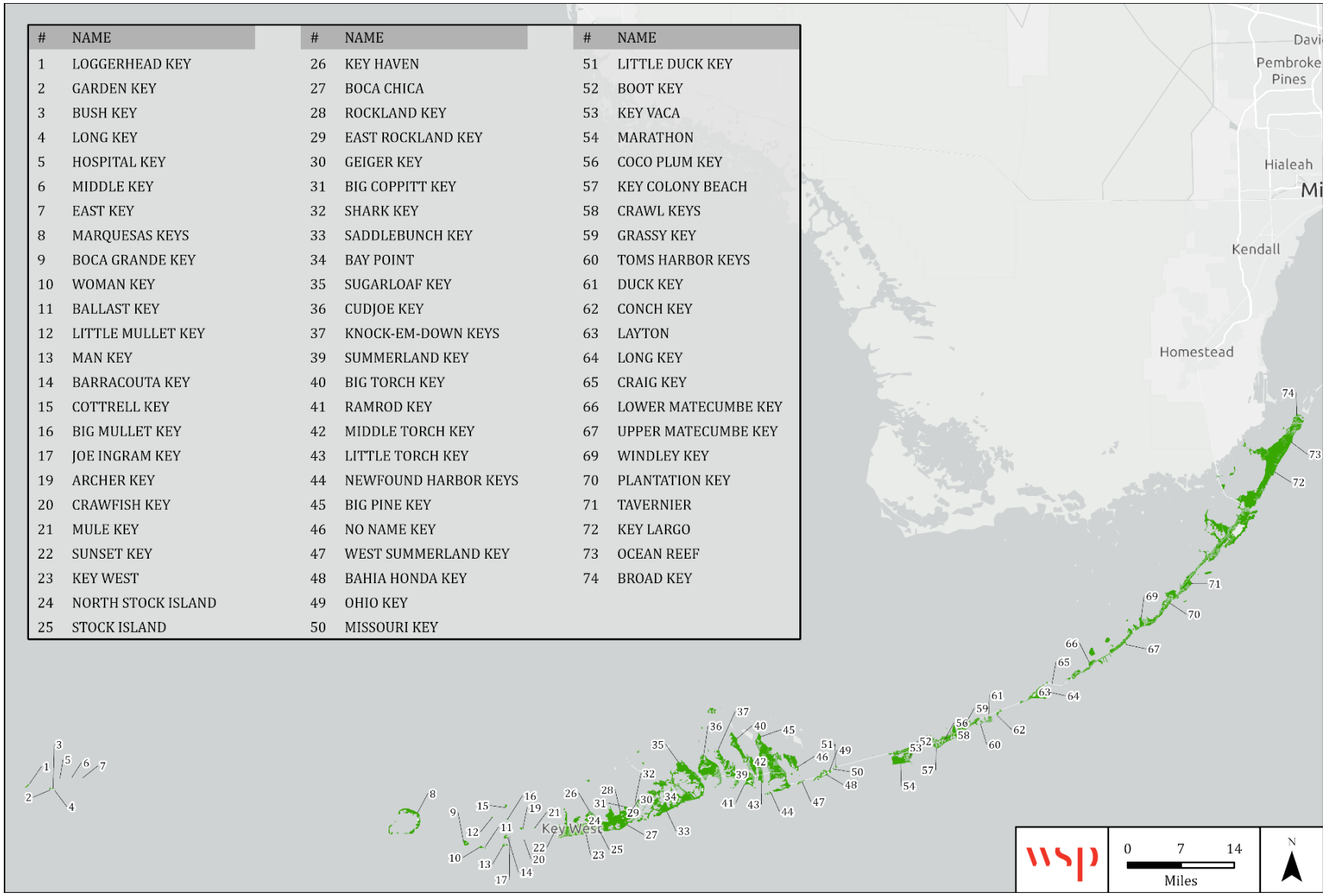


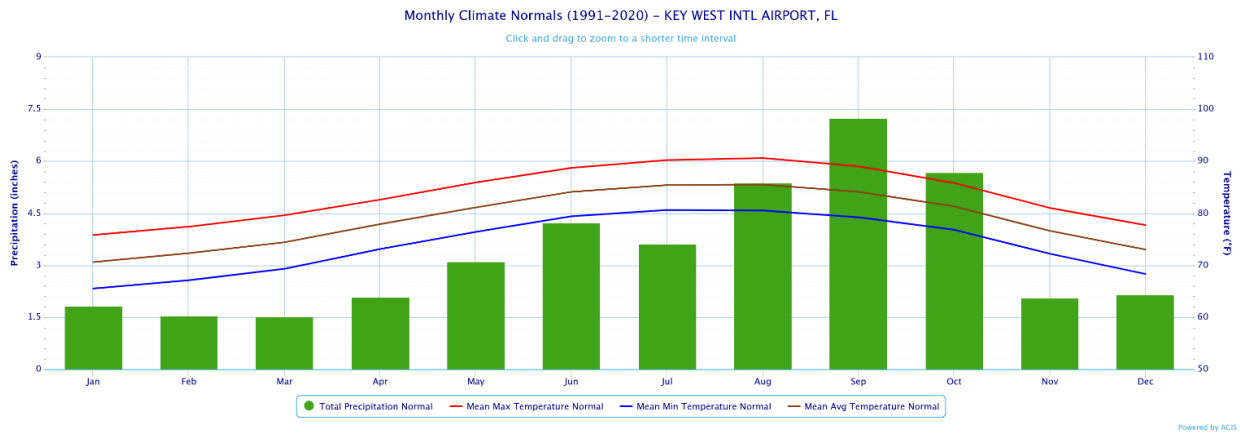
Figure 3.2 – Florida Keys Overview

#	NAME	#	NAME	#	NAME
1	LOGGERHEAD KEY	26	KEY HAVEN	51	LITTLE DUCK KEY
2	GARDEN KEY	27	BOCA CHICA	52	BOOT KEY
3	BUSH KEY	28	ROCKLAND KEY	53	KEY VACA
4	LONG KEY	29	EAST ROCKLAND KEY	54	MARATHON
5	HOSPITAL KEY	30	GEIGER KEY	56	COCO PLUM KEY
6	MIDDLE KEY	31	BIG COPPITT KEY	57	KEY COLONY BEACH
7	EAST KEY	32	SHARK KEY	58	CRAWL KEYS
8	MARQUESAS KEYS	33	SADDLEBUNCH KEY	59	GRASSY KEY
9	BOCA GRANDE KEY	34	BAY POINT	60	TOMS HARBOR KEYS
10	WOMAN KEY	35	SUGARLOAF KEY	61	DUCK KEY
11	BALLAST KEY	36	CUDJOE KEY	62	CONCH KEY
12	LITTLE MULLET KEY	37	KNOCK-EM-DOWN KEYS	63	LAYTON
13	MAN KEY	39	SUMMERLAND KEY	64	LONG KEY
14	BARRACOUTA KEY	40	BIG TORCH KEY	65	CRAIG KEY
15	COTTRELL KEY	41	RAMROD KEY	66	LOWER MATECUMBE KEY
16	BIG MULLET KEY	42	MIDDLE TORCH KEY	67	UPPER MATECUMBE KEY
17	JOE INGRAM KEY	43	LITTLE TORCH KEY	69	WINDLEY KEY
19	ARCHER KEY	44	NEWFOUND HARBOR KEYS	70	PLANTATION KEY
20	CRAWFISH KEY	45	BIG PINE KEY	71	TAVERNIER
21	MULE KEY	46	NO NAME KEY	72	KEY LARGO
22	SUNSET KEY	47	WEST SUMMERLAND KEY	73	OCEAN REEF
23	KEY WEST	48	BAHIA HONDA KEY	74	BROAD KEY
24	NORTH STOCK ISLAND	49	OHIO KEY		
25	STOCK ISLAND	50	MISSOURI KEY		



According to the Köppen climate classification system, Monroe County has a tropical savannah climate, characterized by consistent high temperatures (at or near sea level) with a pronounced dry season in the winter. The region experiences an average annual high temperature of 83.7°F and an average annual low of 74.0°F. Average annual precipitation is approximately 40.44 inches. Figure 3.3 shows the average monthly precipitation for the Key West weather station, which approximates temperature and precipitation of the County.

Figure 3.3 – Average Monthly Temperature and Precipitation



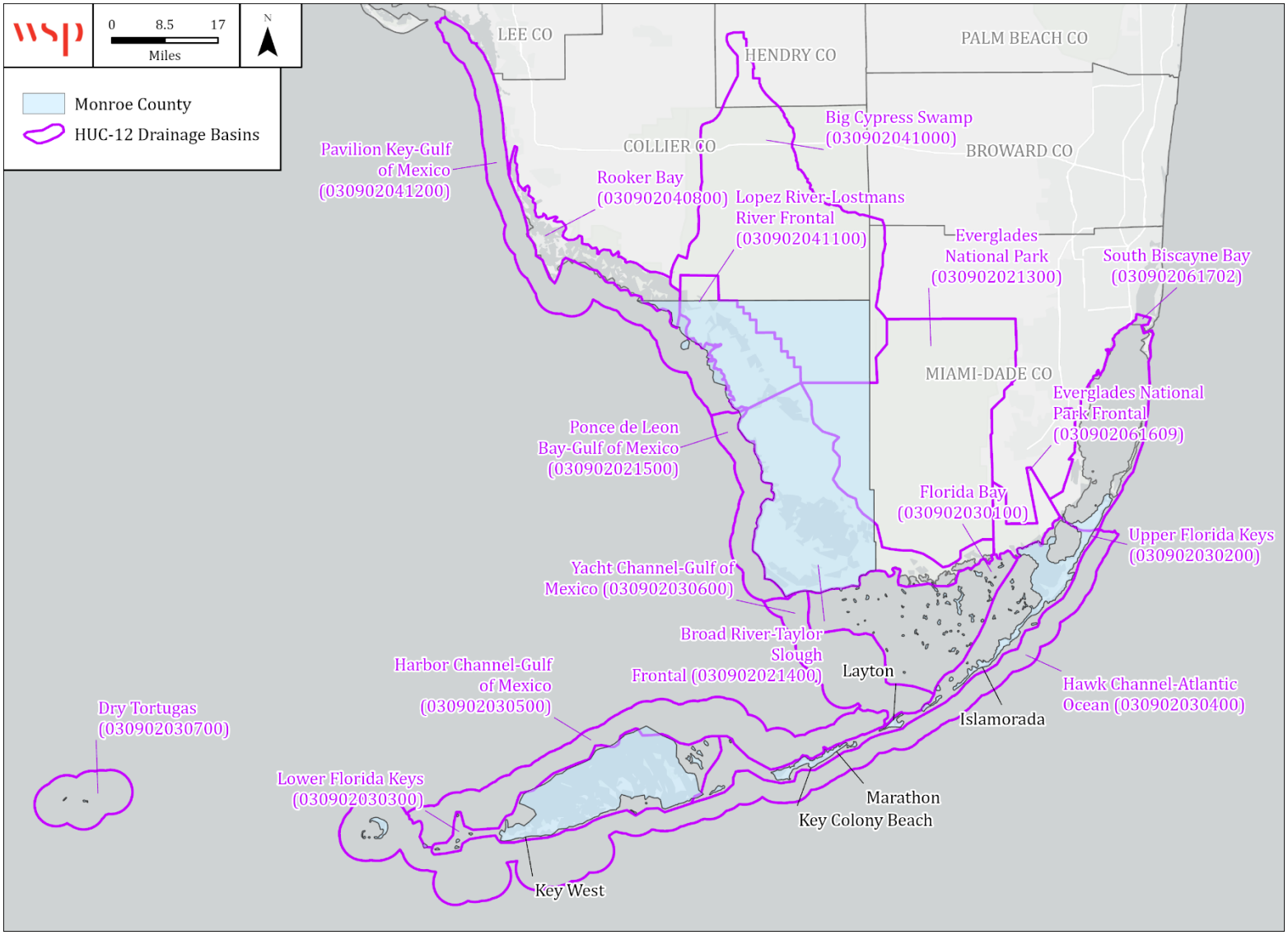
Source: Northeast RCC CLIMOD 2.

As shown in the map of HUC-12 watersheds in Figure 3.4, Monroe County is split between 16 HUC-12 watersheds. Table 3.2 below lists these watersheds with the total area of the County that is included within each.

Table 3.2 – HUC 12 Basins and Area

HUC 12 Basin	Name	Acreage
030902021300	Everglades National Park	566,465.95
030902021400	Broad River-Taylor Slough Frontal	338,535.20
030902021500	Ponce de Leon Bay – Gulf of Mexico	82,301.87
030902030100	Florida Bay	235,639.15
030902030200	Upper Florida Keys	207,344.02
030902030300	Lower Florida Keys	231,929.13
030902030600	Yacht Channel – Gulf of Mexico	132,165.41
030902030500	Harbor Channel – Gulf of Mexico	249,625.30
030902030400	Hawk Channel – Atlantic Ocean	429,202.93
030902030700	Dry Tortugas	70,616.36
030902040800	Rooker Bay	93,816.60
030902041100	Lopez River – Lostmans River Frontal	133,566.81
030902041000	Big Cypress Swamp	612,437.14
030902041200	Pavilion Key – Gulf of Mexico	229,860.45
030902061609	Everglades National Park Frontal	44,437.67
030902061702	South Biscayne Bay	774.59

Figure 3.4 – HUC-12 Drainage Basins



Source: USDA Natural Resources Conservation Service

WETLANDS

According to data from the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are approximately 856,455 acres of wetlands in the region. Wetland areas are shown in Figure 3.5. Acreage by wetland type is summarized in Table 3.3.

Table 3.3 – Acreage by Wetland Type

Wetlands Type	Acreage
Estuarine and Marine Deepwater	217,198
Estuarine and Marine Wetland	446,675
Freshwater Emergent Wetland	111,943
Freshwater Forested/Shrub Wetland	80,321
Freshwater Pond	214
Lake	99
Riverine	6
Total	**856,455**

Source: USFWS National Wetlands Inventory

Natural and Beneficial Wetland Functions: The benefits of wetlands are hard to overestimate. They provide critical habitat for many plant and animal species that could not survive in other habitats. They are also critical for water management as they absorb and store vast quantities of storm water, helping reduce floods and recharge aquifers. Not only do wetlands store water like sponges, they also filter and clean water as well, absorbing toxins and other pollutants.

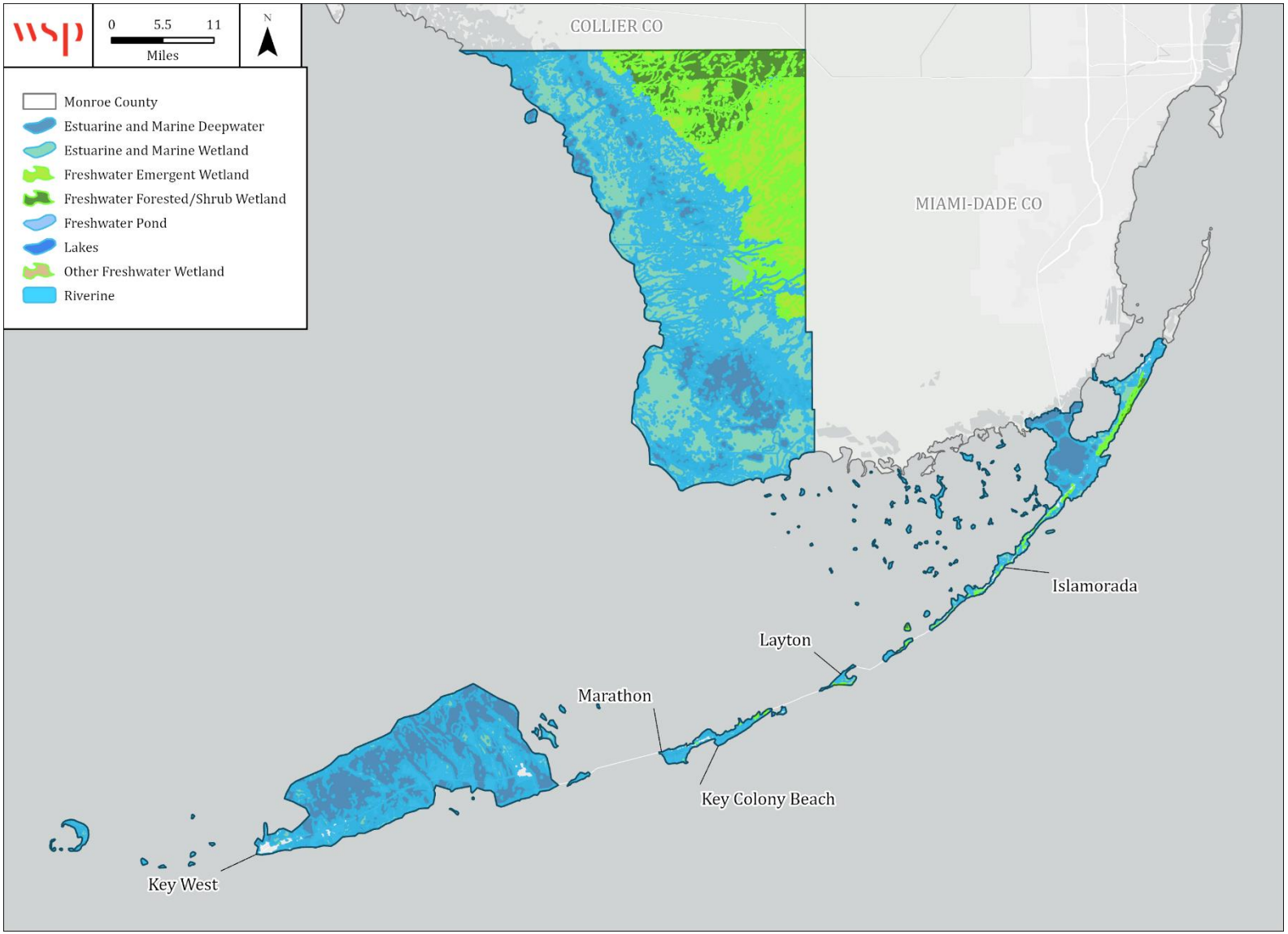
PARKS, PRESERVE, AND CONSERVATION

Monroe County is home to many parks, preserves, beaches, and other natural areas. Mainland Monroe County is home to the western portion of Everglades National Park. There are also 11 state parks:

- Curry Hammock State Park
- Fort Zachary Taylor Historic State Park
- John Pennekamp Coral Reef State Park
- Bahia Honda State Park
- Long Key State Park
- Indian Key Historic State Park
- Dagny Johnson Key Largo Hammock Botanical State Park
- Florida Keys Overseas Heritage Trail
- Windley Key Fossil Reef Geological State Park
- San Pedro Underwater Archaeological Preserve State Park
- Lignumvitae Key Botanical State Park

The Monroe County Facilities Maintenance Department maintains 23 parks and beaches, covering more than 100 acres.

Figure 3.5 – Wetland Areas by Type



Source: U.S. Fish & Wildlife Service National Wetlands Inventory

THREATENED AND ENDANGERED SPECIES

The U.S. Fish and Wildlife Service maintains a regular listing of threatened species, endangered species, species of concern, and candidate species for counties across the United States. There are 59 such species in the County. Table 3.4 below lists the species identified as threatened, endangered, or other classification for Monroe County.

Table 3.4 – Threatened and Endangered Species, Monroe County

Group	Common Name	Scientific Name	Federal Status
Birds	Piping Plover	Charadrius melodus	Threatened
Birds	Everglade snail kit	Rostrhamus sociabilis plumbeaus	Endangered
Birds	Roseate tern	Sterna dougallii dougallii	Threatened
Birds	Cape Sable seaside sparrow	Ammondramus maritimus mirabilis	Endangered
Birds	Wood stork	Mycteria Americana	Threatened
Birds	Red knot	Calidris canutus rufa	Threatened
Birds	Bachman's warbler	Vermivora bachmanii	Endangered
Birds	Crested caracara	Caracara plancus audubonii	Threatened
Birds	Eastern Black rail	Laterallus jamaicensis	Threatened
Birds	Cape Sable seaside sparrow	Ammospiza maritima mirabiliis	Endangered
Birds	Piping Plover	Charadrius melodus	Threatened
Birds	Everglade snail kit	Rostrhamus sociabilis plumbeus	Endangered
Birds	Bachman's warbler	Vermivora bachmanii	Extinction
Birds	Black-capped Petrel	Vermivora bachmanii	Endangered
Flowering Plants	Key tree cactus	Pilosocereus robinii	Endangered
Flowering Plants	Garber's spurge	Chamaesyce garberi	Threatened
Flowering Plants	Sand flax	Linum Arenicola	Endangered
Flowering Plants	Florida semaphore Cactus	Consolea corallicola	Endangered
Flowering Plants	Wedge spurge	Chamaesyce deltoidei serpyllum	Endangered
Flowering Plants	Florida pineland crabgrass	Digitaria pauciflora	Threatened
Flowering Plants	Everglades bully	Sideroxylon reclinatum ssp.	Threatened
Flowering Plants	Cape Sable Thoroughwort	Chromolaena frustrata	Endangered
Flowering Plants	Big Pine partridge pea	Chamaecrista lineata keyensis	Endangered
Flowering Plants	Blodgett's silverbush	Argythamnia blodgettii	Threatened
Flowering Plants	Beach jacquemontia	Jacquemontia reclinata	Endangered
Flowering Plants	Tiny polygala	Polygala smallii	Endangered
Flowering Plants	Carter's mustard	Warea carteri	Endangered
Flowering Plants	Amorpha crenulata	Crenulate lead-plant	Endangered
Flowering Plants	Galactia smallii	Small's milkpea	Endangered
Flowering Plants	Deltoid spurge	Chamaesyce deltoidea	Endangered
Flowering Plants	Florida brickell-bush	Brickellia mosieri	Endangered
Flowering Plants	Carter's Small-Flowered Flax	Linum carteri carteri	Endangered
Flowering Plants	Blackbract pipewort	Eriocaulon nigrobracteatum	Under review
Flowering Plants	Florida prarie-clover	Dalea carthagenesis	Endangered
Flowering Plants	Pineland sandmat	Chamaesyce deltoidea pinetorum	Threatened
Insects	Schaus swallowtail butterfly	Heraclides aristodemus ponceanus	Endangered

Group	Common Name	Scientific Name	Federal Status
Insects	Miami Blue Butterfly	Cyclargus (=Hemiargus) thomasi	Endangered
Insects	Florida leafwing Butterfly	Anaea troglodyta floridalis	Endangered
Insects	Bartram's hairstreak Butterfly	Strymon acis bartrami	Endangered
Insects	Monarch butterfly	Danaus plexippus	Proposed Threatened
Mammals	Florida bonneted bat	Eumops floridanus	Endangered
Mammals	Lower Keys marsh rabbit	Sylvilagus palustris hefneri	Endangered
Mammals	Silver rice rat	Oryzomys palustris natator	Endangered
Mammals	Puma (=mountain lion)	Puma(=Felis) concolor (all subsp. Except coryi)	Similarity of Appearance (Threatened)
Mammals	West Indian Manatee	Trichechus manatus	Threatened
Mammals	Key Largo woodrat	Neotoma floridana smalli	Endangered
Mammals	Key deer	Odocoileus virginianus clavium	Endangered
Mammals	Key Largo cotton mouse	Peromyscus gossypinus allapaticola	Endangered
Mammals	Florida panther	Puma (=Felis) concolor coryi	Endangered
Reptile	Hawksbill sea turtle	Eretmochelys imbricate	Endangered
Reptile	Eastern indigo snake	Drymarchon corais couperi	Threatened
Reptile	Gopher tortoise	Gopherus Polyphemus	Resolved Taxon
Reptile	Leatherback sea turtle	Dermochelys coriacea	Endangered
Reptile	Loggerhead sea turtle	Caretta caretta	Threatened
Reptile	American crocodile	Crocodylus acutus	Threatened
Reptile	American alligator	Alligator mississippiensis	Similarity of Appearance (Threatened)
Reptile	Green sea turtle	Chelonia mydas	Threatened
Reptile	Florida Keys mole skink	Plestiodon egregius egregius	Proposed Threatened
Snails	Stock Island tree snail	Orthalicus reses (not incl. nesodryas)	Threatened

Source: U.S. Fish & Wildlife Service (https://www.fws.gov/endangered/)

3.2 POPULATION AND DEMOGRAPHICS

Monroe County has experienced moderate population growth since 2010, approximately 14.6 percent, according to data from the U.S. Census Bureau's Decennial Census. However, the County's population had declined by just over 8 percent in the decade prior (2000-2010). Table 3.5 provides population counts from 2000, 2010, and 2020 for each of the participating jurisdictions. Table 3.6 provides population projections for Monroe County for 2020-2045. Figure 3.6 shows 2023 population density by census tract in persons per square mile.

Table 3.5 – Monroe County Population Counts

Jurisdiction	2000 Census Population	2010 Census Population	2020 Census Population	Total Change 2010-2020	% Change 2010-2020
City of Key Colony Beach	788	797	790	-7	**-0.9%**
City of Key West	25,478	24,649	26,444	1,795	**7.3%**
City of Layton	186	184	210	26	**14.1%**
City of Marathon	10,255	8,297	9,689	1,392	**16.8%**
Islamorada Village of Islands	6,846	6,119	7,107	988	**16.1%**
Unincorporated Monroe County	36,036	33,044	38,634	5,590	**16.9%**
County Total	79,589	73,090	82,874	9,784	**13.4%**
State of Florida	*15,982,378*	*18,801,310*	*21,538,187*	*2,736,877*	***14.6%***

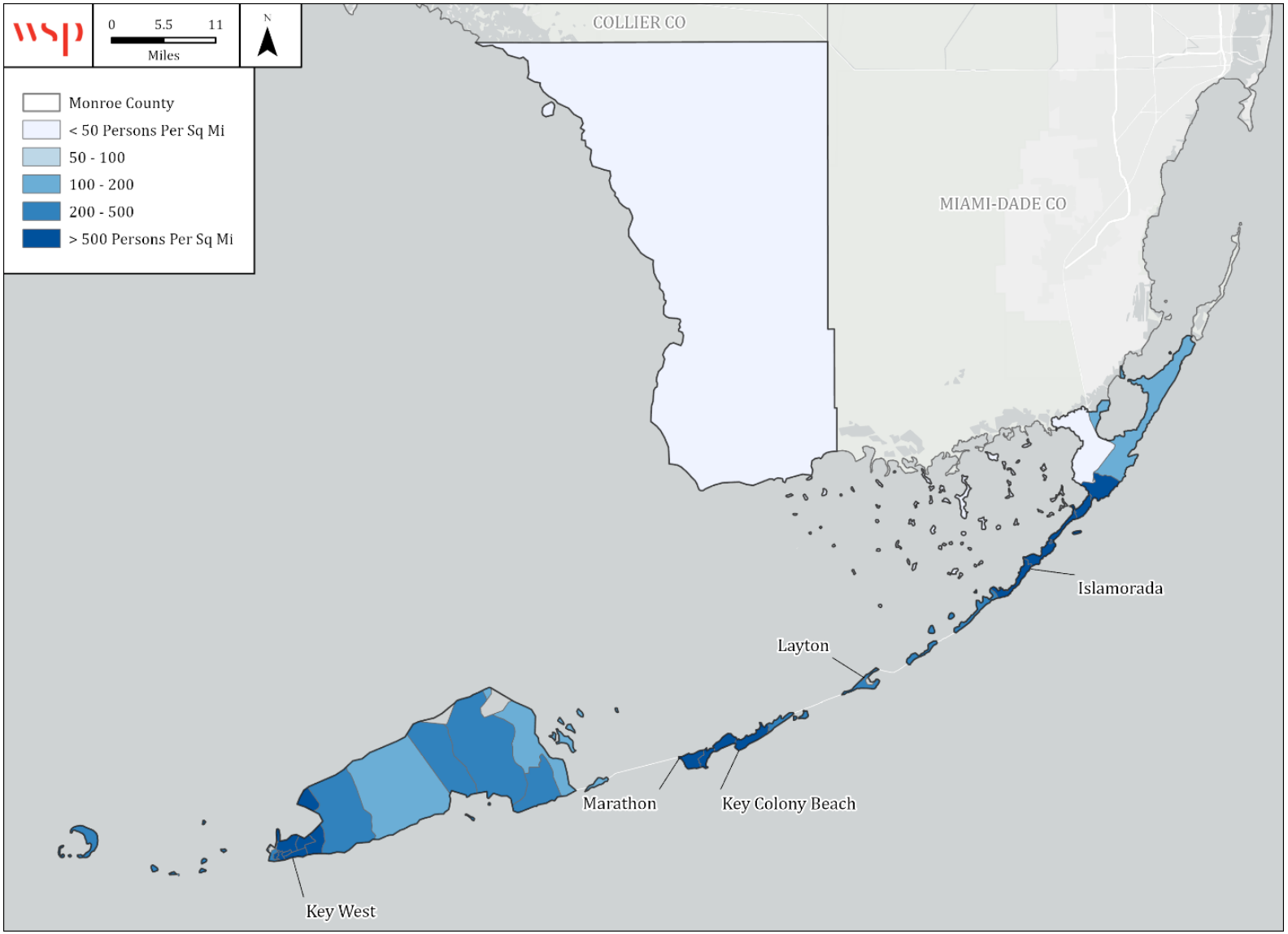
Source: US Census Bureau Decennial Census 2000, Decennial Census 2010; Decennial Census 2020
*Because of Layton's small size, population estimates are likely to underreport total population; the population of the City was also reported to be 186 in 2020 by the Bureau of Economic and Business Research at the University of Florida.

Table 3.6 – Monroe County Population Projections

	2022 Population Estimate	Projections					
		2025	2030	2035	2040	2045	2050
Monroe County	**83,961**						
Low		80,300	78,400	75,900	73,200	70,400	67,800
Medium		85,400	87,100	88,000	88,400	88,600	88,700
High		90,500	95,800	100,100	103,600	106,800	109,500

Source: Bureau of Economic and Business Research (University of Florida), *Projections of Florida Population by County, by 2025-2050, with estimates for 2022*

Figure 3.6 – Population Density, 2023



Source: U.S. Census Bureau, American Community Survey 2019-2023 5-Year Estimates

Table 3.7 details demographic and social characteristics of each of the participating counties compared to the State of Florida overall according to the 2020 Decennial Census. Per this data, the Monroe County population is older than the state average. The County has a greater proportion of individuals with high school diplomas and Bachelor's degrees and a lower proportion of individuals with disabilities and who speak English less than very well as compared to the state.

Table 3.7 – Monroe County Demographic Summary, 2023

Demographic & Social Characteristics	Monroe County	Florida
Median Age	49.7	43.0
% of Population Under 5 years old	3.7%	4.8%
% of population Over 65 years old	23.4%	22.6%
% of Population Over 25 with high school diploma	93.3%	89.6%
% of Population Over 25 with bachelor's degree or higher	37.8%	33.2%
% with Disability	11.3%	13.5%
% Speak English less than "very well"	9.4%	12.1%

Source: US Census Bureau, American Community Survey 2019-2023 5-Year Estimates

Racial characteristics of the participating jurisdictions, compared to the state average, are presented in Table 3.8. Monroe County and its jurisdictions are predominantly white and less racially diverse than the state as a whole. The county and its jurisdictions have a substantially smaller black population than the state. Monroe County does have a sizable Latino population with Latinos making up 23.4% of the county's total population, slightly lower than the state. And Latinos represent 30% of the population in the City of Marathon, higher than the state.

Table 3.8 – Monroe County Racial Demographics, 2020

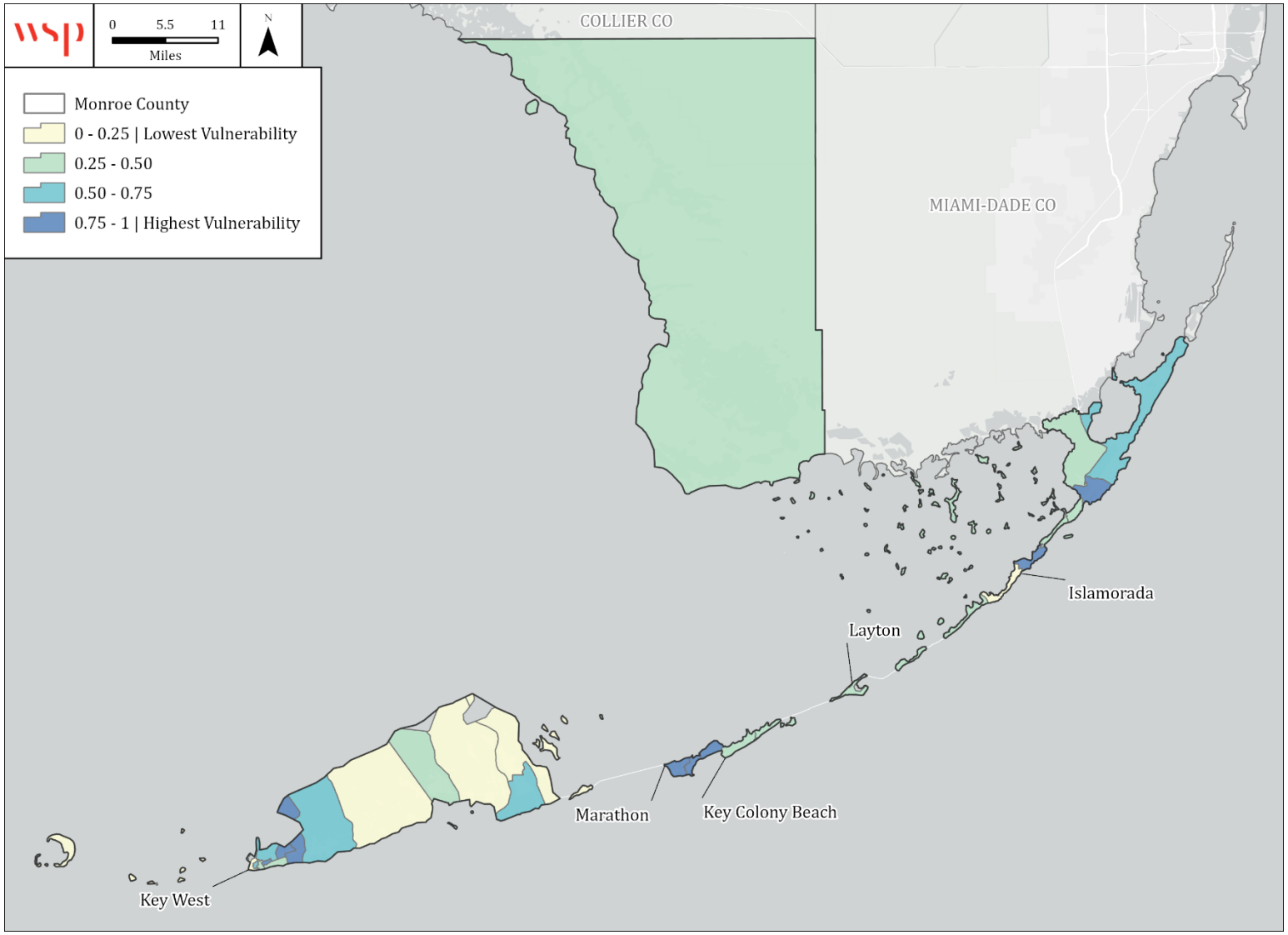
Jurisdiction	White, %	Black, %	Asian, %	Other Race, %	Two or More Races, %	Persons of Hispanic or Latino Origin, %
City of Key Colony Beach	81.6%	2.4%	0.9%	0.8%	1.4%	12.9%
City of Key West	61.1%	9.7%	2.3%	1.1%	3.4%	22.4%
City of Layton	78.6%	1.0%	0.0%	0.0%	1.0%	19.5%
City of Marathon	62.5%	3.8%	0.9%	0.7%	2.4%	30.0%
Islamorada Village of Islands	81%	1%	1%	0.5%	2%	15%
Unincorporated Monroe County	67.1%	4.0%	1.0%	0.7%	2.8%	24.4%
Monroe County	**66.0%**	**5.5%**	**1.4%**	**0.8%**	**2.9%**	**23.4%**
Florida	52%	15%	3%	4%	0.9%	26%

Source: US Census Bureau, American Community Survey 2019-2023 5-Year Estimates

Note: Racial statistics represent the proportion of individuals that fall in each category *alone;* i.e. the white population represents the non-Hispanic white population.

Figure 3.7 displays social vulnerability information for Monroe County by census tract according to 2022 data and analysis by the Centers for Disease Control and Prevention (CDC). The CDC's Social Vulnerability Index (SVI) indicates the relative vulnerability within census tracts based on 15 social factors: poverty, unemployment, income, education, age, disability, household composition, minority status, language, housing type, and transportation access. Higher social vulnerability is an indicator that a community may be limited in its ability to respond to and recover from hazard events. Therefore, using this SVI information can help the Region and jurisdictions to prioritize pre-disaster aid, allocate emergency preparedness and response resources, and plan for the provision of recovery support.

Figure 3.7 – Social Vulnerability Index by Census Tract, 2022



Source: Centers for Disease Control and Prevention (CDC) / Agency for Toxic Substances and Disease Registry (ATSDR) / Geospatial Research, Analysis, and Services Program (GRASP).

3.3 HISTORIC PROPERTIES

As of March 2025, Monroe County had 61 listings on the National Register of Historic Places. Three of the listings are Historic Districts. Listing on the National Register signifies that these structures and districts have been determined to be worthy of preservation for their historical or cultural values. Additionally, four of these properties are also listed as National Historic Landmarks.

Table 3.9 – National Register of Historic Places Listings in Monroe County

Ref#	Property Name	Listed Date	City
70000069	Fort Jefferson National Monument	11/10/1970	Dry Tortugas Islands
96001179	Cane Patch	11/5/1996	Everglades Nat'l Park
96001183	Rookery Mound	11/5/1996	Everglades Nat'l Park
96001180	Ten Thousand Islands Archeological District	11/5/1996	Everglades Nat'l Park
96001182	Bear Lake Mounds Archeological District	11/5/1996	Flamingo
06000979	Mud Lake Canal*	9/20/2006	Flamingo
79000684	Overseas Highway and Railway Bridges	8/13/1979	Florida Keys
11000860	Alligator Reef Light	12/1/2011	Islamorada
06000493	Chaves Shipwreck Site	6/15/2006	Islamorada
95000238	Florida Keys Memorial	3/16/1995	Islamorada
06000495	Herrara Shipwreck Site	6/15/2006	Islamorada
97000404	LaBranche Fishing Camp	5/9/1997	Islamorada
98000652	Lignumvitae Key Archeological and Historical District	2/16/1999	Islamorada
94000794	SAN FELIPE Shipwreck Site	8/11/1994	Islamorada
01000530	SAN PEDRO (shipwreck)	5/31/2001	Islamorada
06000501	Tres Puentes Shipwreck Site	6/15/2006	Islamorada
96000581	USS ALLIGATOR	6/6/1996	Islamorada
91001771	AFRICAN QUEEN	2/18/1992	Key Largo
84000199	Carysfort Lighthouse	10/31/1984	Key Largo
72000340	John Pennekamp Coral Reef State Park and Reserve	4/14/1972	Key Largo
04000788	Overseas Highway and Railway Bridges (Boundary Increase)	8/3/2004	Key Largo
75000562	Rock Mound Archeological Site	7/1/1975	Key Largo
02000494	USCG Cutter DUANE	5/16/2002	Key Largo
12000362	African Cemetery at Higgs Beach	6/26/2012	Key West
71000243	Armory, The	3/11/1971	Key West
01000228	Dry Tortugas National Park	10/26/1992	Key West
71000244	Fort Zachary Taylor*	3/11/1971	Key West
73000586	Gato, Eduardo H., House	4/11/1973	Key West
89001428	HA. 19 (Japanese Midget Submarine)	6/30/1989	Key West
68000023	Hemingway, Ernest, House*	11/24/1968	Key West
92001879	INGHAM (USCGC)*	4/27/1992	Key West
71000245	Key West Historic District	3/11/1971	Key West
83001430	Key West Historic District (Boundary Increase)	2/24/1983	Key West

Ref#	Property Name	Listed Date	City
74000652	Little White House	2/12/1974	Key West
72000341	Martello Gallery-Key West Art and Historical Museum	6/19/1972	Key West
73000587	Old Post Office and Customshouse	9/20/1973	Key West
73000588	Porter, Dr. Joseph Y., House	6/4/1973	Key West
73000589	Sand Key Lighthouse	4/11/1973	Key West
06000957	Sloppy Joe's Bar	11/1/2006	Key West
94000633	Thompson Fish House, Turtle Cannery and Kraals	6/23/1994	Key West
73000590	U.S. Coast Guard Headquarters, Key West Station	10/15/1973	Key West
84000915	US Naval Station	5/8/1984	Key West
12000300	Veterans of Foreign Wars Walter R. Mickens Post 6021 and William Weech American Legion Post 168	5/30/2012	Key West
76000602	West Martello Tower	6/24/1976	Key West
84000930	WESTERN UNION (schooner)	5/16/1984	Key West
06000492	Angustias Shipwreck Site	6/15/2006	Layton
06000494	El Gallo Indiano Shipwreck Site	6/15/2006	Layton
06000499	San Francisco Shipwreck Site	6/15/2006	Layton
06000500	Sueco de Arizon Shipwreck Site	6/15/2006	Layton
72000342	Indian Key	6/19/1972	Lower Matecumbe Key
92001243	Adderley, George, House	9/10/1992	Marathon
12000092	Sombrero Key Light	3/9/2012	Marathon
90000443	Pigeon Key Historic District	3/16/1990	Pigeon Key
06000496	El Infante Shipwreck Site	6/15/2006	Plantation
75002123	SAN JOSE Shipwreck Site	3/18/1975	Plantation Key
82002377	Bat Tower-Sugarloaf Key	5/13/1982	Sugarloaf Key
10001189	American Shoal Light	1/25/2011	Summerland Key
06000497	El Rubi Shipwreck Site	6/15/2006	Tavernier
100005820	Matecumbe Methodist Church	11/30/2020	Islamorada
100006117	Matecumbe Methodist Church Cemetery	2/5/2021	Islamorada
100007123	Crane Point	10/29/2021	Marathon

Source: National Parks Service, National Register of Historic Places, March 2025

*National Historic Landmarks

3.4 HOUSING

Table 3.10 and Table 3.11 provide details on housing characteristics in Monroe County and incorporated jurisdictions according to data from the 2020 Decennial Census and 2019-2023 ACS 5-Year Estimates.

According to the 2020 Decennial Census, there are 53,961 housing units in Monroe County, of which 67.5 percent are occupied. Compared to the state, occupancy rates are lower across the county and all incorporated jurisdictions. Approximately 39.5% of occupied units are renter-occupied. A high percentage of renters is an indicator of higher pre- and post-disaster vulnerability because, according to

Cutter, et al. (2003), renters often do not have the financial resources of homeowners, are more transient, are less likely to have information about or access to recovery aid following a disaster and are more likely to require temporary shelter following a disaster. The City of Key West has the highest rate of renter-occupied housing, at 55.6%. Higher rates of home ownership in some jurisdictions, including Islamorada and unincorporated Monroe County, where owner-occupied housing rates are all above 70 percent, may indicate that more residents in these areas are able to implement certain types of mitigation in their homes.

The housing growth rate since 2010 has been positive in Key West (2.3%), Marathon (3.9%), unincorporated Monroe County (4.6%), and Monroe County (2.3%) as a whole. Key Colony Beach has experienced the largest decrease in overall housing units at -29.9 percent, followed by Layton (-9.8%), and Islamorada (-1.1%).

Nearly 58 percent of housing units in Monroe County are detached single family homes. The next most common housing type is 10 or more apartments, which make up 11.4 of all housing units. Apartments are followed by mobile homes, which make up 9.5% of the county's housing; mobile homes can be more vulnerable to certain hazards, such as tornadoes and wind storms, especially if they aren't secured with tie downs.

Almost half of Monroe County's housing, 48.5 percent, was built prior to 1980. Age can indicate the potential vulnerability of a structure to certain hazards. For example, Monroe County first entered the National Flood Insurance Program in 1973. The Cities of Key Colony Beach, Key West, and Layton all entered the NFIP in 1971, however Marathon and Islamorada did not enter the NFIP until years later. This indicates that a significant portion of housing within Monroe County was not build to floodplain standards.

Table 3.10 – Monroe County and Incorporated Jurisdictions, Housing Characteristics, 2020

Jurisdiction	Housing Units (2010)	Housing Units (2020)	Housing Units Change (2010-2020)	Percent Occupied (2020)	Owner Occupied Units, Percent (2020)	Vacant Units, Percent (2020)	Mobile Home Units, Percent (2023)
City of Key Colony Beach	1,431	1,003	-29.9%	41.0%	79.3%	59.0%	0.0%
City of Key West	14,107	14,426	2.3%	79.6%	44.4%	20.4%	3.8%
City of Layton	184	166	-9.8%	63.3%	61.9%	36.7%	0.0%
City of Marathon	6,187	6,427	3.9%	66.7%	57.2%	33.3%	10.4%
Islamorada Village of Islands	5,692	5,630	-1.1%	58.3%	73.0%	41.7%	0.0%
Unincorporated Monroe County	25,163	26,309	4.6%	64.1%	69.4%	35.9%	13.0%
Monroe County	52,764	53,961	2.3%	67.5%	60.5%	32.5%	9.5%
Florida	*8,989,580*	*9,865,350*	*9.7%*	*86.5%*	*65.1%*	*13.5%*	*7.5%*

Source: U.S. Census Bureau 2020 Decennial Census

Table 3.11 – Monroe County Housing Characteristics, 2020

Housing Characteristics	Monroe County	Florida
Average Household Size	2.83	2.51
% of Housing Units with no Vehicles Available	6.9%	5.9%
% of Housing Units that are mobile homes	9.5%	7.5%

Source: American Community Survey, 2019-2023 5-Year Estimates

3.5 INFRASTRUCTURE

3.5.1 TRANSPORTATION

Transportation in Monroe County is unique. U.S. Route 1 (US 1), also known as the Overseas Highway, is the single road that forms the backbone of the transportation network in the Florida Keys and serves as the sole link to the Florida mainland. US 1 runs 126 miles from Florida City, in Miami Dade County, to Key West. The mostly two-lane highway is maintained by the Florida Department of Transportation. Along the route, there are 42 bridges totaling 19 miles. The Overseas Highway is a lifeline for the Keys, serving as both a highway and a "main street;" it drives the local economy by bringing food, materials, and tourists from the mainland.

In addition to US 1, Monroe County maintains approximately 450 miles of roads, including 37 bridges. Card Sound Road – a toll road – serves as an alternate to US Highway 1 in some places. Mainland Monroe is primarily government owned parks and preserves and has few roads. The only County maintained road is Loop Road, a 16 mile loop off of US 41 that crosses the Miami Dade and Collier County lines. Key West, Marathon, Key Colony Beach, Islamorada, and Layton are all responsible for the streets within their boundaries that are not maintained by the state or the county.

The County has two primary airports. Key West International Airport (EYW) is located within the Key West city limits, two miles east of the main commercial center. EYW is the primary passenger airport in the Keys and served more than 1.3 million passengers in 2023. Florida Keys/Marathon International Airport (MTH) is located within the Marathon city limits directly adjacent to US 1. MTH is a general aviation airport that currently does not have any scheduled passenger flights but does have charter air service. Both airports are self-supporting Enterprise Funds, which operate using money generated by rates and charges levied on airport tenants and users. The Airports Department operates the facilities and provides comprehensive aviation services.

Bus service is provided by Greyhound to the Key Largo bus stop, the Marathon airport, and the Key West Bus Station. Key West Transit provides public bus service with five routes in the City of Key West and one route for the Lower Keys Shuttle, traveling between Key West and Marathon. Miami-Dade Transit provides the Dade-Monroe Express between Florida City and Marathon.

3.5.2 UTILITIES

Electric power for the County is provided by the Florida Keys Electric Cooperative (FKEC) from the Upper Keys (Miami-Dade County Line) to Marathon at the Seven Mile Bridge and by Keys Energy Services KEYS) from the Seven Mile Bridge to Key West. The electric transmission lines in the county are above-ground, and transmission poles are located in the water at bridge crossings between keys.

FKEC is a member-owned not-for-profit electric utility. The cooperative brings power from the mainland to the Florida Keys to serve approximately 33,000 accounts via a 138,000-volt transmission line. The transmission line is jointly owned by FKEC and KEYS, with FKEC responsible for maintenance in their territory. FKEC purchases nearly 100 percent of its power from Florida Power & Light, although generators in Marathon and two solar arrays also contribute to power supply. FKEC operates 6 substations and maintains over 800-miles of distribution power lines.

Keys Energy Services is a municipal owned public utility headquartered in Key West serving more than 28,000 customers. KEYS purchases all of its power through Florida Municipal Power Agency (FMPA) and imports the power from the mainland via the 138,000 volt transmission line. FMPA owns 111

megawatts of generation on Stock Island. The local generation is used to meet peak loads and for emergency backup in the event of loss of the transmission line. KEYS operates 9 substations and maintains over 900 miles of distribution power lines (340 miles three phase equivalent).

Water service in the Florida Keys is provided by the Florida Keys Aqueduct Authority (FKAA), an independent state agency with the primary purpose and function to obtain, supply, and distribute an adequate water supple to the Florida Keys. FKAA provides potable water across the County along with reclaimed water and wastewater services in select areas. In total, FKAA delivers approximately 16.5 million gallons of drinking water per day. The Authority manages the infrastructure to supple water, including a pipeline that originates in Florida City (Miami-Dade County) bringing water from the Biscayne Aquifer. The main pipeline that connects the upper keys is laid underwater; some distribution pipelines, however, are connected to roads and bridges and may be vulnerable to washout. FKAA additionally operates two reverse osmosis emergency water treatment plants to provide an alternate source when water cannot be supplied through the pipeline. FKAA is required to meet or exceed the latest edition of the Florida Building Code when building or renovating its facilities; it also complies with the minimum design standards for flood protection of water and wastewater infrastructure set by the Florida Department of Environmental Protection.

3.6 CURRENT AND FUTURE LAND USE

Monroe County and each of its jurisdictions use a comprehensive land use plan to guide their growth. A community's comprehensive plan and future land use map help determine development decisions and indicate where growth can be expected to occur based on land suitability and the community's overall vision and priorities.

In 1975, the Florida Keys were designated as an Area of Critical State Concern by the Administration Commission and then by the Florida Legislature in 1979. This designation is intended to protect environmental and natural resources of regional and statewide importance, historical archaeological resources, and major public facilities and public investments; these resources include the only coral reef system in North America, and the third largest in the world, and one of the most ecologically diverse ecosystems in the United States. Due to this designation, federal and state involvement in the County's land use planning is extensive.

MONROE COUNTY

Land use in Monroe County is managed by the Monroe County Planning and Environmental Resources Department. The department has four offices: Comprehensive Planning, Current Planning, Environmental Resources, and Marine Resources; floodplain management also falls within this department. Across these offices, the department is responsible for the administration of the County's comprehensive plan and land development regulations, including processing amendments to the plan (comprehensive planning). Additionally, the department reviews development proposals for compliance with the plan, including environmental compliance (current planning). The County's adopted comprehensive plan, most recently updated in 2010 to plan through the year 2030, guides future growth and community development.

Monroe County's Comprehensive Plan states that "Monroe County shall manage future growth to enhance the quality of life, ensure the safety of County residents and visitors, and protect valuable natural resources." It designates the following future land use categories to guide growth within the county:

- Agriculture
- Airport District
- Mixed Use/Commercial Fishing
- Mainland Native

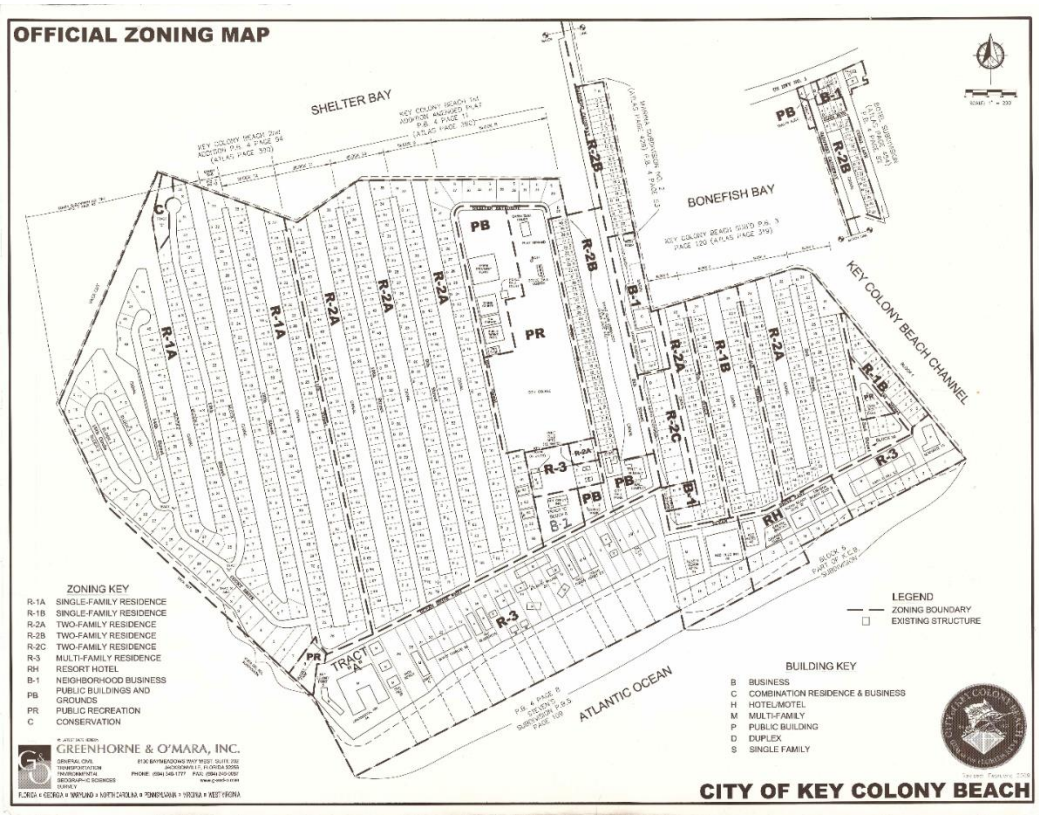
- Conservation
- Commercial
- Education
- Industrial
- Institutional
- Military
- Mixed Use/Commercial
- Public Buildings/Lands
- Public Facilities
- Recreation
- Residential Conservation
- Residential High
- Residential Low
- Residential Medium

Monroe County's future land use map is available via an online GIS application.

CITY OF KEY COLONY BEACH

The City of Key Colony Beach has an adopted comprehensive plan and regulates development with the official Zoning Map, shown below, which includes residential, resort hotel, neighborhood business, public buildings, public recreation, and conservation zones.

Figure 3.8 – Key Colony Beach Zoning Map

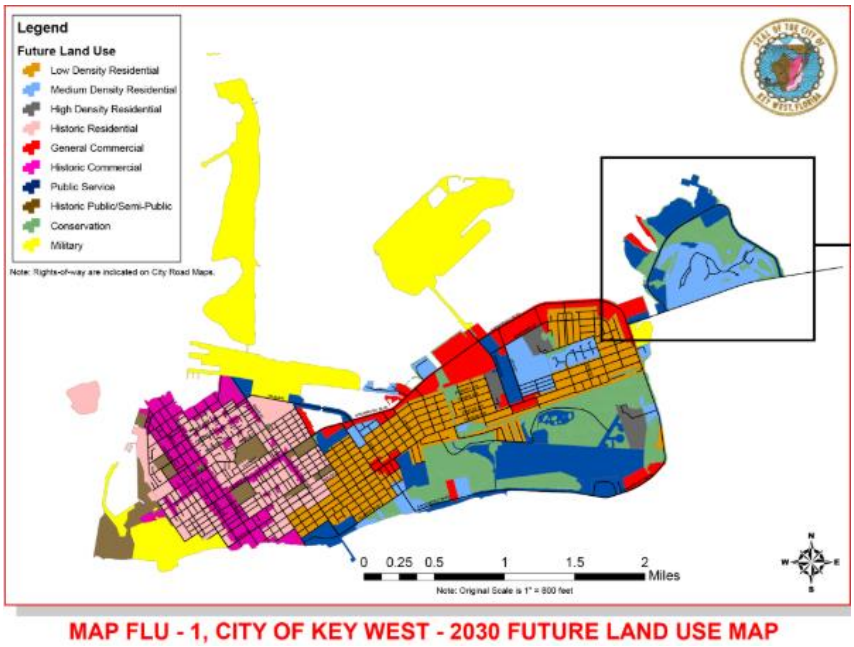


CITY OF KEY WEST

The City of Key West adopted its most recent comprehensive plan in 2013. Key West lists inclusiveness/diversity, ethics, community, environmental stewardship, and fiscal responsibility, as the core values of its comprehensive plan. It recommends medium and high-density development sparingly and emphasizes the legacy of historic residential and commercial uses. Key West's future land use categories are reflected in the map below and include:

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Historic Residential
- General Commercial
- Historic Commercial
- Public Service
- Historic Public/Semi-Public
- Conservation
- Military

Figure 3.9 – City of Key West Future Land Use Map

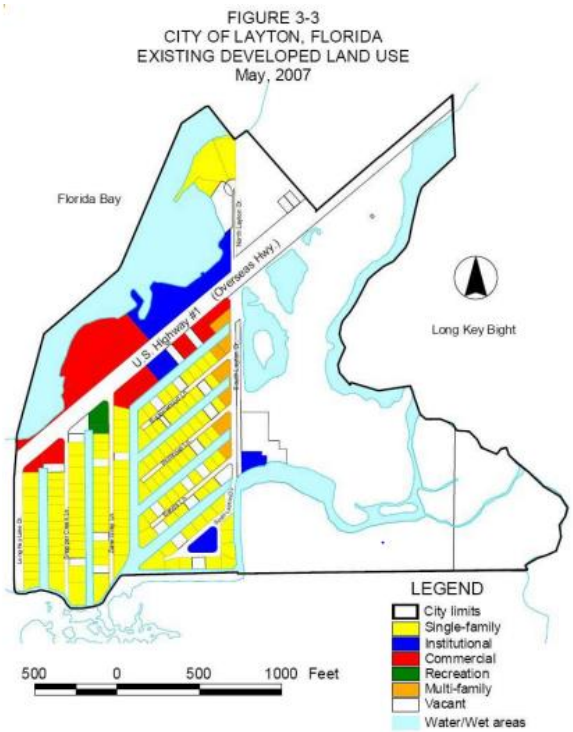


Source: 2013 City of Key West Comprehensive Plan

CITY OF LAYTON

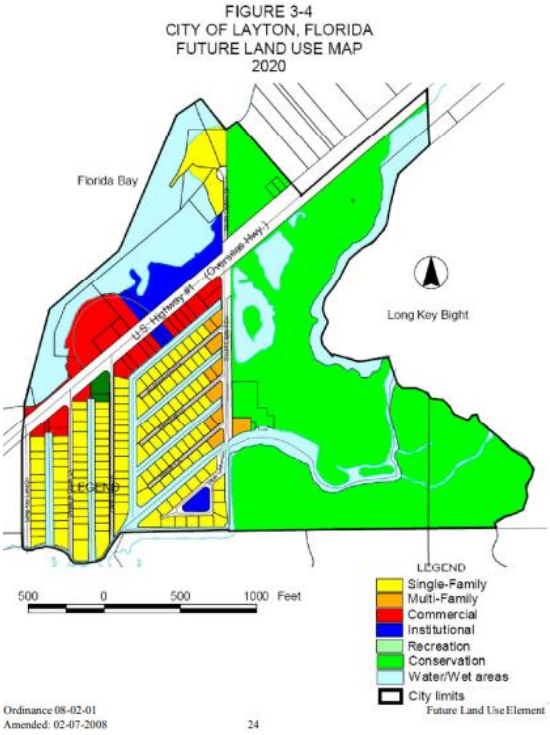
The City of Layton updated its comprehensive plan in 2016. Through this plan, the city sets out to "maintain the residential character of Layton, manage the rate of development and population growth to provide small-town ambiance, improve quality of life for residents…" The comprehensive plan provides an existing land use map (as of 2007) as well as a future land use map. These maps, shown side-by-side in Figure 3.10 and Figure 3.10 are almost identical – meaning that the city intends to maintain the current development pattern. Layton concentrates commercial and institutional development along the U.S. 1 Corridor and reserves the area behind these commercial/institutional spaces for single-family homes. It divides future land uses into four categories: Single-family, Multi-family, Recreation, and Conservation.

Figure 3.10 – Layton Existing Land Use Map



Source: City of Layton Comprehensive Plan, 2016

Figure 3.11 – Layton Future Land Use Map



Source: City of Layton Comprehensive Plan, 2016

CITY OF MARATHON

The City of Marathon passed its most recent comprehensive plan in 2005. The comprehensive plan seeks to direct future growth towards "lands which are inherently most suitable for development" and it promotes "conservation, preservation, and protection of environmentally lands." Through the future land use map, the city primarily encourages mixed use development along the U.S. 1 corridor and reserves areas for conservation and recreation. It also favors medium and high-density residential development, rather than just low residential. Future land use categories include:

- Airport
- Conservation
- Industrial
- Mixed Use Commercial
- Public
- Recreation
- Residential High
- Residential Medium
- Residential Low

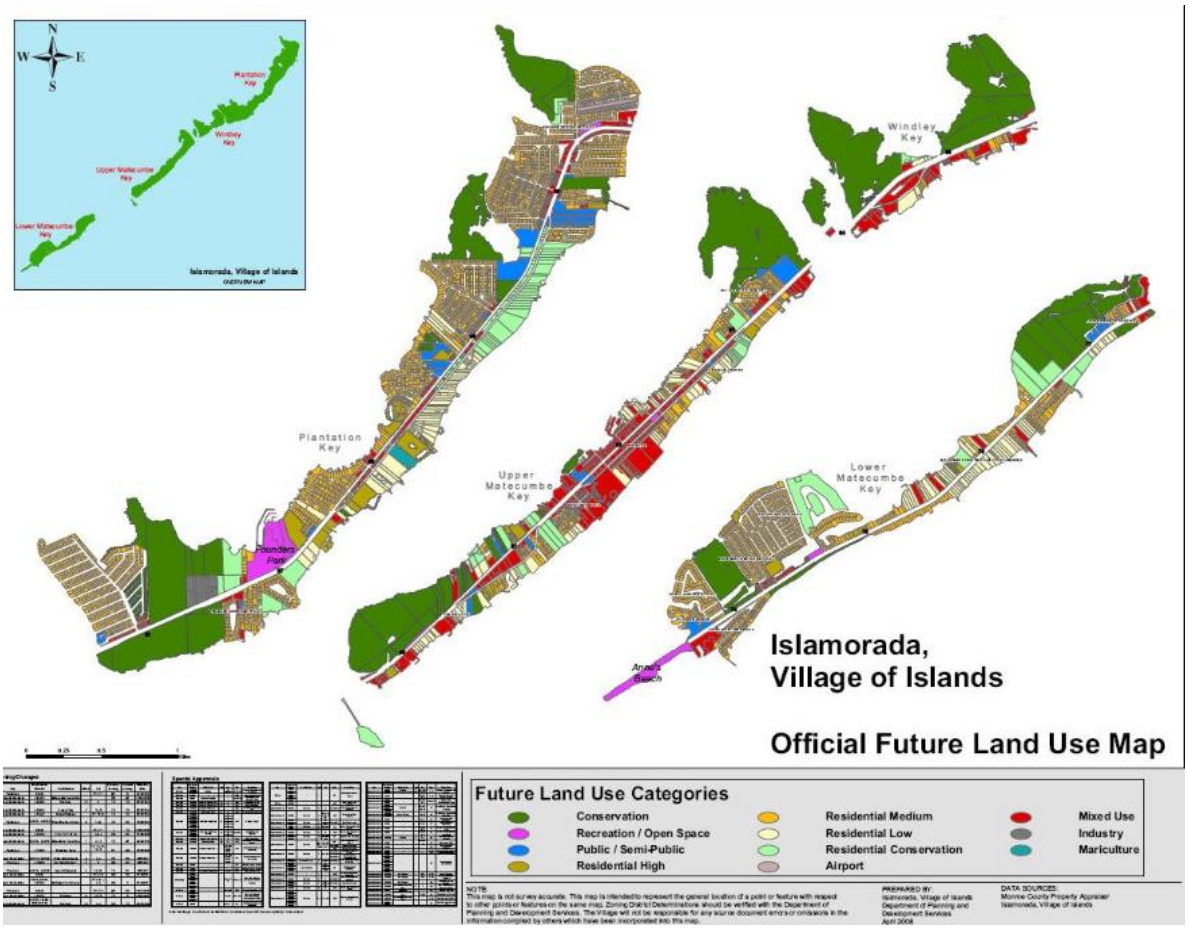
The City's future land use map is available via an online GIS application on the City website.

ISLAMORADA VILLAGE OF ISLANDS

Islamorada Village passed its comprehensive plan in January 2001 and made updates to the plan up until September 2017. As of March 2025, Islamorada is in the process of creating a new comprehensive plan. Its land regulations intend to reinforce the village's community appearance, enhance the appearance and function of US 1 Corridor, protect residential areas from incompatible development, encourage separation of urban and rural land uses, and ensure orderly transition. Future land use categories include:

- Conservation
- Recreation/Open Space
- Public/Semi-Public
- Residential High
- Residential Medium
- Residential Low
- Residential Conservation
- Airport
- Mixed Use
- Industry
- Mariculture

Figure 3.12 – Islamorada, Village of Islands Future Land Use Map



Source: Islamorada, Village of Islands

3.6.1 RATE OF GROWTH ORDINANCE

Growth trends in Monroe County are regulated through the number of residential permits issued. The Monroe County Rate of Growth Ordinance (ROGO) controls the number of dwelling units – both permanent and seasonal – that can be permitted in Monroe County and incorporated municipalities. The ROGO was initially adopted in 1992 as a response to the inability of the road network to accommodate a large-scale hurricane evacuation in a timely fashion. During the initial evacuation study, a series of complex models was developed to determine the number of additional dwelling units that could be permitted without exceeding a 24 hour evacuation from the Keys. As a result, a tool was developed to equitably distribute – geographically and over time – the remaining number of permits available.

Based on the supply of vacant buildable lots, the ROGO distributes a pre-determined number of allocations for new residential permits by ROGO Year – generally from July 13th of one year through July 12th of the next year. To further address concerns of carrying capacity, the County implemented the tier system. This system designates all land outside of mainland Monroe into three general categories for purposes of its land acquisition program and smart growth. Both systems recognize the finite limits of the carrying capacity of both the natural and man-made systems in the Keys. Their goal is to ensure public safety through the ability to maintain a hurricane evacuation clearance time. Both the ROGO and Tier

System exclude the Ocean Reef Club planned development in Key Largo based on the Ocean Reef Club Vested Development rights letter. The three tiers are as follows:

- Tier I: Natural Areas
- Tier II: Transitional and Sprawl Reduction Area (on Big Pine Key and No Name Key, only)
- Tier III: Infill Area; includes a special protection area as a subset (Tier III-A)

Under the Rate of Growth Ordinance, the number of permits to be allocated between July 13th 2013 through July 13th 2023 was to not exceed 1,970. These allocations were to be divided yearly and across market rate units, affordable housing units, mobile homes, and institutional residential units. The County required at least 20 percent of yearly allocations to be affordable units. Annual permits were also divided between three subareas: Upper Keys, Lower Keys, and Big Pine Key/No Name Key. On February 10, 2020, the county adopted Ordinance No. 006-2020 amending section 138-24 of the Monroe County Land Development Code. Through this adoption, the County extended the ROGO time period through 2026. In so doing, the number of permits available annually was reduced. Table 3.12 below illustrated the permits to be made available under this new ordinance amendment.

Table 3.12 – ROGO Annual Permit Allocations

ROGO Year	Annual Allocations	
	Market Rate	Affordable Housing
July 13, 2013 – July 12, 2014	**126 –** U: 61, L:57, BPK/NNK: 8	71
July 13, 2014 – July 12, 2015	**126 –** U: 61, L:57, BPK/NNK: 8	71
July 13, 2015 – July 12, 2016	**126 –** U: 61, L:57, BPK/NNK: 8	71
July 13, 2016 – July 12, 2017	**126 –** U: 61, L:57, BPK/NNK: 8	497 total Affordable Housing Units (Available Immediately)
July 13, 2017 – July 12, 2018	**126 –** U: 61, L:57, BPK/NNK: 8	
July 13, 2018 – July 12, 2019	**126 –** U: 61, L:57, BPK/NNK: 8	
July 13, 2019 – July 12, 2020	**126 –** U: 61, L:57, BPK/NNK: 8	
July 13, 2020 – July 12, 2021	**64 –** U: 31, L: 29, BPK/NNK: 4	
July 13, 2021 – July 12, 2022	**64 –** U: 31, L: 29, BPK/NNK: 4	
July 13, 2022 – July 12, 2023	**64 –** U: 31, L: 29, BPK/NNK: 4	
July 13, 2023 – July 12, 2024	**64 –** U: 31, L: 29, BPK/NNK: 4	
July 13, 2024 – July 12, 2025	**64 –** U: 31, L: 29, BPK/NNK: 4	
July 13, 2025 – July 12, 2026	**64 –** U: 31, L: 29, BPK/NNK: 4	
Total	**1,260**	**710**

Source: Monroe County Ordinance 006-2020

U = Upper Keys; L = Lower Keys; BPK/NNK = Big Pine Key/No Name Key

As residential and non-residential development influence one another, considering non-residential permitting is also important when maintaining the islands' carrying capacity. The predominant form of non-residential development in the Keys is commercial, mainly retail trade and services; this includes tourism related development such as marinas and restaurants. Non-residential development is also controlled to maintain a balance of land uses between residential and commercial. The Non-residential Rate of Growth Ordinance (NROGO) limits the square footage of new commercial development to 239 square feet per each new residential permit issued. In unincorporated Monroe County, this means a maximum of 47,083 square feet of floor area per NROGO year. This is also to be distributed across the same three subareas as the ROGO permits.

3.7 EMPLOYMENT AND INDUSTRY

Monroe County is characterized by a unique economy due to its location and geography. The Keys attract both seasonal residents and short-term visitors with an amenable climate and many recreational opportunities. The economy is dominated by tourism; the service sector, primarily hospitality, is the largest segment of the private sector followed by retail trade. As such an important piece of the economy, the tourism industry supplements the tax base in Monroe County. A major hurricane or other disaster event that keeps visitors away will lead to reduced revenue associated with the Bed Tax, Sales Tax, and Infrastructure Tax.

3.7.1 WAGES AND EMPLOYMENT

Per the 2023 ACS 5-Year Estimates, the median household income for Monroe County was $82,430, which exceeds the state's median household income ($71,711). Household income is higher in each Monroe County jurisdiction than in the state. Income is highest in Key Colony Beach and Islamorada and lowest in Layton. Compared to the state, a smaller portion of the population is living below the poverty line in the County and all jurisdictions, but more of the population lacks health insurance across the County and in all incorporated jurisdictions except Islamorada. Overall, Monroe County and its jurisdictions experience higher household incomes and lower unemployment and poverty rates than the state of Florida.

Table 3.13 shows economic statistics for each jurisdiction compared to the state average and Table 3.14 shows employment statistics for the county compared to the state average.

Table 3.13 – Monroe County Economic Statistics, 2023

Jurisdiction	Median Household Income	Unemployment Rate (%)	% of Individuals Below Poverty Level	% Without Health Insurance
City of Key Colony Beach	$94,531	0.0%	5.1%	7.6%
City of Key West	$78,532	2.0%	11.1%	17.7%
City of Layton	$71,875	0.0%	6.7%	14.1%
City of Marathon	$80,556	5.4%	11.4%	19.2%
Islamorada Village of Islands	$95,212	0.0%	6.0%	12.0%
Monroe County	**$82,430**	**3.2%**	**10.4%**	**14.9%**
Florida	*$71,711*	*4.8%*	*12.6%*	*11.9%*

Source: U.S. Census Bureau, 2019-2023 American Community Survey 5-Year Estimates

Table 3.14 – Monroe County Employment by Industry, 2023

Industry	Monroe County	Florida
Agriculture, forestry, fishing and hunting, and mining	1.6%	0.8%
Construction	9.1%	8.2%
Manufacturing	2.7%	5.2%
Wholesale trade	1.6%	2.4%
Retail trade	9.5%	12.1%
Transportation and warehousing, and utilities	7.4%	6.3%
Information	0.9%	1.6%
Finance and insurance, and real estate and rental and leasing	7.0%	8.0%

Industry	Monroe County	Florida
Professional, scientific, and management, and administrative and waste management services	11.9%	14.0%
Educational services, and health care and social assistance	14.5%	21.0%
Arts, entertainment, and recreation, and accommodation and food services	21.7%	11.1%
Other services, except public administration	5.9%	5.1%
Public administration	6.2%	4.3%

Source: U.S. Census Bureau, 2019-2023 American Community Survey 5-Year Estimates

The largest industry sector in the County in 2023 was "arts, entertainment, and recreation, and accommodation and food services," comprising 21.7 percent of employment across the county. This is followed closely by "educational services, and health care and social assistance," comprising 14.5 percent of total employment. Compared to the state, the arts, entertainment, accommodations, and food services industry makes up a much larger percentage of employment in Monroe County.

Table 3.15 summarizes the major employers in Monroe County according to data from the Key West Chamber of Commerce as of October 2021. Five of the ten largest employers in Monroe County are public entities.

Table 3.15 – Major Employers, Monroe County

Employer	Sector	Employees
US Armed Services (Incl. Civilians Supports & Contractors)	Public	2,190
Monroe County Schools	Public	1,701
Ocean Reef Club	Private	850
Publix Stores (Key West, Marathon, Key Largo)	Private	730
Ocean Properties	Private	550
Monroe County Government	Public	540
Monroe County Sherriff's Office	Public	518
Lower Keys Medical Center, Key West	Private	500
City of Key West	Public	470
Spottswood Properties	Private	360
Casa Marina/Reach Resort	Private	356
Hawk's Cay Resort	Private	350
Florida Keys Aqueduct Authority	Public	283
Fogarty's/Red Fish Blue Fish/Caroline's/Jack Flats/Waterfront Brewery	Private	280
Cheeca Lodge	Private	268
Historic Tours of America	Private	216
Southernmost Beach Resorts	Private	201

Source: Key West Chamber of Commerce, October 2021

4 HAZARD IDENTIFICATION & RISK ASSESSMENT

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

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.

4.1 OVERVIEW

This section describes the Hazard Identification and Risk Assessment process for the development of the Monroe County Local Mitigation Strategy. 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 hazard risk assessment covers all of Monroe County, including the unincorporated county and all incorporated jurisdictions participating in this plan.

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 the potential risk to natural and technological hazards in the county 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 plan:

- **Section 4.2**: **Hazard Identification** identifies the natural and human-caused hazards that threaten the planning area.
- **Section 4.3: Risk Assessment Methodology and Assumptions**
- **Section 4.4: Asset Inventory** details the population, buildings, and critical facilities at risk within the planning area.
- **Section 4.5**: **Hazard Profiles, Analysis, and Vulnerability** discusses the threat to the planning area, describes previous occurrences of hazard events and the likelihood of future occurrences, and assesses the planning area's exposure to each hazard profiled; considering assets at risk, critical facilities, and future development trends.
- **Section 4.6: Conclusions on Hazard Risk** summarizes the results of the Priority Risk Index and defines each hazard as a Low, Moderate, or High-Risk hazard.

4.2 HAZARD IDENTIFICATION

To identify hazards relevant to the planning area, the LMS Working Group (LMSWG) began with a review of the list of hazards identified in the 2023 State Hazard Mitigation Plan and the 2021 Monroe County Local Mitigation Strategy (LMS) as summarized in Table 4.1. The LMSWG used these lists to identify a full range of hazards for potential inclusion in this plan update and to ensure consistency across these planning efforts. All hazards listed below were evaluated for inclusion in this plan update.

Table 4.1 – Full Range of Hazards Evaluated

Hazard	Included in 2023 State HMP?	Included in 2021 Monroe County LMS?
Flood	Yes	Yes
Tropical Cyclones	Yes	Yes
Wildfire	Yes	Yes
Severe Storms and Tornadoes	Yes	Yes
Sea Level Rise	Yes (Flood)	Yes
Drought	Yes	Yes
Coastal Erosion	Yes	Yes
Extreme Heat	Yes	Yes
Radiological Incident	Yes	Yes
Cyber Attack	Yes	Yes
Winter Weather	Yes	No
Sinkhole	Yes	No
Earthquake	Yes	No
Tsunami	Yes	No
Hazardous Materials Incident	Yes	No
Transportation Incident	Yes	No

Hazard	Included in 2023 State HMP?	Included in 2021 Monroe County LMS?
Agricultural Disruption	Yes	No
Human Health Incident	Yes	No
Harmful Algal Bloom	Yes	No
Domestic Security Incident	Yes	No
Mass Migration	Yes	No
Civil Disturbance	Yes	No
Dam Failure	Yes	No
Space Weather	Yes	No

The LMSWG evaluated the above list of hazards using existing hazard data, past disaster declarations, local knowledge, and information from the 2023 State Plan and the 2021 Monroe County Plan to determine the significance of these hazards to the planning area. 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.

One key resource in this effort was the National Oceanic and Atmospheric Administration (NOAA)'s National Center for Environmental Information (NCEI), which has been tracking various types of severe weather since 1950. Their Storm Events Database contains an archive by county 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 their 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, among others. The NCEI database contains 413 records of severe weather events that occurred in Monroe County in the 25-year period from 2000 through 2024. Table 4.2 summarizes these events.

Table 4.2 – NCEI Severe Weather Reports for Monroe County, 2000 – 2024

Type	# of Events	Property Damage	Crop Damage	Deaths	Injuries
Coastal Flood	14	$100,000	$0	0	0
Dense Fog	0	$0	$0	0	0
Drought	12	$0	$0	0	0
Excessive Heat	0	$0	$0	0	0
Extreme Cold/Wind Chill	0	$0	$0	0	0
Flash Flood	0	$0	$0	0	0
Flood	24	$56,000	$0	0	0
Frost/Freeze	0	$0	$0	0	0
Funnel Cloud	9	$0	$0	0	0
Hail	7	$250	$0	0	0
Heavy Rain	12	$0	$0	0	0
High Wind	3	$2,000	$0	1	0
Hurricane (Typhoon)	31	$113,235,000	$0	3	46
Lightning	12	$73,000	$0	0	4
Rip Current	0	$0	$0	0	0
Storm Surge/Tide	34	$2,401,000	$0	1	1
Thunderstorm Wind	51	$146,650	$0	0	0
Tornado	32	$5,336,700	$0	0	0

Type	# of Events	Property Damage	Crop Damage	Deaths	Injuries
Tropical Storm	48	$37,208,200	$0	2	3
Waterspout	123	$0	$0	0	0
Wildfire	1	$0	$0	0	0
Total:	**413**	**$158,558,800**	**$0**	**7**	**54**

Source: National Center for Environmental Information Storm Events Database, March 2025
Note: Losses reflect totals for all impacted areas for each event

The LMSWG also researched past events that resulted in a federal and/or state emergency or disaster declaration for Monroe County in order to identify significant 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.

- Emergency declarations: When federal assistance is needed, the President of the United States can declare an emergency for any occasion or disaster. Emergency declarations aide State and local efforts in providing emergency services that help protect human lives.
- Major disaster declarations: When a local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Federal and/or state disaster declarations may be granted when the Governor certifies that the combined local, county, and state resources are insufficient, and the situation is beyond their recovery capabilities.

Records of designated counties for FEMA major disaster declarations start in 1964. Since then, Florida has been designated in 88 major disaster declarations, and Monroe County, has been designated in 27 major disaster declarations, as detailed in Table 4.3, and 18 emergency declarations, as detailed in Table 4.4.

Table 4.3 – FEMA Major Disaster Declarations, Monroe County

Disaster #	Dec. Date	Incident Type	Event Title
4834	10/11/2024	Hurricane	Hurricane Milton
4828	9/28/2024	Hurricane	Hurricane Helene
4806	8/10/2024	Tropical Storm	Hurricane Debby
4673	9/29/2022	Hurricane	Hurricane Ian
4486	3/25/2020	Biological	COVID-19 Pandemic
4337	9/10/2017	Hurricane	Hurricane Irma
4084	10/18/2012	Hurricane	Hurricane Isaac
1785	8/24/2008	Tropical Storm	Tropical Storm Fay
1609	10/24/2005	Hurricane	Hurricane Wilma
1602	8/28/2005	Hurricane	Hurricane Katrina
1595	7/10/2005	Hurricane	Hurricane Dennis
1551	9/16/2004	Hurricane	Hurricane Ivan
1545	9/4/2004	Hurricane	Hurricane Frances
1539	8/13/2004	Severe Storm(s)	Hurricane Charley and Tropical Storm Bonnie
1359	2/5/2001	Freeze	Severe freeze
1345	10/4/2000	Severe Storm(s)	Heavy rains and flooding
1306	10/20/1999	Hurricane	Hurricane Irene

Disaster #	Dec. Date	Incident Type	Event Title
1259	11/6/1998	Severe Storm(s)	Tropical Storm Mitch
1249	9/28/1998	Hurricane	Hurricane Georges
1223	6/18/1998	Fire	Extreme Fire Hazard
1204	2/12/1998	Severe Storm(s)	Severe Storms, high Winds, Tornadoes, and Flooding
982	3/13/1993	Severe Storm(s)	Tornadoes, flooding, high winds, tides, freezing
955	8/24/1992	Hurricane	Hurricane Andrew
851	1/15/1990	Freeze	Severe freeze
526	1/31/1977	Severe Storm(s)	Severe winter weather
337	6/23/1972	Coastal Storm	Tropical Storm Agnes
209	9/14/1965	Hurricane	Hurricane Betsy

Source: FEMA Disaster Declarations Summary, March 2025

Table 4.4 – FEMA Emergency Declarations, Monroe County

Disaster #	Dec. Date	Incident Type	Event Title/Description
3622	10/7/2024	Hurricane	Hurricane Milton
3615	9/24/2024	Tropical Storm	Tropical Storm Helene
3605	8/3/2024	Tropical Storm	Tropical Storm Debby
3584	9/24/2022	Hurricane	Tropical Storm Ian
3561	7/4/2021	Severe Storm	Tropical Storm Elsa
3533	08/01/2020	Hurricane	Tropical Storm Isaias
3432	3/13/2020	Biological	COVID-19 Pandemic
3419	8/31/2019	Hurricane	Hurricane Dorian
3385	9/5/2017	Hurricane	Hurricane Irma
3377	10/6/2016	Hurricane	Hurricane Matthew
3293	9/7/2008	Hurricane	Hurricane Ike
3288	8/21/2008	Tropical Storm	Tropical Storm Fay
3259	9/20/2005	Tropical Storm	Tropical Storm Rita
3220	9/5/2005	Hurricane	Hurricane Katrina Evacuation
3150	10/15/1999	Hurricane	Hurricane Irene
3139	4/27/1999	Fire	Fire Hazard
3131	09/24/1998	Hurricane	Hurricane Georges
3079	5/6/1980	Human Caused	Undocumented Aliens

Source: FEMA Disaster Declarations Summary, March 2025

Monroe County also declared Local States of Emergency for Tropical Storm Laura (August 22, 2020) and Tropical Storm Eta (November 6, 2020).

Using the above information and additional discussion, the LMSWG evaluated each hazard's significance to the planning area in order to decide which hazards to include in this plan update. Some hazard titles have been updated either to better encompass the full scope of a hazard or to assess closely related hazards together. Table 4.5 summaries the determination made for each hazard.

Table 4.5 – Hazard Evaluation Results

Hazard	Included in this LMS update?	Explanation for Decision
Natural Hazards		
Flood	Yes	The 2021 Monroe County plan and 2023 State plan addressed this hazard. As a coastal county, over 99 percent of the county is within the 100-year-floodplain, and the county is also vulnerable to localized and stormwater flooding.
Tropical Cyclones	Yes	Both the 2021 Monroe County plan and the 2023 State plan addressed Tropical Cyclones. Since 1965, the county has received 16 Major Disaster declarations from FEMA for Hurricanes/Tropical storms.
Severe Storms and Tornadoes	Yes	The 2021 Monroe County plan profiled these hazards separately. From 2000 to 2024, the County experienced 225 thunderstorm and tornado events (including waterspouts) causing over $5.5m in damages.
Wildfire	Yes	The 2021 Monroe County plan as well as the 2023 State plan addressed this hazard. Although NCEI reports only 1 wildfire in Monroe County, the State plan reports parts of mainland Monroe have moderate to high burn probability.
Coastal Erosion	Yes	The 2021 Monroe County LMS and the 2023 State Plan addressed this hazard. The 2024 State Critically Eroded Beaches Report identified 13 critically eroded beaches in the middle and lower keys totally 15.02 miles.
Drought	Yes	Drought as included in both the 2021 Monroe County LMS and the 2023 State Plan. NCEI reports 12 instances of drought in the county; the LMSWG decided to continue to evaluate drought in this plan update.
Sea Level Rise	Yes	Sea Level Rise was addressed in the 2021 Monroe County LMS as well as the 2023 State plan. NOAA's Sea Level Rise Viewer shows the County will experience impacts from even just one foot of sea level rise.
Extreme Heat	Yes	The 2021 Monroe County LMS and the 2023 State Plan addressed this hazard. Although NCEI reports zero instances of extreme heat in the county, the LMSWG decided to include it in this plan update.
Sinkhole	No	This hazard was not included in the 2021 Monroe County LMS. According the 2023 State HMP, Monroe County has a low susceptibility to sinkholes, therefore the LMSWG chose to not include sinkholes in this plan update.
Winter Weather	No	Winter storms and freezes were not included in the 2021 LMS. Although there have been some instances of low wind chill in the Keys, the LMSWG noted that the Keys are generally not at risk to winter weather.

Hazard	Included in this LMS update?	Explanation for Decision
Earthquake	No	Earthquake was not included as a hazard in the 2021 Monroe County LMS. Earthquakes are very rare in the State, the peak ground acceleration (PGA) with a 10% probability of exceedance in 50 years is 0% gravity – the lowest potential for seismic ground shaking. As FEMA recommends earthquakes only be evaluated in areas with PGA of 3% or more, this hazard was excluded from the plan update.
Tsunami	No	While there is some tsunami risk for low-elevation (less than 15 feet above mean high tide), they are extremely rare in the Florida Keys. The state HMP concludes the probability of future tsunamis is low.
Technological Hazards		
Radiological Incident	Yes	The 2021 Monroe County LMS and the 2023 State Plan addressed this hazard. Due to the County's proximity to the Turkey Point Nuclear Generating Station, the LMSWG decided to include it in this update.
Cyber Attacks	Yes	The 2021 Monroe County LMS and the 2023 State Plan addressed this hazard. The LMSWG determined that because of recent events, it should be included in this update.
Hazardous Materials Incident	No	This hazard was not included in the previous Monroe County LMS and not suggested by the LMSWG for inclusion in this update.
Transportation Incident	No	This hazard was not included in the previous Monroe County LMS. The LMSWG discussed this hazard and the consequences of transportation incidents on the Keys. However, this hazard was ultimately not included in this update.
Agricultural Disruption	No	This hazard was not included in the previous Monroe County LMS and not suggested by the LMSWG for inclusion in this update.
Human Health Incident	No	This hazard was not included in the previous Monroe County LMS and not suggested by the LMSWG for inclusion in this update. Health hazards are addressed by public health departments and emergency operations planning.
Harmful Algal Bloom	No	This hazard was not included in the previous Monroe County LMS and not suggested by the LMSWG for inclusion in this update.
Domestic Security Incident	No	This hazard was not included in the previous Monroe County LMS and not suggested by the LMSWG for inclusion in this update. These threats are addressed by emergency operations planning.
Mass Migration	No	This hazard was not included in the previous Monroe County LMS and not suggested by the LMSWG for inclusion in this update.
Civil Disturbance	No	This hazard was not included in the previous Monroe County LMS and not suggested by the LMSWG for inclusion in this update. These threats are addressed by emergency operations planning.
Dam Failure	No	The 2023 State Plan reported there were no high or significant hazard dams in Monroe County.
Space Weather	No	This hazard was not included in the previous Monroe County LMS and not suggested by the LMSWG for inclusion in this update.

4.3 RISK ASSESSMENT METHODOLOGY AND ASSUMPTIONS

The Disaster Mitigation Act of 2000 requires that the LMSWG evaluate the risks associated with each of the hazards identified in the planning process. Each hazard was evaluated to determine its probability of future occurrence and potential impact. A vulnerability assessment was conducted for each hazard using either quantitative or qualitative methods depending on the available data, to determine its potential to cause significant human and/or monetary losses. A consequence analysis was also completed for each hazard. Each hazard is profiled in the following format:

HAZARD DESCRIPTION

This section provides a description of the hazard, including discussion of its speed of onset and duration, as well as any secondary effects followed by details specific to the Monroe County planning area.

LOCATION

This section includes information on the hazard's physical extent, with mapped boundaries where applicable.

EXTENT

This section includes information on the hazard extent in terms of magnitude and describes how the severity of the hazard can be measured. Where available, the most severe event on record is used as a frame of reference.

HISTORICAL OCCURRENCES

This section contains information on historical events, including the location and consequences of known past events on record within or near the Monroe 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 according to historical occurrence (e.g. 10 winter storm events over a 30-year period equates to a 33 percent chance of experiencing a severe winter storm in any given year).

CLIMATE CHANGE

Where applicable, this section discusses how climate change may or may not influence the risk posed by the hazard on the planning area in the future.

VULNERABILITY ASSESSMENT

This section quantifies, to the extent feasible using best available data, assets at risk to natural hazards and potential loss estimates. People, properties and critical facilities, and environmental assets that are vulnerable to the hazard are identified. Future development is also discussed in this section, including how exposure to the hazard may change in the future or how development may affect hazard risk.

The vulnerability assessments followed the methodology described in the FEMA publication Understanding Your Risks—Identifying Hazards and Estimating Losses (August 2001). The vulnerability assessment first describes the total vulnerability and values at risk and then discusses vulnerability by hazard. Data used to support this assessment included the following:

- 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 Monroe County Local Mitigation Strategy and other relevant documents including the 2019 Critically Eroded Beaches Report and the Regional Climate Action Plan;
- Exposure and vulnerability estimates derived using local parcel and building data; and
- Crop insurance claims by cause from USDA's Risk Management Agency.

Two distinct risk assessment methodologies were used in the formation of the vulnerability assessment. The first consists of a quantitative analysis that relies upon best available data and technology, while the second approach consists of a qualitative analysis that relies on local knowledge and rational decision making. The quantitative analysis involved the use of FEMA's Hazus-MH, a nationally applicable standardized set of models for estimating potential losses from earthquakes, floods, and hurricanes. Hazus uses a statistical approach and mathematical modeling of risk to predict a hazard's frequency of occurrence and estimated impacts based on recorded or historic damage information. The Hazus risk assessment methodology is parametric, in that distinct hazard and inventory parameters—such as wind speed and building type—were modeled using the Hazus software to determine the impact on the built environment. Monroe County's GIS-based risk assessment was completed using data collected from local, regional and national sources that included Monroe County, Florida DEM, and FEMA.

Vulnerability can be quantified in those instances where there is a known, identified hazard area, such as a mapped floodplain. In these instances, the numbers and types of buildings subject to the identified hazard can be counted and their values tabulated. Other information can be collected regarding the hazard area, such as the location of critical facilities, historic structures, and valued natural resources (e.g., an identified wetland or endangered species habitat). Together, this information conveys the vulnerability of that area to that hazard.

ASSOCIATED HAZARDS

Related hazards or hazards with cascading impacts are noted in this section.

CHANGES IN DEVELOPMENT

Changes in development that may affect exposure, vulnerability, or the hazard occurrence are described.

PROBLEM STATEMENTS

Specific problems that can be addressed through mitigation are summarized in this section.

PRIORITY RISK INDEX

The conclusions drawn from the hazard profiling and vulnerability assessment process can be used to prioritize all potential hazards to the Monroe County planning area. The Priority Risk Index (PRI) was applied for this purpose because it 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 to five categories for each hazard (probability, impact, spatial extent, warning time, and duration). Each degree of risk was assigned a value (1 to 4) and a weighting factor as summarized in Table 4.6.

PRI ratings by category for the planning area as a whole are provided throughout each hazard profile. Ratings specific to each jurisdiction are provided at the end of each hazard profile. The results of the risk assessment and overall PRI scoring are provided in Section 4.6 Conclusions on Hazard Risk.

Table 4.6 – 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 highest possible PRI value is 4.0).

PRI = [(PROBABILITY x .30) + (IMPACT x .30) + (SPATIAL EXTENT x .20) + (WARNING TIME x .10) + (DURATION x .10)]

The purpose of the PRI is to categorize and prioritize all potential hazards for the Monroe County planning area as high, moderate, or low risk. The summary hazard classifications generated using the PRI allows for the prioritization of those high and moderate hazard risks for mitigation planning purposes. Mitigation actions are not necessarily developed for hazards identified as low risk through this process.

4.4 ASSET INVENTORY

An inventory of assets within Monroe County was compiled to identify those structures potentially at risk to the identified hazards and assess the level of vulnerability. Assets include elements such as buildings, property, business/industry goods, and civil infrastructure. Building footprint, foundation type, and building value data were provided by Monroe County. By identifying the type and number of assets that exist and where they are in relation to known hazard areas, the relative risk and vulnerability for such assets can be assessed.

4.4.1 BUILDING EXPOSURE

The properties identified to be at risk include all improved properties in Monroe County and its incorporated jurisdictions according to parcel and building footprint data provided by Monroe County. The information is provided in Table 4.7.

Table 4.7 – Monroe County Building Exposure by Jurisdiction and Occupancy

Occupancy	Estimated Parcel Count	Structure Value	Estimated Content Value	Total Value
Islamorada	**6,136**	**$2,988,853,615**	**$1,747,555,234**	**$4,736,408,849**
Commercial	671	$393,616,980	$393,616,980	$787,233,960
Education	7	$5,927,080	$5,927,080	$11,854,160
Government	51	$77,688,696	$77,688,696	$155,377,391
Industrial	30	$9,444,577	$14,166,865	$23,611,441
Religious	19	$10,134,944	$10,134,944	$20,269,888
Residential	5,358	$2,492,041,339	$1,246,020,669	$3,738,062,008
Key Colony Beach	**743**	**$384,669,274**	**$200,480,877**	**$585,150,151**
Commercial	10	$13,746,479	$13,746,479	$27,492,958
Government	8	$2,546,001	$2,546,001	$5,092,002
Residential	725	$368,376,794	$184,188,397	$552,565,191
Key West	**7,233**	**$3,559,316,371**	**$2,084,710,853**	**$5,644,027,224**
Commercial	2,629	$2,114,482,380	$1,962,942,785	$4,077,425,165
Education	16	$17,403,897	$17,403,897	$34,807,794
Government	905	$454,725,420	$454,725,420	$909,450,841
Industrial	87	$28,970,253	$43,455,379	$72,425,632
Religious	64	$37,537,885	$37,537,885	$75,075,770
Residential	9,033	$4,472,293,153	$2,236,146,577	$6,708,439,730
Layton	**168**	**$45,574,751**	**$28,335,151**	**$73,909,902**
Commercial	13	$9,091,528	$9,091,528	$18,183,056
Government	10	$1,589,642	$1,589,642	$3,179,284
Religious	2	$414,380	$414,380	$828,760
Residential	143	$34,479,201	$17,239,600	$51,718,801
Marathon	**6,190**	**$2,421,193,487**	**$1,524,040,488**	**$3,945,233,975**

Occupancy	Estimated Parcel Count	Structure Value	Estimated Content Value	Total Value
Commercial	758	$434,714,236	$434,714,236	$869,428,472
Education	12	$2,961,497	$2,961,497	$5,922,994
Government	124	$129,680,070	$129,680,070	$259,360,140
Industrial	118	$24,615,386	$36,923,080	$61,538,466
Religious	25	$10,300,913	$10,300,913	$20,601,826
Residential	5,153	$1,818,921,384	$909,460,692	$2,728,382,075
Unincorporated Monroe County	**26,353**	**$12,029,183,132**	**$6,624,472,888**	**$18,653,656,020**
Agriculture	1	$267,735	$267,735	$535,470
Commercial	1,434	$809,369,304	$809,369,304	$1,618,738,608
Education	31	$22,737,542	$22,737,542	$45,475,084
Government	493	$158,704,315	$158,704,315	$317,408,630
Industrial	243	$100,510,211	$150,765,316	$251,275,526
Religious	43	$27,663,327	$27,663,327	$55,326,654
Residential	24,108	$10,909,930,699	$5,454,965,349	$16,364,896,048
Countywide Totals	**52,324**	**$24,994,887,246**	**$14,877,096,580**	**$39,871,983,827**
Agriculture	1	$267,735	$267,735	$535,470
Commercial	4,831	$3,471,941,718	$3,471,941,718	$6,943,883,436
Education	66	$49,030,016	$49,030,016	$98,060,032
Government	1,591	$824,934,144	$824,934,144	$1,649,868,288
Industrial	478	$163,540,426	$245,310,639	$408,851,065
Religious	153	$86,051,449	$86,051,449	$172,102,899
Residential	45,204	$20,399,121,758	$10,199,560,879	$30,598,682,637

Source: Monroe County parcel data, 2024
Note: In this exposure table, utilities are included in the Government category. However, parcels without a building cost were excluded – therefore, parcels with small utilities may not be included in the above count).
Note: For the City of Layton, two marine laboratory facilities are listed under the Government category.

Note: Content value estimations are generally based on the FEMA 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 value. Agricultural and commercial 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.

4.4.2 CRITICAL FACILITIES AND INFRASTRUCTURE EXPOSURE

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 lifelines that, if damaged during an emergency event, would result in severe consequences to public health, safety, and welfare. Critical facility information is regularly updated by the County. Critical facilities and infrastructure in Monroe County are listed by type in Table 4.8 and organized by FEMA lifeline. A detailed list of critical facilities is provided in each jurisdictional annex. These facilities were identified and verified by the LMSWG.

Table 4.8 – Critical Facilities and Infrastructure by FEMA Lifeline, Monroe County

Jurisdiction	Communications	Energy	Food, Hydration, Shelter	Hazardous Materials	Health and Medical	Safety and Security	Transportation	Water Systems	Total
Unincorporated Monroe County	28	17	14	2	10	35	2	190	298
City of Key Colony Beach	-	-	-	-	-	2	-	1	3
City of Key West	-	7	22	1	5	20	2	6	63
City of Layton	1	-	-	-	-	1	-	3	5
City of Marathon	-	3	6	-	6	22	1	8	46
Village of Islamorada	-	2	8	-	3	12	-	7	32
Countywide Total	**29**	**29**	**50**	**3**	**24**	**92**	**5**	**215**	**447**

Source: Monroe County

4.5 HAZARD PROFILES, ANALYSIS, AND VULNERABILITY

4.5.1 COASTAL EROSION

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Coastal Erosion	Likely	Limited	Moderate	Less than 24 hrs	Less than 1 week	2.5

HAZARD DESCRIPTION

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 often destroys homes, businesses, 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 subsidizes beach nourishment projects and other shoreline erosion control measures. Since 2018, the federal government has spent more than $770 million for emergency beach nourishment projects in Florida, Georgia, and the Carolinas.

Coastal erosion has both natural causes and causes related to human activities. Gradual coastal erosion and accretion results naturally from the impacts of tidal longshore currents. Severe coastal erosion can occur over a short period 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, of course, 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.

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 (NOAA, 2014).

Estuaries are partially enclosed, coastal water bodies where freshwater meats 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.

Warning Time: 1 – More than 24 hours

Duration: 3 – Less than 1 week

LOCATION

Erosion can occur along any shoreline in the county. In Monroe County, erosion is typically caused by coastal tides, ocean currents, and especially storm events such as hurricanes and tropical storms. Erosion

rates are dependent on many characteristics, including soil type. The Lower Keys, having more calcium carbonate beaches, are more susceptible to erosion than the Upper and Middle Keys. In fact, the Upper Keys do not have naturally occurring beaches are thus less susceptible to erosion. The Florida Department of Environmental Protection (DEP) regularly monitors Florida's coastline and determines geographic areas of the state that are at high risk to erosion. DEP defines a critical erosion area as:

"a segment of shoreline where natural processes or human activity have caused or contributed to erosion and recession of beach or dune system to such a degree that upland development, recreational interest, wildlife habitat, or important cultural resources are threatened or lost. Critical erosion areas may also include peripheral segments or gaps between identified critical erosion areas which, although they may be stable or slightly erosional now, their inclusion is necessary for continuity of management of the coastal system or for the design integrity of adjacent beach management projects."

Per DEP's Strategic Beach Management Plan, there are 36.3 miles of beaches in the Florida Keys Region, from just south of Key Biscayne (in Miami-Dade County) to the Dry Tortugas (in Monroe County). Of these beaches, 15.02 miles are critically eroded, all in the Monroe County portion of the region. Table 4.9 below lists the locations of these critically eroded beaches as reported in the 2024 Critically Eroded Beaches report. These shorelines are also mapped in Figure 4.1.

Mainland beaches of Key McLaughlin and Cable Sable fronting the Gulf of Mexico are not included in the list below due to insufficient data, however both beaches did sustain severe erosion during Hurricane Wilma in 2005. The Distal Sand keys, west of Key West, were also left out of the below assessment due to insufficient evidence. The Fills, in Islamorada between mile marker 77 and 79, have experienced significant erosion and received funding in the past to address these issues. Additionally, erosion has impacted Key's Energy infrastructure. Erosion around utility and transmission poles has led to the removal and relocation of such infrastructure.

It should be noted that many of the designated critically eroded beaches have undergone some level of restoration. The shorelines where these beach restoration projects have taken place have improved compared to their pre-project condition, however, these shorelines retain their critical erosion designation in order to retain their state of Florida funding eligibility for long term management and beach project maintenance and monitoring. More details on the methods used to determine the location of critically eroded beaches and the impacts of such erosion on individual locations may be found in Florida DEP's Critically Eroded Beaches Report.

Spatial Extent: 3 – Moderate

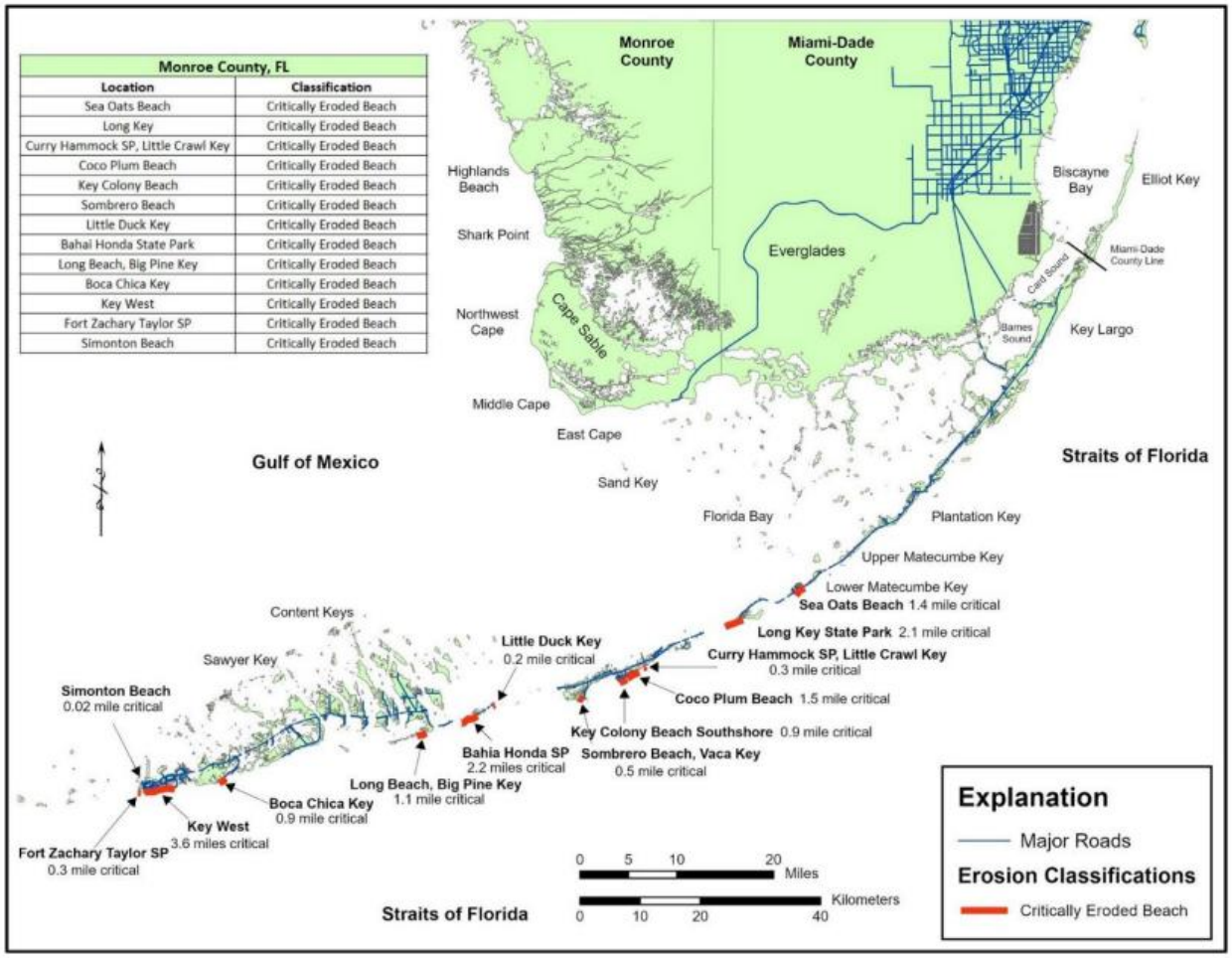
Table 4.9 – Critically Eroded Shorelines, Monroe County

Eroding Shoreline	Region	Erosion Condition	Miles of Critically Eroded Beach
Sea Oats Beach	Middle Keys	Critical	1.4
Long Key State Park	Middle Keys	Critical	2.1
Curry Hammock SP, Little Crawl Key	Middle Keys	Critical	0.3
Coco Plum Beach	Middle Keys	Critical	1.5
Key Colony Beach Southshore	Middle Keys	Critical	0.9
Sombrero Beach, Vaca Key	Middle Keys	Critical	0.5
Little Duck Key	Lower Keys	Critical	0.2
Bahia Honda State Park	Lower Keys	Critical	2.2
Long Beach, Big Pine Key	Lower Keys	Critical	1.1
Boca Chica Key	Lower Keys	Critical	0.9
Key West	Lower Keys	Critical	3.6
Fort Zachary Taylor SP	Lower Keys	Critical	0.3

Eroding Shoreline	Region	Erosion Condition	Miles of Critically Eroded Beach
Simonton Beach	Lower Keys	Critical	0.02
		Total	**15.02**

Source: Florida DEP Critically Eroded Beaches Report, 2024

Figure 4.1 – Critically Eroded Beaches, Monroe County, 2024



Source: Florida DEP Critically Eroded Beaches Report, 2024

EXTENT

The magnitude of erosion can be measured as a rate of change from a measured previous condition. Erosion rates can vary significantly across the county due to several factors including fetch, shoreline orientation, and soil composition. To account for these variations, long-term erosion can also be measured by land cover changes and increases in open water. While a small fraction of the shoreline may exhibit accretion over a short period of time, cumulative impacts can still indicate an overall loss of estuarine coastline and marsh habitat. Table 4.10 provides from the NOAA Coastal Change Analysis Program (C-CAP) Land Cover Atlas showing land cover changes in the County from 1996 to 2021.

Table 4.10 – Land Cover Changes, 1996-2021

Land Cover Type	Monroe Net Change	Monroe Percent Change
Developed, High Intensity	1.15 sq. mi	6.79%
Developed, Low Intensity	0.67 sq. mi	4.76%
Developed, Open Space	0.00 sq. mi	0.05%
Grassland/Herbaceous	-0.10 sq. mi	-5.87%
Agriculture	-0.01 sq. mi	-100.00%
Forested	-0.04 sq. mi	-1.57%
Scrub/Shrub	-0.70 sq. mi	-47.83%
Woody Wetland	-2.74 sq. mi	-0.46%
Emergent Wetland	3.67 sq. mi	0.95%
Bare Land	-1.02 sq. mi	-44.22%
Open Water	-0.88 sq. mi	-0.03%

Source: https://coast.noaa.gov/digitalcoast/data/ccapregional.html

The C-CAP data indicates a net decrease in open water, however the percentage decrease is less than one-half of one percent. The County saw a large, over 47 percent, decrease in scrub land, and over 44 percent decrease in bare land. Only emergent wetlands and all development types were the only land cover areas to see an increase during this time period. Increases in developed land likely result in increased impervious surfaces, which may increase stormwater runoff, alter drainage patterns, and further exacerbate erosion and flood issues.

In terms of the magnitude of impacts, erosion may cause property damage when severe but is unlikely to cause injury or death. In the 2020 LMS, it was noted that much of the reported property damage caused by erosion was to public facilities and park infrastructure. The following table summarizes potential expected impacts by critical erosion area as reported by DEP.

Table 4.11 – Impacts of Critically Eroded Shorelines, Monroe County

Eroding Shoreline	Potential Impacts
Sea Oats Beach, Lower Matecumbe Key	Recreational interests, private development & U.S. Highway 1 along Sea Oats Beach
Long Key	Recreational interests in Long Key State Park & private development
Curry Hammock, Little Crawl Key	Recreational interests at Curry Hammock State Park
Coco Plum Beach	Private development, wildlife habitats & recreational interests at Monroe County park
Key Colony Beach	Private development
Sunset Beach	Recreational interests
Sombrero Beach, Vaca Key	Monroe county public park
Little Duck Key	Monroe county public park
Bahia Honda Key	Recreational interests, park road & park development
Long Beach, Big Pine Key	--
Boca Chica Key	Recreational interests & park road
Key West	Recreational interests – complete elimination of recreational beach
Simonton Beach	Recreational interests as city park
Fort Zachary Taylor	Recreational interests at state park

Source: Florida DEP Critically Eroded Beaches Report, 2024

Impact: 2 – Limited

HISTORICAL OCCURRENCES

As Figure 4.1 shows, shoreline erosion is occurring along ocean coastlines throughout Monroe County. Erosion is typically an ongoing process; however, it can be intensified and accelerated during storm events, particularly hurricane storm tides. Per an examination of event narratives in NCEI records for hurricanes, tropical storms, storm surges, and coastal floods, the following instances of major erosion are noted in Monroe County:

August 17, 2008 (Tropical Storm) – Tropical Storm Fay crossed through the Lower Florida Keys of Monroe County during the evening of August 18. Damage and preparedness costs to government facilities and infrastructure totaled 2.8 million dollars, with about one million dollars due to coastal flooding damage to roads, and 200,000 dollars due to erosion.

September 9, 2008 (Tropical Storm) – Hurricane Ike passed well southwest of the Florida Keys and into the Gulf of Mexico. However, Ike's large wind field produced tropical storm force winds during September 9-10, 2008. Total damage to government property in Monroe County was estimated at $13.5 million dollars. Approximately $1.2 million damage in debris removal and erosion occurred county-wide due to storm surge flooding, with $2.6 million estimated from combined effects from wind and wind-blown rain. Erosion occurred to the causeways surrounding the Card Sound Bridge.

November 7, 2020 (Tropical Storm) – Tropical Storm Eta passed northwest through the middle Florida Keys on November 8 through 9, 2020. Primary impacts from wind occurred as result of a primary rain band which drifted very slowly north through the Upper Florida Keys. Peak wind gusts were mostly in the 50 to 60 mph range, downing trees and large tree limbs, utility lines, and a billboard. One residence was destroyed by a fallen tree resulting in 1 minor injury. Two other residential structures were significantly damaged, with three inaccessible due to blocked streets. About 20 separate power outages affected about 1,000 customers, mostly in Key Largo. Storm Surge flooding was generally in the 1.5 to 2.5 foot range, producing significant street flooding in oceanside Key Largo neighborhoods. The northbound right-of-way was damaged including major erosion, loss of riprap, and about 3,000 feet of fencing along northbound U.S. Highway 1 along the west end of Barnes Sound and Manatee Bay. Minor over wash occurred in the middle Florida Keys at Key Colony Beach, along with yard and dock flooding along the Florida Bay side of Marathon. Widespread rainfall of 3.5 to over 8 inches was measured throughout the Keys, with the highest totals in Key Largo. Damages were estimated near $500K due to mostly from homes damaged by falling trees and tree limbs, as well as utility damage. Storm Surge damage near $100K due to wave action on top of a minor storm surge to the U.S Highway 1 right-of-way.

July 5, 2021 (Tropical Storm) – Tropical Storm Elsa moved north-northwest from western Cuba, through the western Straits of Florida, and passed between the Marquesas Keys and Dry Tortugas into the southeast Gulf of Mexico. Numerous rain bands moved northwest and north through the Lower and Middle Florida Keys, with strong tropical-storm-force wind gusts measured near Key West from the evening of July 5th through the afternoon of July 6th. Maximum winds over the Florida Keys of Monroe County were recorded at 52 mph with gusts to 70 mph at Key West. Wind impacts were confined to damage to trees and utility lines, mostly in Key West proper. No storm surge was recorded in the Florida Keys, however the onshore southerly winds raised water levels just below 1.0 foot above normal at Key West closer to low astronomical tide. Moderate oceanside beach erosion occurred at Key West along with over wash from heavy wave action. Storm total rainfall up to near 7.5 inches resulted in brief but significant street flooding in Key West midday on July 6th.

The Strategic Beach Management Plan report notes the following storms caused erosion of County beaches:

— Hurricane Andrew (1992; Upper Keys)

- Hurricane Georges (1998; Upper, Middle, and Lower Keys)
- Hurricane Irene (1999; Middle and Lower Keys)
- Hurricanes Rita and Wilma (2005; Upper, Middle, and Lower Keys)
- Tropical Storm Fay (2008)
- Hurricane Isaac (2012)
- Hurricane Irma (2017)

Hurricane Irma caused moderate to severe erosion along most beaches in the Middle and Lower Florida Keys. As reported in the Hurricane Irma Post-Storm Report, as Irma made landfall in the Keys with the eye around Cudjoe Key, areas within and to the east of the eye sustained major beach and dune erosion, including complete destruction of entire dune systems in some cases along with destruction of fences and beach access walkways. The Lower Keys to the west of the eye, in the weak quadrant, sustained only minor beach erosion. Details by location can be found in the Post-Storm Report.

PROBABILITY OF FUTURE OCCURRENCE

Erosion and accretion are natural processes that are likely to continue to occur. The likelihood of significant instances of erosion will likely be tied to the occurrence of hurricane, tropical storm, and nor'easter events. Although NCEI only reports on erosion impacts from 4 events over the 25-year span between 1999 through 2024, DEP reports on an additional 7 events. In total, this equates to a 44 percent chance of erosion occurring every year. Additionally, drawing from the likelihood of hurricanes, tropical storms, and Nor'easters, erosion is likely to occur.

Probability: 3 – Likely

CLIMATE CHANGE

As discussed under Climate Change in Section 4.5.5, 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. A 2018 study found that globally, between 1984 and 2015 erosion outweighed accretion. However, the study could not conclude the degree to which erosion during this period is attributed to climate changes or increased coastal development. Nonetheless, increases in erosion have been observed and are expected to continue.

VULNERABILITY ASSESSMENT

PEOPLE

Erosion is unlikely to have any direct impact on the health or safety of individuals. However, it can pose a financial risk. Households and businesses along the shore may have to relocate or make expensive structural changes on their property. Relocating is difficult for anyone, but it can be especially challenging for lower-income individuals.

PROPERTY

Erosion can cause buildings to become closer to the water's edge, increasing the likelihood of water inundating a structure. This can lead to damage or destruction of a foundation. In addition to structural repairs, property owners may be subject to higher insurance premiums to account for increased risk.

Data is not available on specific property or critical facility risk to erosion.

ENVIRONMENT

Erosion can change the shape and characteristics of coastal shorelines. Eroded material may clog waterways and decrease drainage capacity. Erosion can also negatively impact water quality by increasing sediment loads in waterways.

CONSEQUENCE ANALYSIS

Table 4.12 summarizes the potential negative consequences of erosion.

Table 4.12 – Consequence Analysis – Erosion

Category	Consequences
Public	Erosion is unlikely to impact public health and safety.
Responders	Erosion is unlikely to require immediate response or rescue operations.
Continuity of Operations (including Continued Delivery of Services)	Erosion is unlikely to impact public continuity of operations.
Property, Facilities and Infrastructure	Erosion can result in property damage if it is severe enough or if scour occurs that undermines the integrity of structural foundations.
Environment	Erosion can increase sediment loads in waterbodies and change riverine and coastal topography.
Economic Condition of the Jurisdiction	Beach re-nourishment projects to counter erosion are extremely costly. Water dependent industries may suffer from lost shoreline and degraded water quality.
Public Confidence in the Jurisdiction's Governance	Erosion is unlikely to impact public confidence.

ASSOCIATED HAZARDS

Natural hazards are often interconnected. Any given hazard may lead to, or be spurred by, another hazard – sometimes referred to as cascading disasters. Coastal erosion may be associated with tropical cyclones, coastal storms, storm surge, and flood.

CHANGES IN DEVELOPMENT

Increased development along the coastal areas vulnerable to erosion could speed up or intensify existing erosion processes. Enhanced development anywhere on the coast could create new erosional hotspots if not managed properly.

PROBLEM STATEMENTS

U.S. Highway 1 is at risk where erosion is occurring along Sea Oats Beach. Erosion that impacts US Highway 1 could interrupt transportation on the entire Island Chain.

As highlighted in Table 4.11, numerous recreational beaches and parks are at risk due to Coastal Erosion. Loss of such beaches would threaten the Keys' vital tourist economy. Mitigation strategies to address losses caused by coastal erosion should align with the Strategic Beach Management Plan for the Florida Keys Region.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes coastal erosion hazard risk by jurisdiction. Exposure to erosion varies slightly across jurisdictions, particularly in spatial extent. The ratings below are based on the length of miles of critically eroded beaches in each jurisdiction. The impact of erosion across jurisdictions is relatively similar – impacting public and private interests. Importantly, if erosion impacts transportation infrastructure it effects public and private interests the same. Layton is the only jurisdiction without a critically eroded shoreline, so it received impact and spatial extent ratings of 1; however, given the number of hurricanes and storms that impact the county, there is still a possibility that erosion might occur in Layton in the future, therefore it was rated as possible. Other jurisdictions received probability ratings based on prevalence of past and current erosion challenges.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Key Colony Beach	4	2	2	1	3	2.6	M
Key West	4	2	3	1	3	2.8	M
Layton	2	1	1	1	3	1.5	L
Marathon	3	2	3	1	3	2.5	M
Islamorada	4	2	2	1	3	2.6	M
Unincorporated Monroe County	3	2	3	1	3	2.5	M

4.5.2 DROUGHT

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Drought	Likely	Minor	Large	More than 24 hrs	More than 1 week	2.5

HAZARD DESCRIPTION

Drought is a deficiency in precipitation over an extended period. It is a normal, recurrent feature of climate that occurs in virtually all climate zones. The duration of a drought varies widely. There are cases when drought develops relatively quickly and lasts a very short period, exacerbated by extreme heat and/or wind, and there are other cases when drought spans multiple years, or even decades. Studying the paleoclimate record is often helpful in identifying when long-lasting droughts have occurred. Common types of drought are detailed below in Table 4.13.

Table 4.13 – Drought Classifications

Type	Details
Meteorological Drought	Meteorological Drought is based on the degree of dryness (rainfall deficit) and the length of the dry period.
Agricultural Drought	Agricultural Drought is based on the impacts to agriculture by factors such as rainfall deficits, soil water deficits, reduced ground water, or reservoir levels needed for irrigation.
Hydrological Drought	Hydrological Drought is based on the impact of rainfall deficits on the water supply such as stream flow, reservoir and lake levels, and ground water table decline.
Socioeconomic Drought	Socioeconomic drought is based on the impact of drought conditions (meteorological, agricultural, or hydrological drought) on supply and demand of some economic goods. Socioeconomic drought occurs when the demand for an economic good exceeds supply as a result of a weather-related deficit in water supply.

Source: National Drought Mitigation Center

The wide variety of disciplines affected by drought, its diverse geographical and temporal distribution, and the many scales drought operates on make it difficult to develop both a definition to describe drought and an index to measure it. Many quantitative measures of drought have been developed in the United States, depending on the discipline affected, the region being considered, and the application. Several indices developed by Wayne Palmer, as well as the Standardized Precipitation Index, are useful for describing the many scales of drought.

The U.S. Drought Monitor provides a summary of drought conditions across the United States and Puerto Rico. Often described as a blend of art and science, the Drought Monitor map is updated weekly by combining a variety of data-based drought indices and indicators and local expert input into a single composite drought indicator.

The **Palmer Drought Severity Index** (PDSI) devised in 1965, was the first drought indicator to assess moisture status comprehensively. It uses temperature and precipitation data to calculate water supply and demand, incorporates soil moisture, and is considered most effective for unirrigated cropland. It primarily reflects long-term drought and has been used extensively to initiate drought relief. It is more complex than the Standardized Precipitation Index (SPI) and the Drought Monitor.

The **Standardized Precipitation Index** (SPI) is a way of measuring drought that is different from the Palmer Drought Severity Index (PDSI). Like the PDSI, this index is negative for drought, and positive for wet conditions. But the SPI is a probability index that considers only precipitation, while Palmer's indices are water balance indices that consider water supply (precipitation), demand (evapotranspiration) and loss (runoff).

The State of Florida adopted a Drought Action Plan in 2007 that specifies response strategies to varying levels of declared drought. These rules provide the framework to coordinate statewide response to drought.

Warning Time: 1 – More than 24 hours

Duration: 4 – More than one week

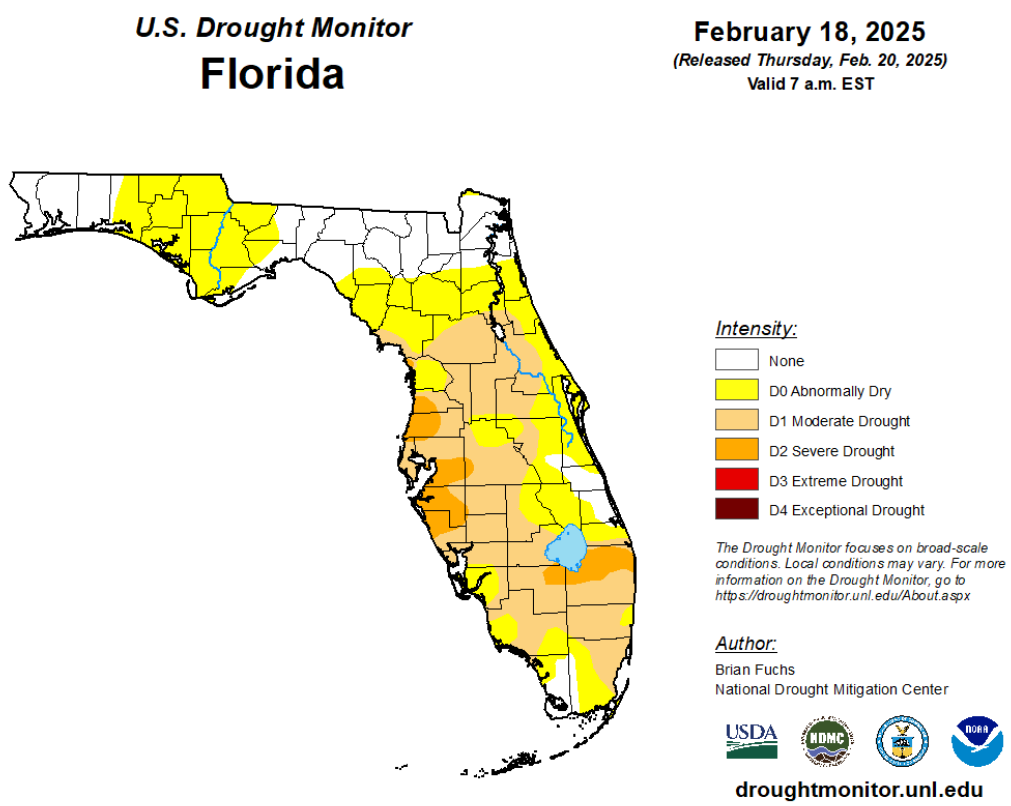
LOCATION

Drought is a regional hazard that can impact large swaths of land – across county and even state lines. In the event of a drought, the entirety of Monroe County will experience impacts.

Figure 4.2 below shows the U.S. Drought Monitor's drought ratings for Florida as of February 18, 2025; as of that date, Monroe County was experiencing some abnormally dry conditions (D0) in the western side of the County and the southeastern corner, and moderate drought (D1) throughout the rest of the County.

Spatial Extent: 4 – Large

Figure 4.2 – US Drought Monitor for Week of February 18, 2025



Source: U.S. Drought Monitor

EXTENT

Drought extent can be defined in terms of intensity, using the U.S. Drought Monitor scale. The Drought Monitor Scale measures drought episodes with input from the Palmer Drought Severity Index, the Standardized Precipitation Index, the Keetch-Byram Drought Index, soil moisture indicators, and other inputs as well as information on how drought is affecting people. Figure 4.3 details the classifications used by the U.S. Drought Monitor. A category of D2 (severe) or higher on the U.S. Drought Monitor Scale can typically result in crop or pasture losses, water shortages, and the need to institute water restrictions.

Drought in Florida occurs on a regular, cyclical basis. The different areas of Florida are randomly affected and sometimes equally affected. Counties that are expected to experience the most weeks of drought each year are the northern and central counties.

Monroe County is susceptible to almost every level of drought on the U.S. Drought Monitor scale, however since 2000 it has not experienced and exceptional drought. The most severe period of drought since 2000 occurred in the spring of 2011 and reached extreme drought across 17% of Monroe County.

Impact: 1 – Minor

Figure 4.3 – US Drought Monitor Classifications

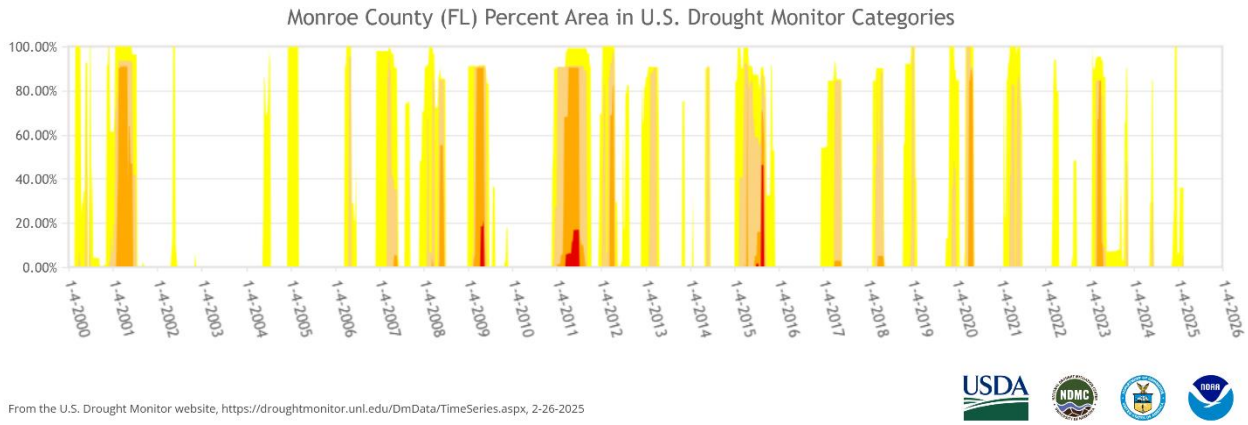
			Ranges				
Category	Description	Possible Impacts	Palmer Drought Severity Index (PDSI)	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Objective Drought Indicator Blends (Percentiles)
D0	Abnormally Dry	Going into drought: ▪ short-term dryness slowing planting, growth of crops or pastures Coming out of drought: ▪ some lingering water deficits ▪ pastures or crops not fully recovered	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	▪ Some damage to crops, pastures ▪ Streams, reservoirs, or wells low, some water shortages developing or imminent ▪ Voluntary water-use restrictions requested	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	▪ Crop or pasture losses likely ▪ Water shortages common ▪ Water restrictions imposed	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	▪ Major crop/pasture losses ▪ Widespread water shortages or restrictions	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	▪ Exceptional and widespread crop/pasture losses ▪ Shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2

Source: US Drought Monitor

HISTORICAL OCCURRENCES

U.S. Drought Monitor provides historical data on droughts in Monroe County and records drought intensity weekly throughout the country. The following figures show historical periods where each county was considered in some level of drought condition. The color key shown in Figure 4.4 indicates the intensity of the drought. According to the U.S. Drought Monitor, between January 1, 2000 and February 18, 2025, Monroe County was in some level of drought condition 42% of the time, or 547 of 1,312 weeks. Most this time was spent in “abnormally dry” or “moderate” drought conditions; Monroe County recorded 26 weeks in “extreme” drought.

Figure 4.4 – US Drought Monitor Historical Trends, Monroe County



Source: U.S. Drought Monitor

The National Drought Mitigation Center's Drought Impact Reporter Dashboard summarizes drought-related media reports starting in 2005. The following narratives were compiled from the Dashboard search results for Monroe County:

- In November 2006, continuing drought conditions and related water supply concerns prompted the South Florida Water Management District to impose voluntary water use restrictions for residents and agriculture producers in Broward, Miami-Dade, Monroe, and Palm Beach Counties. Residents were asked to limit lawn irrigation and personal water use.
- As a result of the ongoing drought in March 2007, the area received about half of the rainfall that they normally received leading to low water levels for Lake Okeechobee – the areas main backup water supply. Mandatory water restrictions were put into effect for the South Florida Water Management District. The restrictions are intended to reduce water consumption by 15%. Farmers were moved to Phase 2 to reduce consumption by 30%.
- More than 30 Florida counties were declared to be natural disaster areas by the U.S. Department of Agriculture due to cold and drought between November 5 and December 17, 2010.
- In March 2018, the Florida Forest Service warned of a heightened wildfire risk statewide as drought conditions persisted. Extreme fire risk existed in Monroe, Miami-Dade, Broward, Lee, Martin, Indian River, Brevard, Highlands, Polk and Orange counties.

The worst drought in Florida's recorded history was from 1954-1956 resulting in the loss of many of crops and a lot timber were lost. The Northern Counties got the worst part of the drought but most of the State was in drought for all of 1956. Another major drought occurred in 1981-1982 when rain was scarce, and Lake Okeechobee reached the lowest water level ever recorded. All the State was in moderate or severe drought, but many regions were out of drought by the end of 1981.

Florida had another severe drought from 1998 to 2001. During this, crops were destroyed, lake levels were at an all-time low, and wildfires raged. This drought caused the water management districts to restrict water use, municipalities to hike water rates, and many restaurants were ordered to stop serving water except for to customers who asked. Several wildfires also occurred in 2007, including one in Monroe County, because of a drought from 2006 to 2007. This period saw the largest rainfall deficit since the 1950s and was considered a one in 25-year drought event.

From 2010 to 2012, the State saw a drought that affected most counties, but the northern central and Panhandle regions were classified as in "extreme drought" for an extended period. Again in 2016, drought conditions developed and lasted into 2017 causing many wildfires.

There has never been a Presidential Major Disaster Declaration for drought in Florida. However, the USDA has declared agricultural disasters because of drought. Disaster designations help producers get loans and emergency assistance in these situations.

PROBABILITY OF FUTURE OCCURRENCE

Based on historical occurrences, the probability that the County will experience some level of drought is likely, with Monroe County in drought 42 percent of the time during the period from 2000 through 2024. Over the same time period, approximately 133 weeks were categorized as a severe (D2) drought or greater; which equates to a 10 percent chance of severe drought in any given week.

Probability: 3 – Likely

CLIMATE CHANGE

The Fourth National Climate Assessment reports that average and extreme temperatures are increasing across the country and average annual precipitation is decreasing in the Southeast. Heavy precipitation events are becoming more frequent, meaning that there will likely be an increase in the average number of consecutive dry days. As temperature is projected to continue rising, evaporation rates are expected to increase, resulting in decreased surface soil moisture levels. Together, these factors suggest that drought will increase in intensity and duration in the Southeast.

The Fifth National Climate Assessment upholds the climate trends reported in the Fourth Assessment and presents additional patterns in the Southeast that exacerbate climate risk and impacts. These patterns include population growth, high proportion of the population with health issues or underlying health conditions, and a large, climate-dependent agricultural sector.[1]

VULNERABILITY ASSESSMENT

PEOPLE

Drought can affect people's physical and mental health. For those economically dependent on a reliable water supply, drought may cause anxiety or depression about economic losses, reduced incomes, and other employment impacts. Conflicts may arise over water shortages. People may be forced to pay more for water, food, and utilities affected by increased water costs.

Drought may also cause health problems due to poorer water quality from lower water levels. If accompanied by extreme heat, drought can also result in higher incidents of heat stroke and even loss of human life.

The Florida Keys experience dry and wet seasons and are sometimes characterized by an arid climate. As the County is supplied by water from the mainland, residents always need to be aware of preserving water, but especially during drought periods. The Florida Key's Aqueduct Authority and the South Florida Water Management District will issue restrictions as needed. Such restrictions are predominantly intended for lawn and vegetation maintenance, but irresponsible water use will affect residents' access to water with continued development.

PROPERTY

Drought is unlikely to cause damages to the built environment, including private property or critical facilities. However, in areas with shrinking and expansive soils, drought may lead to structural damages.

[1] https://nca2023.globalchange.gov/chapter/22/

Drought may cause severe property loss for the agricultural industry in terms of crop and livestock losses. The USDA's Risk Management Agency (RMA) maintains a database of all paid crop insurance claims, however no claims were made in Monroe County between 2007-2023 as a result of drought.

ENVIRONMENT

Drought can affect local wildlife by shrinking food supplies and damaging habitats. Sometimes this damage is only temporary, and other times it is irreversible. Wildlife may face increased disease rates due to limited access to food and water. Increased stress on endangered species could cause extinction. Residents are aware of the need to use native vegetation and ground cover to avoid the need for excessive watering.

Drought conditions can also provide a substantial increase in wildfire risk. As plants and trees die from a lack of precipitation, increased insect infestations, and diseases—all of which are associated with drought—they become fuel for wildfire. Long periods of drought can result in more intense wildfires, which bring additional consequences for the economy, the environment, and society. Drought may also increase likelihood of wind and water erosion of soils.

CONSEQUENCE ANALYSIS

Table 4.14 summarizes the potential negative consequences of drought.

Table 4.14 – Consequence Analysis - Drought

Category	Consequences
Public	Can cause anxiety or depression about economic losses, conflicts over water shortages, reduced incomes, fewer recreational activities, higher incidents of heat stroke, and fatality.
Responders	Impacts to responders are unlikely. Exceptional drought conditions may impact the amount of water immediately available to respond to wildfires.
Continuity of Operations (including Continued Delivery of Services)	Drought would have minimal impacts on continuity of operations due to the relatively long warning time that would allow for plans to be made to maintain continuity of operations.
Property, Facilities and Infrastructure	Drought has the potential to affect water supply for residential, commercial, institutional, industrial, and government-owned areas. Drought can reduce water supply in wells and reservoirs. Utilities may be forced to increase rates.
Environment	Environmental impacts include strain on local plant and wildlife; increased probability of erosion and wildfire.
Economic Condition of the Jurisdiction	Farmers may face crop losses or increased livestock costs. Businesses that depend on farming may experience secondary impacts. Extreme drought has the potential to impact local businesses in landscaping, recreation and tourism, and public utilities.
Public Confidence in the Jurisdiction's Governance	When drought conditions persist with no relief, local or State governments must often institute water restrictions, which may impact public confidence.

ASSOCIATED HAZARDS

Natural hazards are often interconnected. Any given hazard may lead to, or be spurred by, another hazard – sometimes referred to as cascading disasters. Drought may be associated with wildfire and extreme heat.

CHANGES IN DEVELOPMENT

Drought is predominantly controlled by larger weather patterns and less by human development. However, increased development and the resulting increasing impervious surfaces would mean less surface water would be able to directly infiltrate into the ground. Further, because the County's water is predominantly supplied by the Biscayne aquifer in Miami-Dade County, new development and population growth in Monroe County as well as Miami-Dade and other areas supplied by the aquifer will increase water demand. In turn, this could lower the threshold for socioeconomic drought in terms of an inability of water supply to mee water demand.

PROBLEM STATEMENTS

Drought is a regional hazard. If drought impacts Monroe County, it will similarly be impacting neighboring counties and towns. The Keys get most of their drinking water from the Biscayne Aquifer and supplement with water from the Floridan Aquifer. In the case of a drought, water supply could be impacted. Water is already transported long distances to reach the keys, and in drought circumstances the distance water must travel could increase.

Drought can create or exacerbate water quality issues. Though the Biscayne Aquifer is of superior quality, the Floridan Aquifer is considered brackish and experience saltwater intrusion.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes drought hazard risk by jurisdiction. Drought risk is uniform across the planning area. Warning time, duration, and spatial extent are inherent to the hazard and remain constant across jurisdictions. Drought most commonly and severely impacts agricultural activities, of which there are few in the County. In more heavily developed areas, the magnitude of drought is less severe, with lawns and local gardens affected and potential impacts on already constrained local water supplies during severe, prolonged drought.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Key Colony Beach	3	1	4	1	4	2.5	M
Key West	3	1	4	1	4	2.5	M
Layton	3	1	4	1	4	2.5	M
Marathon	3	1	4	1	4	2.5	M
Islamorada	3	1	4	1	4	2.5	M
Unincorporated Monroe County	3	1	4	1	4	2.5	M

4.5.3 EXTREME HEAT

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Extreme Heat	Likely	Limited	Large	More than 24 hrs	More than 1 week	2.7

HAZARD DESCRIPTION

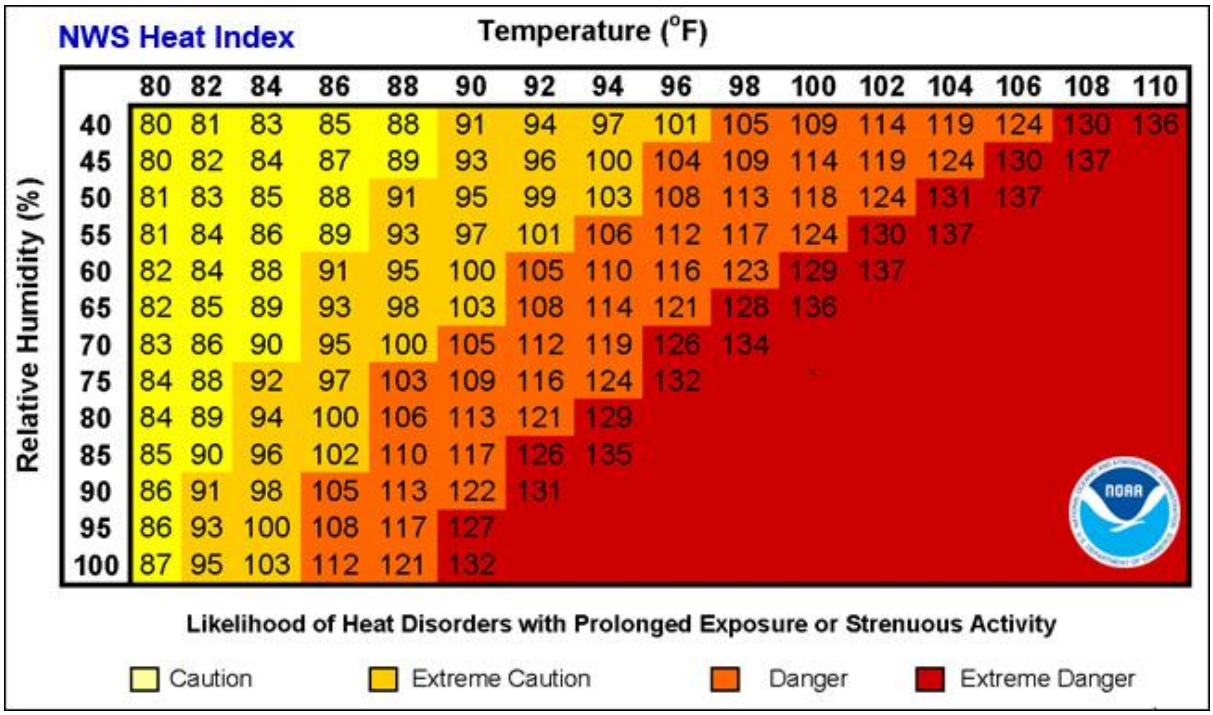
Per information provided by Ready.gov, in most of the United States extreme heat is defined as a long period (2 to 3 days) of high heat and humidity with temperatures above 90 degrees. As temperatures rise, our bodies naturally cool down by sweating. In extreme heat, the body must work extra hard to maintain a normal temperature and sweating might not be enough to cool down. When this happens, a person's body temperature rises faster than it can cool itself. Additionally, when the humidity is high, as is common during extreme heat events in North Carolina, evaporative cooling through sweating becomes less effective. Heat-related illnesses occur when the body overheats from exposure to high temperatures and in severe cases can cause damage to the brain and other vital organs. Heat-related illnesses can also arise from moderate to vigorous physical activity in hot situations.

Extreme heat often results in the highest annual number of deaths among all weather-related disasters. On average, the number of extreme heat days has been increasing each year, putting residents at a higher risk of heat-related illnesses. In 2023, more people in the United States died of heat-related illness than any year on record. Per Ready.gov, older adults, children, and people with certain illnesses and chronic conditions are at greater risk from extreme heat; and humidity increases the feeling of heat.

The National Weather Service (NWS) uses the heat index, also known as apparent temperature, to determine when to issue health alerts. The heat index is a measure of how hot it really feels when the relative humidity is considered along with the actual air temperature. In most areas of the country, the NWS generally issues alerts “when the heat index is expected to exceed 105°F -110°F for at least two consecutive days,” but they also work with local partners to determine the most appropriate conditions for a specific geography.

Ambient air temperature is one component of heat conditions, with relative humidity being the other. The relationship of these factors creates what is known as the apparent temperature. The Heat Index Chart in Figure 4.5 uses both factors to produce a guide for the apparent temperature or relative intensity of heat conditions.

Figure 4.5 – Heat Index Chart



Source: National Weather Service (NWS) https://www.weather.gov/safety/heat-index

Note: Exposure to direct sun can increase Heat Index values by as much as 15˚F. The shaded zone above 105˚F corresponds to a heat index that may cause increasingly severe heat disorders with continued exposure and/or physical activity.

During these conditions, the human body has difficulties cooling through the normal method of the evaporation of perspiration. Health risks rise when a person is overexposed to heat. The most dangerous place to be during an extreme heat incident is in a permanent home, with little or no air conditioning. Those at greatest risk for heat-related illness include people 65 years of age and older, young children, people with chronic health problems such as heart disease, people who are obese, people who are socially isolated, and people who are on certain medications, such as tranquilizers, antidepressants, sleeping pills, or drugs for Parkinson's disease. However, even young and healthy individuals are susceptible if they participate in strenuous physical activities during hot weather or are not acclimated to hot weather. Table 4.15 lists typical symptoms and health impacts of heat exposure.

Table 4.15 – Typical Health Impacts of Extreme Heat

Heat Index (HI)	Disorder
80-90˚ F (HI)	Fatigue possible with prolonged exposure and/or physical activity
90-105˚ F (HI)	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and/or physical activity
105-130˚ F (HI)	Heatstroke/sunstroke highly likely with continued exposure

Source: National Weather Service Heat Index Program, www.weather.gov/os/heat/index.shtml

The NWS has a system in place to initiate alert procedures (advisories or warnings) when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. A common guideline for issuing excessive heat alerts is when the maximum daytime Heat Index is expected to equal or exceed 105 degrees Fahrenheit (°F) and the

night time minimum Heat Index is 80°F or above for two or more consecutive days. A heat advisory is issued when temperatures reach 105°F and a warning is issued at 115°F.

Impacts of extreme heat are not only focused on human health, as prolonged heat exposure can have devastating impacts on infrastructure as well. Prolonged high heat exposure increases the risk of pavement deterioration, as well as railroad warping or buckling. High heat also puts a strain on energy systems and consumption, as air conditioners are run at a higher rate and for longer; extreme heat can also reduce transmission capacity over electric systems.

Warning Time: 1 – More than 24 hours

Duration: 3 – Less than one week

LOCATION

Monroe County and its jurisdictions are susceptible to high temperatures and incidents of extreme heat.

Spatial Extent: 4 – Large

EXTENT

The extent of extreme heat can be defined by the maximum apparent temperature reached. Apparent temperature is a function of ambient air temperature and relative humidity and is reported as the heat index. The NWS Southern Region sets the following criteria for heat advisory and excessive heat warning:

- **Heat Advisory** – Heat Index of 108°F or higher or temperature of 103°F or higher
- **Excessive Heat Warning** – Heat Index of 113°F or higher for any duration or temperature of 103°F or higher

Table 4.16 notes the highest temperature on record at nine weather stations in Monroe County according to the Southeast Regional Climate Center, which maintains temperature records for the highest maximum temperature each month.

Table 4.16 - Highest Temperature by Location

Temperature	Location	Date
101˚F	Dry Tortugas	August 1992
96˚F	Key West Int'l Airport	August 2024*
100˚F	Bahia Honda State Park	July 2023
97˚F	Curry Hammock State Park	July 2011*
99˚F	Duck Key	July 1987
93˚F	Islamorada	August 2010
98˚F	Tavernier	September 1963
95˚F	John Pennekamp State Park	July 2018
97˚F	Flamingo Ranger Station	September 2013

Source: Southeast Regional Climate Center; only for stations with records within the past 20 years.
*Some maximum temperatures were recorded more than once, where this occurred, the most recent occurrence is noted.

Impact: 2 – Limited

HISTORICAL OCCURRENCES

Table 4.17 provides maximum monthly temperature for 2000-2024 at the Key West Municipal Airport weather station (KAPF). This location is used as an indicator for Monroe County overall. Data was summarized with the Northeast Regional Climate Center's Climate Information for Management and Operational Decisions (CLIMOD 2) tool which uses data from NCEI. The highest recorded temperature is 96°F and occurred in both July 2023 and August 2023. The data also indicates that it is typical to have maximum temperature days of 90°F and over from June to September.

Table 4.17 – Historical Monthly Maximum Temperature, Key West International Airport

Year	Maximum Temperature by Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	82	83	86	86	90	91	93	91	91	89	84	82
2001	81	83	85	86	88	90	91	92	90	88	82	83
2002	82	81	85	86	89	89	92	91	90	89	87	83
2003	80	83	86	85	88	90	92	92	91	90	86	81
2004	81	81	82	84	87	90	91	91	90	88	87	84
2005	80	81	83	84	89	90	92	93	90	88	84	82
2006	81	82	83	85	88	90	90	92	90	89	84	83
2007	83	82	84	86	87	93	94	94	95	90	87	83
2008	82	84	84	85	91	91	91	92	91	87	84	80
2009	81	79	84	86	89	91	94	93	92	91	86	84
2010	80	80	82	84	89	92	91	92	90	87	85	78
2011	79	80	84	86	89	90	93	92	92	88	84	81
2012	81	83	82	85	87	89	88	90	90	89	81	83
2013	82	82	84	87	89	91	90	90	90	88	85	83
2014	82	82	83	87	88	91	93	93	90	90	83	82
2015	82	82	84	90	89	94	94	94	94	90	87	84
2016	84	81	83	85	89	91	93	92	92	91	84	85
2017	83	83	86	85	90	91	92	94	93	89	86	83
2018	79	83	83	86	86	90	94	94	95	91	88	86
2019	83	85	85	87	94	93	93	94	92	89	88	85
2020	82	85	85	89	90	92	94	93	93	91	88	82
2021	79	84	85	87	90	91	93	91	92	89	84	84
2022	83	81	84	86	89	91	93	92	92	88	87	83
2023	83	86	87	88	92	95	96	95	95	91	85	85
2024	81	80	85	87	93	92	92	96	94	89	86	82
Max	**84**	**85**	**87**	**90**	**94**	**94**	**94**	**96**	**95**	**91**	**88**	**85**
Mean	**81**	**82**	**84**	**86**	**89**	**91**	**92**	**93**	**92**	**89**	**85**	**83**

Source: Northeast Regional Climate Center CLIMOD 2

PROBABILITY OF FUTURE OCCURRENCE

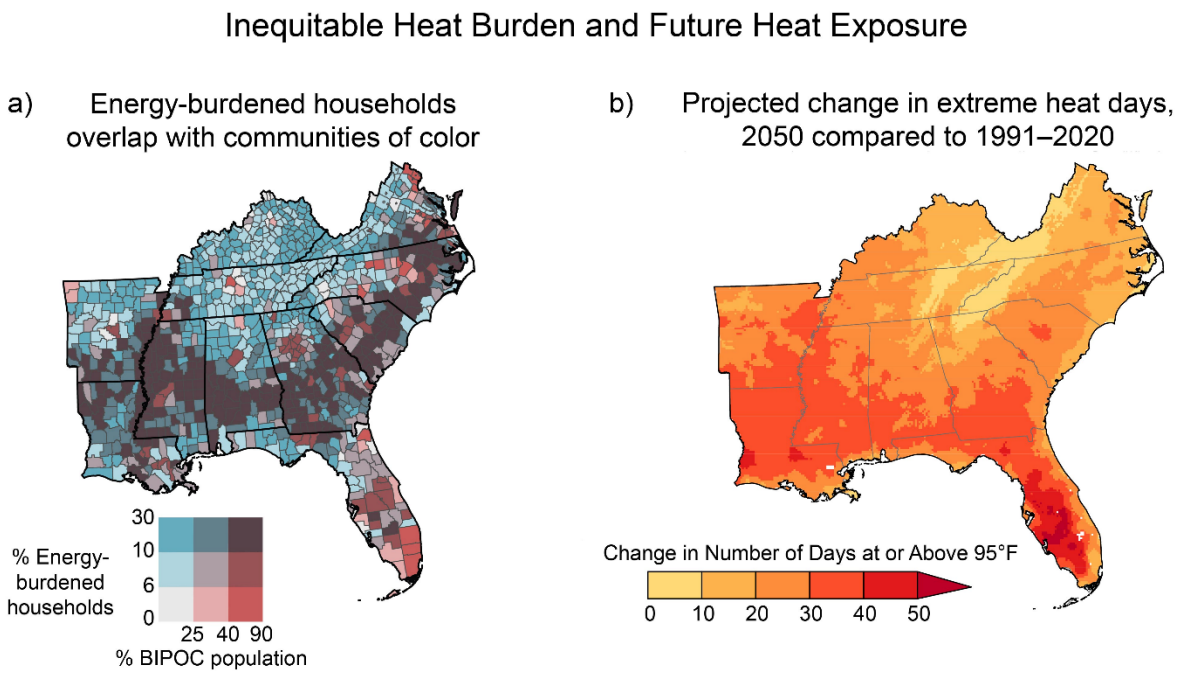
Data was gathered from the Northeast Regional Climate Center's CLIMOD 2 Tool using the Key West airport weather station as an approximation for Monroe County. Based on 25 years of available data, the Region regularly experiences maximum temperatures from June to September that can impact public health and safety.

Probability: 3 – Likely

CLIMATE CHANGE

Research shows that average temperatures will continue to rise in the Southeast United States and globally. Per the Fifth National Climate Assessment, "The number of extreme warm days (above 95°F) is expected to continue increasing with every increment of global warming" and that "heatwaves in the Southeast are happening more frequently and are occurring during a longer heat season, with some cities also showing increasing trends in their duration and intensity." Additional heat stresses can be attributed to the urban heat island effect which can increase the temperature of those living in urban environments compared to rural areas. The number of days over 95°F is expected to increase by between 10 and 40 days annually within the Everglades area of Monroe County as shown in Figure 4.6. Data is unavailable for the Florida Keys.

Figure 4.6 – Projected Change in Number of Days over 95˚F



Source: USGCRP, 2023: Fifth National Climate Assessment

VULNERABILITY ASSESSMENT

METHODOLOGIES AND ASSUMPTIONS

No data is available to assess the vulnerability property in the planning area to extreme heat. Vulnerable populations based on age are estimated according to Census data. Data on other vulnerable populations is not available.

PEOPLE

Extreme heat can cause heat stroke and even loss of human life. The elderly and the very young are most at risk to the effects of heat. People who are isolated are also more vulnerable to extreme heat. The table below summarizes the percent of each jurisdiction's total population that falls within these age groups.

Jurisdiction	Population under 5 years of age (%)	Population over 65 years of age (%)
Islamorada	4%	30%
Key Colony Beach	0%	55%
Key West	5%	21%
Layton	4%	36%
Marathon	5%	21%
Unincorporated Monroe County	4%	26%
Monroe County Total	**4%**	**24%**

Source: U.S. Census Bureau, American Community Survey 2019-2023 5-year estimates

PROPERTY

Extreme heat is unlikely to cause significant damages to the built environment. However, road surfaces can be damaged as asphalt softens, and concrete sections may buckle under expansion caused by heat. Train rails may also distort or buckle under the stress of head induced expansion. Power transmission lines may sag from expansion and if contact is made with vegetation the line may short out causing power outages. Additional power demand for cooling also increases power line temperature adding to heat impacts.

ENVIRONMENT

Wild animals are vulnerable to heat disorders like humans, including mortality. Vegetation growth will be stunted, or plants may be killed if temperatures rise above their tolerance extremes.

CONSEQUENCE ANALYSIS

Table 4.18 summarizes the potential negative consequences of extreme heat.

Table 4.18 – Consequence Analysis – Extreme Heat

Category	Consequences
Public	Extreme heat may cause illness and/or death.
Responders	Consequences may be greater for responders if their work requires exertion and/or wearing heavy protective gear.
Continuity of Operations (including Continued Delivery of Services)	Continuity of operations is not expected to be impacted by extreme heat because warning time for these events is long.
Property, Facilities and Infrastructure	Minor impacts may occur, including possible damages to road surfaces and power lines.
Environment	Environmental impacts include strain on local plant and wildlife, including potential for illness or death.
Economic Condition of the Jurisdiction	Farmers may face crop losses or increased livestock costs.
Public Confidence in the Jurisdiction's Governance	Extreme heat is unlikely to impact public confidence.

ASSOCIATED HAZARDS

Natural hazards are often interconnected. Any given hazard may lead to, or be spurred by, another hazard – sometimes referred to as cascading disasters. Extreme heat may be associated with drought and wildfire.

CHANGES IN DEVELOPMENT

More intensive development can increase the urban heat island effect – where the concentration of structures, infrastructure, and human activity traps and stores heat resulting in localized "heat islands." Information is not available on the extent to which impervious surface coverage has changed since the adoption of the previous hazard mitigation plan.

PROBLEM STATEMENTS

Populations most vulnerable to the effects of excessive heat are children under the age of 5 and those over the age of 65. Key Colony Beach and Layton have more than a third of their population in the 65 and above category. Key west has over 5% of its population in the under 5 category.

The county and participating jurisdictions may want to consider identifying community spaces that can serve as cooling centers and publicize those spaces in advance of forecasted extreme heat.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes extreme heat hazard risk by jurisdiction. Extreme heat risk does not vary significantly by jurisdiction.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Key Colony Beach	3	2	4	1	3	2.7	M
Key West	3	2	4	1	3	2.7	M
Layton	3	2	4	1	3	2.7	M
Marathon	3	2	4	1	3	2.7	M
Islamorada	3	2	4	1	3	2.7	M
Unincorporated Monroe County	3	2	4	1	3	2.7	M

4.5.4 FLOOD

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Flood	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 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 causes more damage in the United States than any other severe weather related event, an average of $5 billion a year. Approximately 90 percent of presidentially declared disasters result from flood-related natural hazard events. Taken as a whole, more frequent, localized flooding problems that do not meet federal disaster declaration thresholds ultimately cause the majority of damages across the United States.

SOURCES AND TYPES OF FLOODING

Per the 2005 Flood Insurance Study (FIS), flooding results mainly from storm surge flooding in the areas of the county bordering the Atlantic Ocean and Gulf of Mexico when tidal surges, wave action, and heavy rainfall combine.

The general topography of Monroe County is extremely flat, with natural elevations of 4 to 7 feet above mean sea level. Shallow slopes and the generally low-lying nature of the keys makes the County vulnerable to flooding during coastal events and heavy rains. Some rainfall in the area runs off into the surrounding seas and other rainfall that is caught in closed basins can drain relatively quickly into underlying coral rock and limestone soils that have high infiltration rates. However, there are still instances of rainfall flooding that does not runoff or drain quickly, causing water to accumulate in ponded areas. Additionally, there are approximately 170 miles of canals in the Florida Keys. Mismanagement and improper cleaning of these canals also causes flooding from heavy rains, hurricanes, and tidal systems.

Coastal Tidal Flooding: All lands bordering the Atlantic and Gulf Coasts are susceptible to tidal effects and flooding. Coastal land such as sand bars, barrier islands and deltas provide a buffer zone to help protect human life and real property relative to the sea much as flood plains provide a buffer zone along rivers and other bodies of water. Coastal floods usually occur because of abnormally high tides or tidal waves, storm surge and heavy rains in combination with high tides, tropical storms and hurricanes.

Shallow Ponding: Because much of the County is flat, whatever rainfall doesn't flow from an area tends to pond and percolate into the ground, causing water tables to rise during the wet season and periods of extended rainfall and reducing the capacity for soil storage and infiltration.

Flash or Rapid Flooding: A flash flood occurs when water levels rise at an extremely fast rate as a result of intense rainfall over a brief period, possibly from slow-moving intense thunderstorms and sometimes combined with saturated soil, or impermeable surfaces. Flash flooding can happen in Special Flood Hazard Areas (SFHAs) as delineated by the National Flood Insurance Program (NFIP) and can also happen in areas not associated with floodplains. Flash flood hazards caused by surface water runoff are most common in urbanized areas, where greater population density generally equates to more impervious surface (e.g., pavement and buildings) which increases the amount of surface water generated.

Flash flooding is a dangerous form of flooding which can reach full peak in only a few minutes. Rapid onset allows little or no time for protective measures. Flash flood waters move at very fast speeds and can move boulders, tear out trees, scour channels, destroy buildings, and obliterate bridges. Flash flooding can result in higher loss of life, both human and animal, than slower developing river and stream flooding.

Localized/Stormwater Flooding: Localized stormwater flooding can occur in Monroe County. Localized stormwater flooding occurs when heavy rainfall and an accumulation of runoff overburden the stormwater drainage system. The cause of localized stormwater flooding in Monroe County can be attributed to its generally flat topography, among other factors. 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.

While localized flooding may not be as destructive as coastal flooding, it is a chronic problem. The repetitive damage caused by such flooding can add up. Sewers may back up, yards can be inundated, and homes, businesses and vehicles can be flooded. Drainage and sewer systems not designed to carry the capacity currently needed to handle increased storm runoff can cause water to back into basements and damage mechanical systems. These impacts, and other localized flooding impacts, can create public health and safety concerns.

In addition to these different types of flooding, flooding in Monroe County is a factor of the amount and timing of rainfall and the tide cycle elevation. The amount of rainfall occurring in March would not have the same flooding effect if the same amount occurred in September. During the dry season, the water table elevation typically drops to several feet below natural ground elevations. This allows for larger storage volume in the soil, lakes, canals, ditches, and swales. During the wet season, however, the water table elevation is often near the natural ground surface, lakes are filled, and ditches are flowing. The rainfall added to such conditions creates more stormwater runoff.

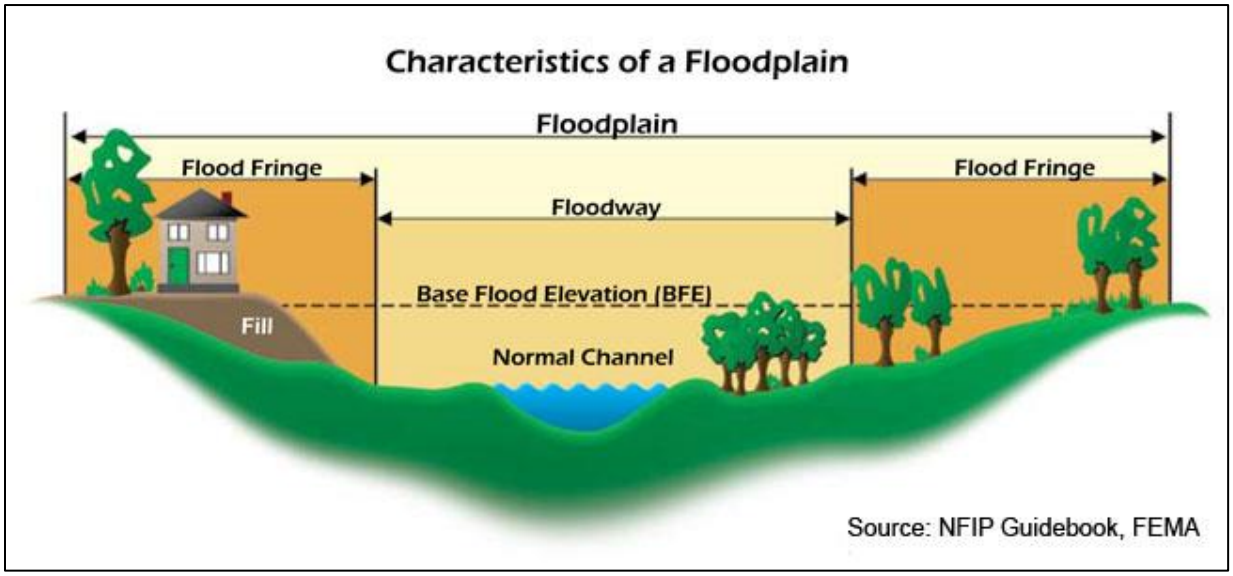
FLOODING AND FLOODPLAINS

A floodplain, as shown in Figure 4.7 and Figure 4.8, is flat or nearly flat land adjacent to a stream, river, or body of water that experiences occasional or periodic flooding. In riverine floodplains, it includes the floodway, which consists of the stream channel and adjacent areas that carry flood flows, and the flood fringe, which are areas covered by the flood, but which do not experience a strong current. Floodplains are made when floodwaters exceed the capacity of the main channel or escape the channel by eroding its banks. When this occurs, sediments (including rocks and debris) are deposited that gradually build up over time to create the floor of the floodplain. Floodplains generally contain unconsolidated sediments, often extending below the bed of the stream. In coastal floodplains, zones are distinguished by wave heights.

Floodplain boundaries are designated and routinely updated through cooperation between local governments, states and the FEMA. Flood Insurance Study findings are shown on Flood Insurance Rate

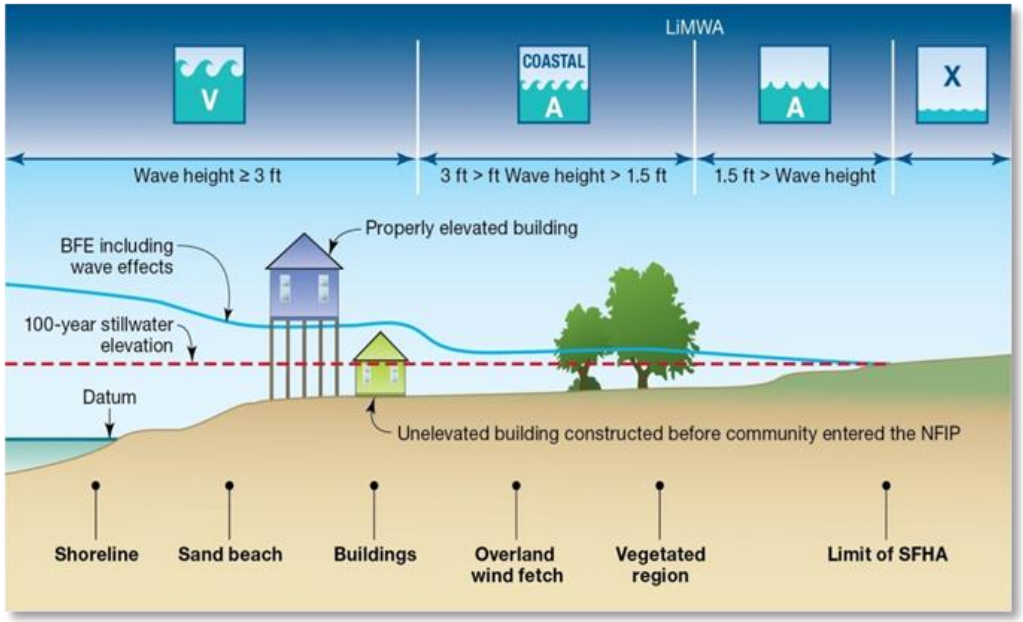
Maps (FIRMs) and describe various flood hazard zones based on flood height exceedance return periods. Flood hazard zone designations depend on local conditions and map issue dates, but all will show the 100-year or base flood elevation (1-percent annual chance flood), as well as some areas of the 500-year floodplain (0.2-percent annual chance flood).

Figure 4.7 – Characteristics of a Riverine Floodplain



In coastal areas, flood hazards typically include the added risk of wave action delineated by the VE Zone and Coastal AE Zone. Wave height and intensity decreases as floodwaters move inland. Figure 4.8 shows the typical coastal floodplain and the breakdown of flood zones in these settings. These flood zones are discussed further in Table 4.19

Figure 4.8 – 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 percent chance in any given year of being equaled or exceeded. The 500-year flood is the flood that has a 0.2 percent 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-percent-annual-chance flood, which is the minimum standard used by most federal and state agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance. 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 damages. Participation in the NFIP allows for the federal government to make flood insurance available within the community as a 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.

Warning Time: 3 – 6 to 12 hours

Duration: 3 – Less than 1 week

LOCATION

Regulated floodplains are illustrated on FIRMs, which 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-percent-annual-chance flood event. Table 4.19 summarizes the flood insurance zones identified by the Digital FIRMs (DFIRMs). 4.19 reflects the effective mapped flood insurance zones for Monroe County and Figure 4.10 shows the mapped preliminary DFIRM. Maps for each participating jurisdiction are provided in the jurisdictional annexes.

Flooding can occur anywhere in Monroe County. Flood risk is not limited to the 1%-annual-chance floodplain.

Table 4.19 – Mapped Flood Insurance Zones within Monroe 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. The Coastal AE Zone is differentiated from the AE Zone by the Limit of Moderate Wave Action (LiMWA) and includes areas susceptible to wave action between 1.5 to 3 feet.

Zone	Description
AO	Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet. Average flood depths derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance purchase requirements and floodplain management standards apply.
0.2% Annual Chance (Shaded Zone X)	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.

Figure 4.9 – FEMA Effective Flood Hazard Areas in Monroe County

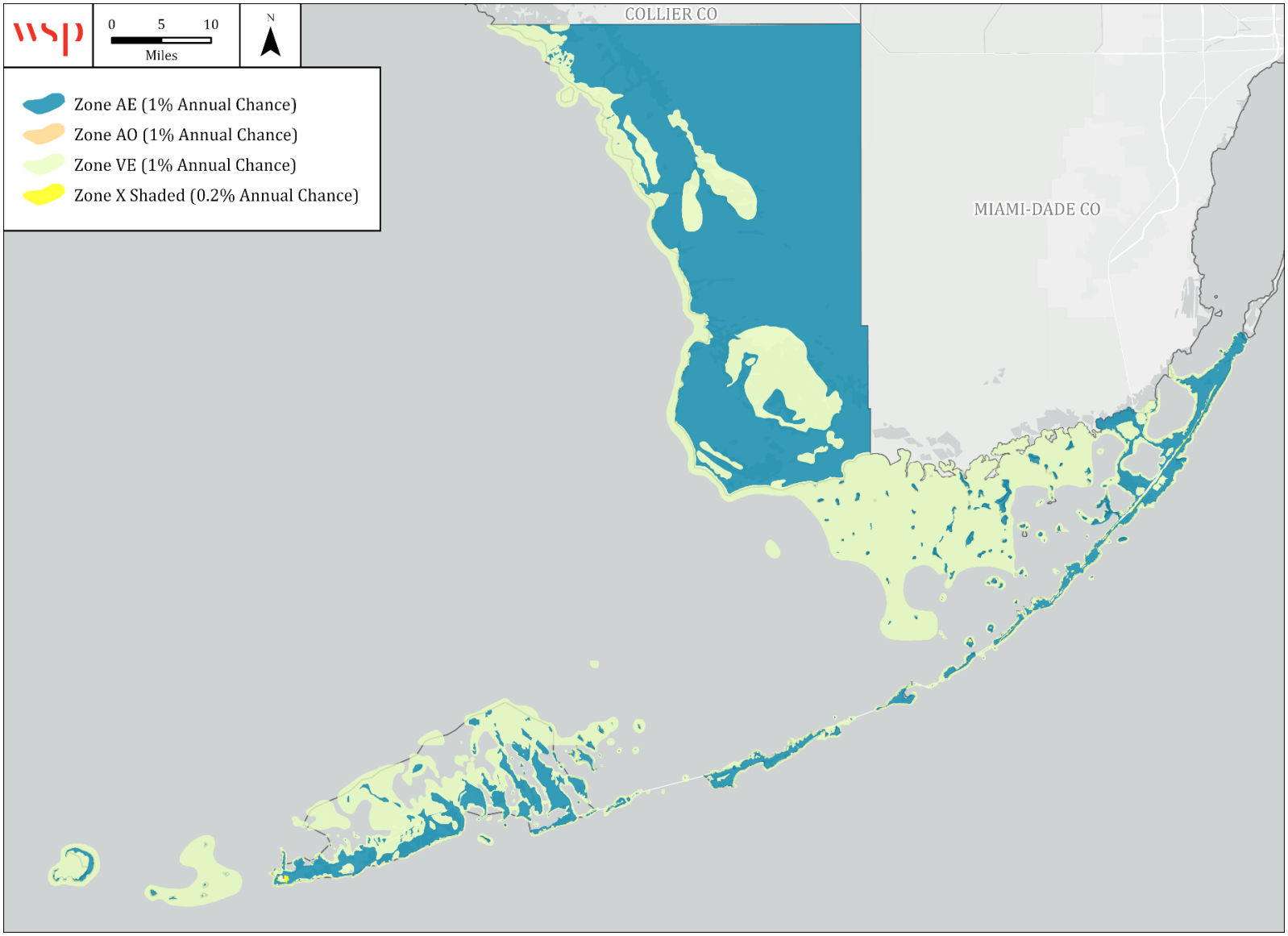
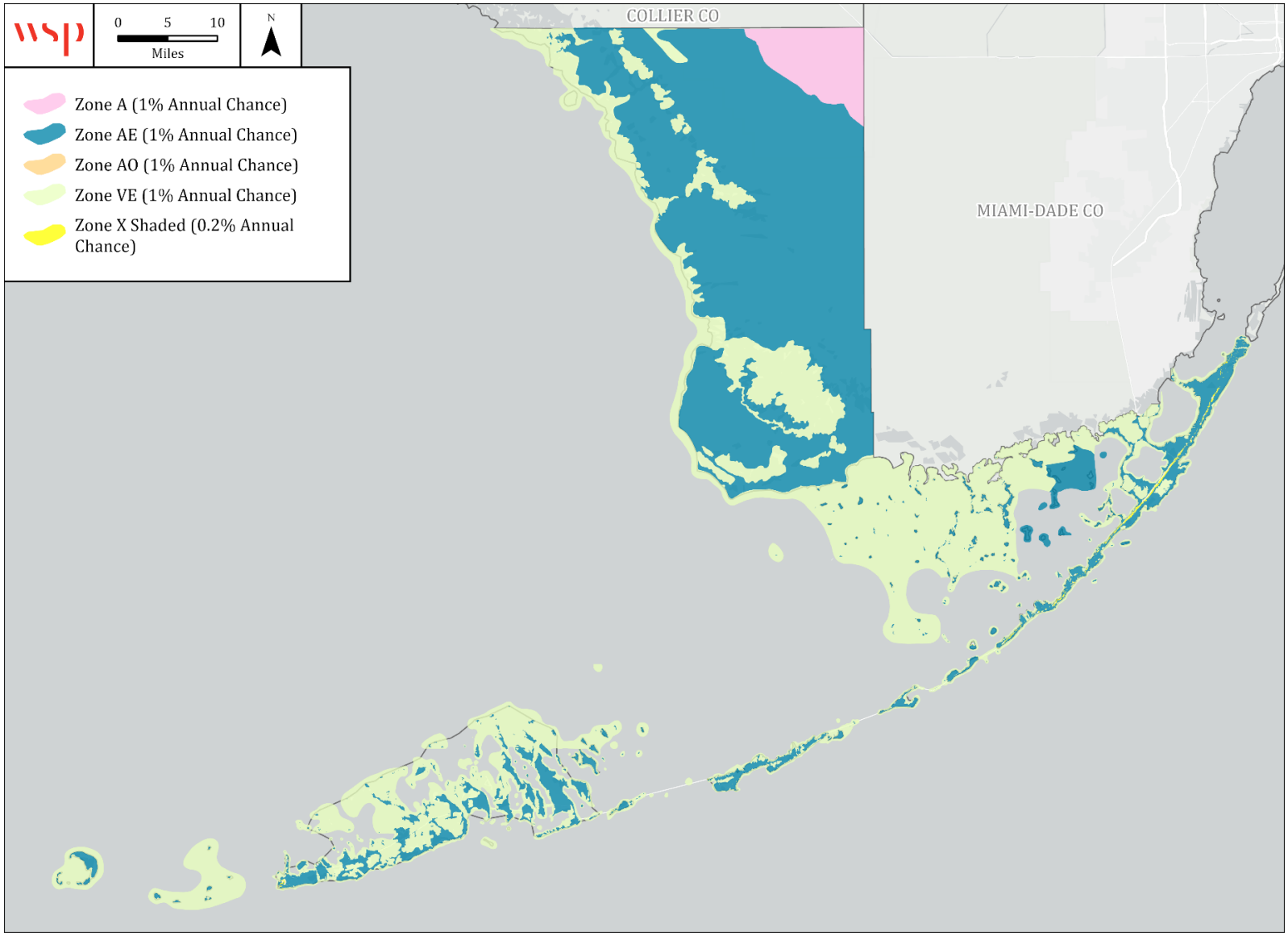


Figure 4.10 – FEMA Preliminary Flood Hazard Areas in Monroe County



Further, the LMSWG and the previous LMS plan identified the following areas more vulnerable to coastal flooding and/or pooling of rainfall flooding from heavy rains. Locations along Highway:

- MM 109 in the Upper Keys.
- MM 106, Lake Surprise Area; vulnerable to the effects of wind driven wave run-up from E/NE and W/SW directions; heavy rainfall results in ponding.
- MM 111, the exposed beach area along the 17-mile stretch bordering Barnes Sound, experiences wave runup or "piling" with strong E and NE winds.
- MM 113, the Point Laura Marina Area, borders Barnes Sound and is susceptible to strong E and NE winds.
- MM 73.5-74.5, the Lower Matecumbe area known as "Sea Oats Beach," vulnerable to NE/E/SE wind driven wave run-up.
- MM 30-32, Big Pine Key; the area north of the Big Pine Plaza Shopping Center encompassing Wilder Road and Key Deer Boulevard, while not normally vulnerable to storm surge effects, experience rainfall ponding.
- MM 9-10, Big Coppitt Key, Bayside, experience wind-generated wave run-up.

These areas of repetitive flooding may impact evacuation routes during an extended rainfall or wind-driven flood event.

Spatial Extent: 4 – Large

AREAS LIKELY TO FLOOD IN THE FUTURE

Based on this assessment of the locations vulnerable to current flooding and potential changes to flood conditions discussed under the Climate Change and Changes in Development sections below, the following locations were identified as areas that are likely to flood in the future:

- Special Flood Hazard Areas and 0.2% annual-chance floodplains: According to both the effective and preliminary FIRMs, about 94 percent of Monroe County is located within the SFHA, and between 0.1 and 0.2 percent of the county is located within the 0.2% annual-chance floodplain. These areas are at high risk of future flooding. While new development and redevelopment is limited, changes in floodplain development and future development within the watershed in general as well as climate change-driven changes in rainfall probabilities and intensities could increase the size of the SFHAs and/or the depth of flooding in these areas in the future.
- Localized stormwater flooding areas: It is highly likely that areas without stormwater drainage infrastructure or with undersized or underperforming drainage infrastructure will continue to experience localized flooding problems. Specific problem locations are listed above. Areas with vacant land that may be developed and converted into impervious surface area may be more likely to flood in the future if steps are not taken to mitigate the impacts of development.
- Repetitive loss areas: Many repetitive losses can be attributed to coastal flooding and storm surge events which may become more severe due to sea level rise. Therefore, it is very likely that unmitigated repetitive loss properties will continue to flood in the future. Repetitive loss counts are detailed later in this section and areas vulnerable to storm surge are detailed in Section 4.5.7.
- Areas vulnerable to sea level rise: Sea level rise will increase vulnerability to high tide flooding and coastal flooding and can even increase stormwater flooding if drainage outfalls are impeded by higher water levels. Areas directly vulnerable to sea level rise are detailed in Section 4.5.5. These areas are likely to flood in the future.

EXTENT

Flood extent can be defined by the amount of land in the floodplain and the potential magnitude of flooding as measured by flood height and velocity. FEMA Flood Insurance Studies define the probability of flooding by flood events of a magnitude which are expected to be equaled or exceeded once on the average during a specific time period, or recurrence interval.

Per this assessment, approximately 99 percent of Monroe County falls within the SFHA, an additional 5.2 percent of the County area is open water. Therefore, effectively 99 percent of the county's land area (not classified as open water) is within the SFHA. Table 4.20 provides a summary of the County's total area by flood zone on the 2005 effective DFIRM and a comparison to flood zone acreage on the preliminary DFIRM (released in December 2019). Changes from the effective DFIRM include over 62,000 acres of land no longer in the AE zone, over 44,000 acres now classified in the A zone, which was previously not included in the County's flood maps, and over 18,000 acres now classified as VE. Additionally, the preliminary maps represent an 79% increase in acreage in the 0.2% annual chance flood zone. Figure 4.11 shows the depth of flooding predicted from a 1% annual chance flood. Details on individual jurisdiction's flood zone acreage are available in the jurisdictional annexes.

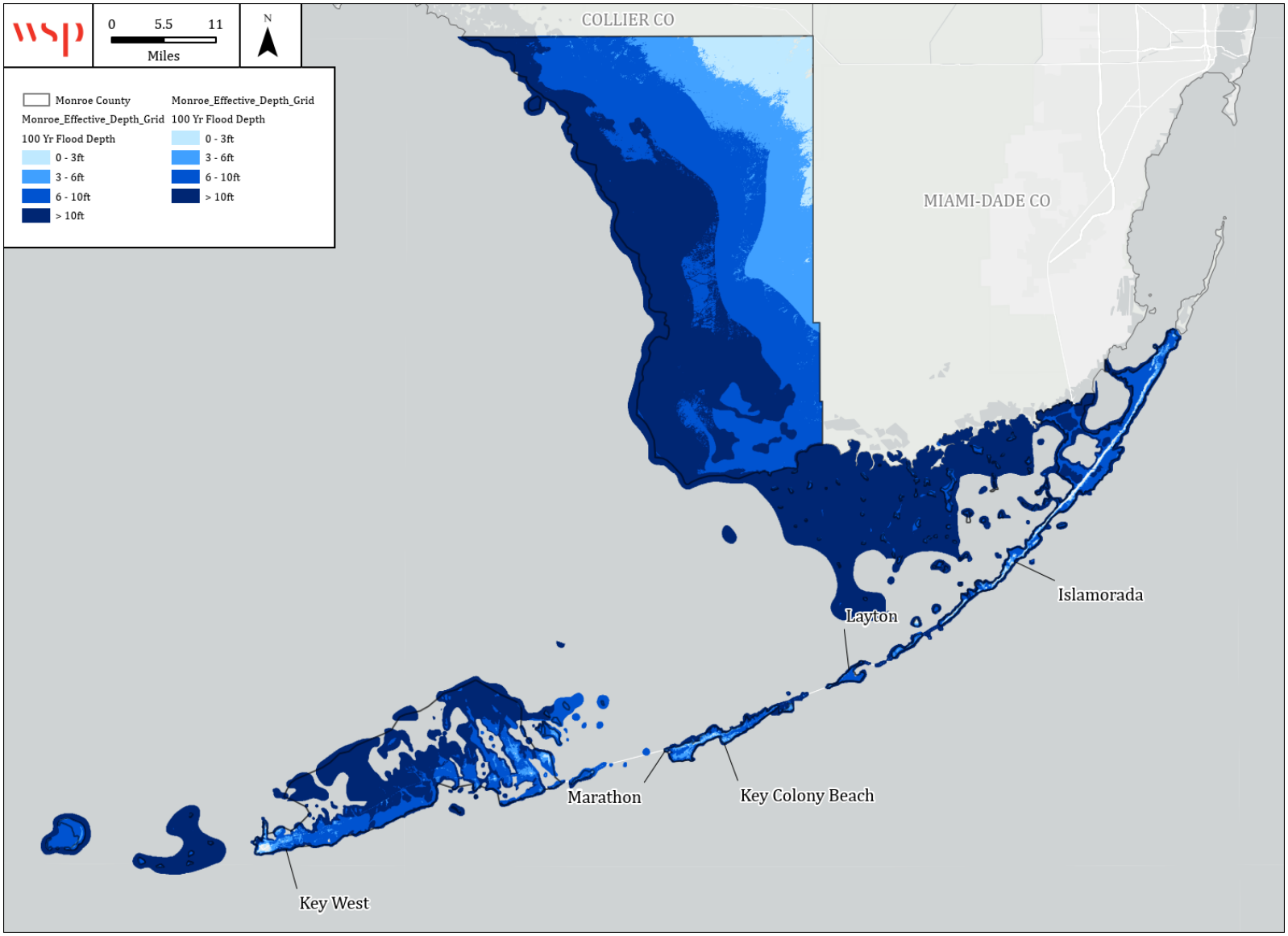
Table 4.20 – Flood Zone Acreage in Monroe County

Flood Zone	Effective DFIRM (2005)		Preliminary DFIRM (2019)		Change from Effective (acres)
	Acreage	Percent of Total (%)	Acreage	Percent of Total (%)	
A	0.0	0%	44,683.8	5.1%	44,683.8
AE	630,059.3	71.9%	567,352.5	64.7%	-62,706.8
AO	3.5	0.0%	19.1	0.0%	15.6
VE	198,089.7	22.6%	216,144.0	24.7%	18,054.3
0.2% Annual Chance Flood Hazard (Shaded X)	1,195.8	0.1%	2,141.4	0.2%	945.6
Unshaded X	1,556.9	0.2%	849.3	0.1%	-707.6
Open Water	45,809.2	5.2%	45,524.3	5.2%	-284.9
Total	876,714.4	--	876,714.4	--	0.0
SFHA Total	**828,152.5**	**94%**	**828,199.4**	**94%**	**46.9**

Source: FEMA Effective DFIRM, Preliminary DFIRM

Note: The differences between the effective FIRM and the preliminary FIRM are significant and will likely still change. These details are provided here only as a comparison – all further flood analysis is based in the 2005 Effective DFIRM.

Figure 4.11 – Flood Depth, 100-Year Floodplain, Monroe County



Almost the entire planning area is within areas of high flood risk, as defined by the SFHA on FEMA's 2005 Flood Insurance Rate Maps as vulnerable to the 1-percent-annual-chance flood event. However, while the 1-percent-annual-chance flood is the basis for floodplain management under the NFIP, that does not mean that properties outside the SFHA are not at risk of flooding. Floods of other magnitudes may occur. The remainder of the planning areas is subject to moderate and low flood risk. Low risk is not no risk; areas outside the SFHA may still be flooded by heavy rain events and/or more severe coastal floods.

Impact: 3 – Critical

HISTORICAL OCCURRENCES

Table 4.21 details the historical occurrences of flooding identified from 2000 through 2024 by NCEI Storm Events database. It should be noted that only those historical occurrences listed in the NCEI database are shown here. Other, unrecorded or unreported events may have occurred within the planning area during this timeframe. Further, while storm surge events are the dominant cause of flooding in the County, they will be considered and detailed in the Tropical Cyclones Section 4.5.5.

Table 4.21 – NCEI Records of Flooding, 2000-2024

Type	Event Count	Deaths/ Injuries	Reported Property Damage
Coastal Flood	14	0/0	$100,000
Flood	24	0/0	$56,000
Heavy Rain	11	0/0	$0
Flash Flood	-	-	-
Total	**49**	**0/0**	**$156,000**

Source: NCEI
Note: No flash flood events were recorded in the NCEI database

According to NCEI, 49 recorded flood events affected the planning area from 2000 to 2024 causing an estimated $156,000 in property damage, with no fatalities, injuries, or crop damage. Note that damage numbers reported here are only those reported by NCEI, which does not include insurance damage estimates; actual damages due to flood in County are likely higher.

To supplement the data from NCEI, the following table summarizes the number and dollar value of NFIP claims paid in Monroe County by year. Note that these claims also include those made for flooding due to hurricanes.

Table 4.22 – NFIP Claims Data by Year, Monroe County

Year	Number of Claims	Total Value of Claims
2000	23	$63,213.40
2001	34	$ 183,507.10
2002	5	$1,740.23
2003	5	$5,607.30
2004	25	$66,398.20
2005	9,186	$335,370,185.90
2006	22	$153,652.80
2007	7	$24,196.80
2008	44	$395,397.10
2009	7	$74,009.10
2010	17	$121,885.81
2011	41	$325,979.97

Year	Number of Claims	Total Value of Claims
2012	18	$55,824.92
2013	14	$23,9402.23
2014	13	$224,458.63
2015	6	$48,734.98
2016	3	$8,950.04
2017	8,190	$290,459,534.30
2018	8	$0
2019	7	$4,025.38
2020	77	$1,193,608.10
2021	3	$22,574.00
2022	570	$28,391,407.08
2023	30	$706,708.91
2024	21	$210,307.03
2025	9	$ 168,863.82
Total	**18,385**	**$658,520,173.13**

Source: NFIP Claims Data, accessed April 2025

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

February 12, 2007 – A line of thunderstorms developed along a developing warm front in the Florida Straits. Several thunderstorm cells tracked northeast across Duck Key and Long Key, producing very heavy rainfall and minor flooding. A Long Key State Park, 5.38 inches of rain were observed in two hours, with a final storm total rainfall of 9 inches. State Park Rangers reported 6 campsites were washed out and a park road was flooded. There were also reports of a flooded parking lot at the Layton Post Office. 5.6 inches of rain were reported in Duck Key.

August 18, 2008 – Tropical Storm Fay moved through the Lower Florida Keys during the evening of August 18, 2008, producing tropical storm force winds and heavy rainfall. Rainfall produced widespread street flooding in Key West. This flooding caused a small section of the tarmac at the Key West international airport to collapse. In total, rainfall amount of 3.5 to 4.0 inches were reported in the Key West area, up to 7.27 inches in Marathon, and 7.05 inches in Ramrod Key, resulting in temporary street and low area flooding.

September 29, 2010 - Thunderstorms focused along a convergence zone indirectly related to Tropical Storm Nicole produced heavy rainfall and extensive street flooding over Lower and Upper Matecumbe Keys within the Village of Islamorada. Water entered one home on Lower Matecumbe Key, causing one family to be temporarily displaced.

October 17, 2011 – Persistent showers and thunderstorms moved across the extreme Lower Florida Keys due to lower pressure over the Yucatan Peninsula. Street flooding of 3 to 4 feet deep was reported at the corners of White and Eaton Streets and Caroline and Margaret Streets in Old Town Key West, as well as at Donald and 20th Streets in New Town Key West. Several cars were stranded due to street flooding along South Roosevelt Boulevard between the Overseas Highway and Flagler Avenue, as well as near 1st Street and North Roosevelt Boulevard. Isolated low elevation home flooding was observed in Mid Town Key West along Fogarty Avenue.

October 19, 2011 - A low pressure system in the eastern Gulf of Mexico assisted in the formation of three separate squall lines, which moved east through the Florida Keys and surrounding coastal waters from the evening of October 18th through morning of October 19th. Widespread gale-force wind gusts

and street flooding occurred across the Lower and Middle Florida Keys, along with a damaging waterspout across the Anchorage at Key West Harbor. Flooding was observed at Sigsbee Park at Dredgers Key in Key West, as well as up to three feet deep at the Stadium Apartments in New Town Key West. Flooding of side streets up to two feet was observed in Marathon.

May 2, 2013 – Thunderstorms developed in cyclic fashion over Key West and adjacent nearshore waters over a duration of three hours, producing widespread street flooding and flooding to businesses along the lower elevations of Key West. Flooding was reported in the Old Town Historic District of Key West, including up to two feet of flood depth at the corner of Front and Simonton Streets, at Duval and Greene Streets, and at the corner of White and Eaton Streets and up to three feet in depth at Duval and Front Streets. Up to 7 inches of rain was measured at the Key West Wastewater Treatment Plant on the south end of Fleming Key. Several businesses had water inundation to around 6 inches in depth. Significant flooding was observed on Patterson Street in Mid-Town Key West, causing a commercial-sized dumpster to float down the street. Further flooding included inundation of two and a half feet along Thompson and George Streets, and up to one foot in depth at the corner of Jose Marti Drive and North Roosevelt Boulevard. A retention and floodwater staging pond overflowed due to blocked drainage culverts leading to the Gulf of Mexico under North Roosevelt Boulevard. Street flooding up to two feet in depth was also observed along South Roosevelt Boulevard between Flagler Avenue and the Overseas Highway.

September 21, 2015 - Minor coastal flooding occurred in a few Florida Bayside neighborhoods in North Key Largo, due mostly to persistent large northeast fetch occurring offshore the southeast U.S. Coast. Due to the very small diurnal tidal range of 2 to 3 inches in the far eastern end of Florida Bay and Blackwater Sound. Continuous coastal flooding of streets began approximately 17:00 EST on September 21st in the area of Adams and Shaw Drive in North Key Largo's bayside, gradually expanding to adjacent streets throughout the Blackwater Sound and Sexton Cove shorelines. While no homes or businesses were flooded, the depth of water reached as high as 0.8 feet by September 30th, with a couple streets becoming impassable to small vehicles. The flooding was confirmed by Monroe County Emergency Management and Key Largo Fire Rescue.

October 5, 2017 - Abnormally high spring tides occurred throughout the Florida Keys as result of seasonal autumn King Tides and prolonged strong northeast to east winds. Coastal Flooding with saltwater depth 3 to 6 inches above street level observed at the corner of Truman Avenue and North Roosevelt Boulevard in Key West. U.S. Coast Guard and National Weather Service personnel confirmed further coastal flooding in the Upper Florida Keys, with saltwater depth 6 to 8 inches above streets on the oceanside of Rock Harbor, and minor flooding of the U.S. Highway 1 northbound lane at Sea Oats Beach, Lower Matecumbe Key, near Mile Marker 74.5. Coastal Flooding was also confirmed along West Ocean Drive in Key Colony Beach, with saltwater depth 6 inches over the road. Coastal flooding of near 1 foot in depth was observed near Sombrero Beach in Marathon.

December 12, 2018 – A strong extratropical cyclone moving northeast over the Gulf of Mexico pushed a cold front through the Florida Keys. Strong west winds overspread the Florida Keys and Florida Bay, causing water levels to rise quickly. Water levels along several Florida Bay neighborhoods from near Mile Marker 100 through 106 off the Overseas Highway reported flooding of yards, docks, and streets generally from 6 to 18 inches in depth. Several ground-floor slab homes had flooding of attached porches, with water levels nearly entering the homes.

May 10, 2020 – Thunderstorms developed in the early morning hours just north of a stationary front extending west-to-east across the Straits of Florida. Heavy rainfall produced widespread flooding on Long Key including the City of Layton. Secondary roads and parking lots were flooded through most portions of the City of Layton. Rainfall more than 4 inches was estimated by radar.

June 4, 2022 – Rainfall from the early morning hours of June 3rd through the afternoon of June 4th totaled generally 6 to 11 inches in the upper Florida Keys, from 5.5 to 8.5 inches in the middle Florida

Keys, and 3 to 6 inches in the lower Florida Keys. Isolated flood damages occurred in the upper Florida Keys where rainfall was heaviest. Localized street flooding was observed in several neighborhoods in the Key Largo through Tavernier areas of the upper Florida Keys. In addition, a few boats on lifts with drain plugs left in were damaged or dropped into local canals due to the weight of accumulated rainfall onboard.

November 15, 2023 – Strong low pressure over the eastern Gulf of Mexico resulted in a slow-moving pre-frontal trough focusing heavy convective rainfall over portions of the middle and upper Florida Keys. Heavy rainfall estimated by radar of 5 to 8 inches produced extensive poor drainage area flooding across Marathon and Key Colony Beach, with some streets with one to two feet depth of water. Several motor vehicles stalled due to flooding.

December 17, 2023 – Bands of showers moved across the region on the 16th and early on the 17th, producing wind gusts up to 50-60 mph over the waters. Due to the prolonged period of gusty gradient winds and convective gusts, it led to a spike in high tides, which created coastal flooding in Palm Beach and Flamingo during the local high tides. The National Park Service reported coastal flooding that inundated the campgrounds, housing area, and maintenance areas around Flamingo. Eleven vehicles had water intrusion, and one required a tow truck. Four trailer pads closest to the shoreline had the concession resident trailers damaged, including one RV with heavy damage.

August 20, 2024 – Higher than normal water levels occurred in late August due to the full moon cycle, or king tides, across the Gulf coast of South Florida. Minor coastal flooding was possible during high tide with the peak height. An Everglades National Park ranger reported minor saltwater flooding in Flamingo, on the flood-prone campground adjacent to the water, during the high tide cycles. Standing water was less than one foot on the road at the Flamingo Campground.

The Monroe County LMSWG also noted the importance of the following event:

November 11-12, 1980: The "Veteran's Day Storm" resulted from the influence of a stalled cold front and Tropical Storm Jeanne that was over Cuba. In total, these combined systems produced 23 inches of rain in 24 hours. Even though much of the water was running off into the surrounding seas, the event resulted in widespread flooding especially in streets and low-lying areas. Weather Service reports indicated that 300 vehicles and 500 buildings were seriously damaged, resulting in $1 million in property damage, primarily in Key West.

PROBABILITY OF FUTURE OCCURRENCE

By definition the 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. The shaded X Zone indicates areas that are estimated to be inundated by the flood event having a 0.2-percent chance of being equaled or exceeded in any given year. The SFHA and the Shaded X Zone indicate areas of high and moderate risk according to FEMA guidelines; however, this does not mean that flood risk is limited to these areas. There is also potential for other magnitudes of flood events to impact these and other areas in the region.

While exposure to flood hazards vary across jurisdictions, all jurisdictions have high risk flood hazard areas, and the entire county faces some level of flood risk. Additionally, there is risk of localized and stormwater flooding as well as severe wind-driven surge in areas outside the SFHA. Based on these considerations as well as the 49 flood-related events recorded by NCEI over the last 24 years, the probability of flooding is considered highly likely (100% annual probability) for all jurisdictions.

Probability: 4 – Highly Likely

CLIMATE CHANGE

The potential for flooding can change and increase. Various land use changes and changes to land surface can result in changes to the floodplain and flood prone areas. For example, an increase in impervious surface can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. These changes are often created by human activity. However, changes in precipitation frequency and intensity can also result in changes to flood magnitudes and probabilities. For example, what we currently define as the 1-percent-annual-chance flood may occur more frequently in the future.

Per the Fourth National Climate Assessment, frequency and intensity of heavy precipitation events is expected to increase across the country. More 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.

Climate change will increase people's exposure to coastal flooding and likely cause an increase in inland flooding in the Monroe County region. Higher ocean temperatures will lead to more intense storms. As temperatures increase so does evaporation, producing greater rainfall intensity. A warmer atmosphere can hold more moisture, which can result in heavier, longer-lasting rainfall events. The increase in rainfall means effects of a storm can be felt miles away and far inland. Additionally, the speed at which tropical cyclones move, is expected to slow, meaning longer periods of storm-related rainfall will occur potentially causing disastrous inland flooding.

As the intensity of coastal storms increase, coastal communities may experience higher levels of surge and more intense impacts from flooding. Surge depths will be higher as sea levels rise, expanding the boundary of coastal flood areas and impacting more communities along the coast.

VULNERABILITY ASSESSMENT

METHODOLOGIES AND ASSUMPTIONS

WSP conducted a Level 2 Hazus Flood Simulation by leveraging the 1%-annual-chance flood boundaries from the effective FEMA Flood Insurance Study dated 02/18/2005. Base Flood Elevations were converted to a depth raster using LiDAR topography obtained from USGS. WSP also leveraged the 2024 parcel data provided by Monroe County and building footprints for the loss determination. Parcels that were potentially at risk of flooding from the 1%-annual-chance flood zone were selected for analysis. Only areas that were contained within the extent of available LiDAR, and by extension the depth grid, were analyzed. This accounted for 99.9% of all structures in the SFHA.

Losses were derived in Hazus using USACE depth damage functions, shown in Table 4.23. Flood damage is directly related to the depth of flooding by the application of a depth damage curve. In applying the curve, a specific depth of water translates to a specific percentage of damage to the structure, which translates to the same percentage of the structure's replacement value. Figure 4.11 depicts the depth of flooding that can be expected within the Monroe County planning area during the 1%-annual-chance flood event.

Table 4.23 – Depth Damage Percentages

Percent Damaged (%)							
Depth (ft)	Agricultural	Commercial	Education	Government	Industrial	Religious	Residential
0	0	1	0	0	1	0	18
1	6	9	5	5	10	10	22
2	11	14	7	8	12	11	25

Percent Damaged (%)							
Depth (ft)	Agricultural	Commercial	Education	Government	Industrial	Religious	Residential
3	15	16	9	13	15	11	28
4	19	18	9	14	19	12	30
5	25	20	10	14	22	12	31
6	30	23	11	15	26	13	40
7	35	26	13	17	30	14	43
8	41	30	15	19	35	14	43
9	46	34	17	22	29	15	45
10	51	38	20	26	42	17	46
11	57	42	24	31	48	19	47
12	63	47	28	37	50	24	47
13	70	51	33	44	51	30	49
14	75	55	39	51	53	38	50
15	79	58	45	59	54	45	50
16	82	61	52	65	55	52	50
17	84	64	59	70	55	58	51
18	87	67	64	74	56	64	51
19	89	69	69	79	56	69	52
20	90	71	74	83	57	74	52
21	92	74	79	87	57	78	53
22	93	76	84	91	57	82	53
23	95	78	89	95	58	85	54
24	96	80	94	98	58	88	54

Source: Hazus

Building foundation types were not available in the parcel or building data provided by Monroe County but are required for Hazus. Therefore, based on local knowledge and experience, WSP made the assumption that 40% of the foundations in Monroe County are elevated, 25% are crawl space, and 35% are slab on grade.

Loss numbers are based on improved parcel values listed in the 2024 parcel data from Monroe County. Parcels with values greater than or equal to $5,000 are considered improved parcels. Parcels with building values less than $5,000 but with building footprint of single structure greater than 600sqft within boundary are considered improved parcels. All parcels with building values less than $5,000 and no building footprint or no single building footprint greater than 600sqft are considered unimproved parcels.

Content value estimations are based on Hazus methodologies of estimating value as a percent of improved structure values by property type. Table 4.24 shows the breakdown of the different property types and their estimated content replacement value percentages.

Table 4.24 – Content Replacement Factors

Property Type	Content Replacement Values
Residential	50%
Commercial	100%
Educational	100%
Government	100%
Religious	100%
Industrial/Agriculture	150%

Source: Hazus

PEOPLE

HEALTH & SAFETY

Flood events pose many threats to public health and safety. While such problems are often not reported, three general types of health hazards accompany floods: physical hazards from the water itself, environmental hazards in the aftermath of the flood, and long-term psychological hazards. These common health and safety hazards are detailed below:

- **Contaminated water**: Floodwaters carry anything that was on the ground that the upstream runoff picked up, including dirt, oil, animal waste, and lawn, farm and industrial chemicals. Pastures and areas where farm animals are kept or where their wastes are stored can contribute polluted waters to the receiving streams. Floodwaters also saturate the ground, which leads to infiltration into sanitary sewer lines, or wastewater treatment plants may be flooded or over loaded. 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. Private sewer and septic systems may also introduce pollutants into floodwaters. Private wells may become contaminated through infiltration of polluted water. Given the many potential sources of contamination, direct or indirect contact with floodwaters poses a significant health risk for contraction of infectious disease.
- **Debris**: During a flood, debris carried by floodwaters can cause physical injury from impact. During the recovery process, people may often need to clear debris out of their properties but may encounter dangers such as sharp materials or rusty nails that pose a risk of tetanus.
- **Unsafe food**: If floodwaters come into contact with food items, that food may no longer be safe for consumption due to the potential contaminants in the floodwaters. Foods stored in cardboard, plastic bags, jars, bottles, and paper packaging may all be subject to contamination. Even if foods don't come into direct contact with floodwaters, the introduction of mold and mildew from flooding may cause foods to spoil faster. Additionally, power outages may cause refrigerated and frozen foods to spoil.
- **Mosquitos and animals**: After most of the water has receded, stagnant pools can become breeding grounds for mosquitoes, which may carry infectious diseases such as West Nile virus or St. Louis encephalitis. Wild animals such as snakes or rodents may carried by floodwaters or lose their habitat and seek shelter in buildings. Snakes may also be swimming in floodwaters seeking higher ground. People may be at risk for bites or disease if they come in contact with these animals or animal carcasses.
- **Mold and mildew**: Areas of a building that were exposed to excessive moisture can breed mold and mildew. Molds can start to grow in only 24 to 48 hours and will continue to grow without steps to dry out and disinfect the affected surface. Some molds are allergens, while others can produce harmful mycotoxins. Exposure to mold can cause respiratory problems; nasal and sinus congestion; eye, nose, and throat irritation; aches and pains; and effects on the nervous system. Infants, children, immunocompromised individuals, elderly adults, pregnant women, and individuals with respiratory conditions are all at higher risk.
- **Reentering a flooded building**: Health hazards may occur when heating ducts in a forced air system are not properly cleaned after inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants. If the public water systems lose pressure, public water supplies may be contaminated, and a boil order may be issued to protect people and animals from contaminated water.
- **Mental stress**: Long-term psychological impacts can result after having been through a flood and seeing one's home damaged and personal belongings destroyed. The cost and labor needed to repair a flood-damaged home can also put a severe strain on people, especially individuals who were

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. See the Property section below for estimates of critical facility vulnerability. 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 floodwaters, 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 hazards as the public and are more likely to be exposed to these hazards during response efforts.

Floods can result in fatalities. Individuals face high risk when driving through flooded streets. According to NCEI records, however, there have been no deaths in Monroe County caused by flood events.

An estimate of population at risk to flooding was developed based on the assessment of residential property at risk. Counts of residential buildings at risk were multiplied by a household factor for each jurisdiction, derived from a weighted average of the 2019-2023 American Community Survey's average household size for owner- and renter-occupied housing. The resulting estimates of population at risk are shown in Table 4.25. Overall, approximately 93,541 people live in high-risk flood zones.

Table 4.25 – Monroe County Population at Risk to Flood

Jurisdiction	Residential Buildings at Risk	Household Factor	Population at Risk
Islamorada	4,865	2.17	10,557.05
Key Colony Beach	1,409	1.75	2,465.75
Key West	6,666	2.21	14,731.86
Layton	143	2.29	327.47
Marathon	5,151	2.48	12,774.48
Unincorporated Monroe County	22,515	2.34	52,685.10
Total	**40,749**	--	**93,541.71**

Source: FEMA 2005 Effective FIRM; U.S. Census Bureau 2023 ACS 5-Year Estimates; Monroe County 2024 parcel data
Note: The household factor used to approximate population at risk in unincorporated Monroe County is representative of the entire County, not just the unincorporated areas.

PROPERTY

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.

Table 4.26 and Table 4.17 detail the estimated losses for the 1%-annual-chance flood event in Monroe County, calculated using the methodology and assumptions described above. The total damage estimate value is based on damages to the total of improved building value and contents value. Land value is not included in any of the loss estimates as generally land is not subject to loss from floods. Detailed tables by jurisdiction are located in individual jurisdictional annexes. Table 4.26 is based on the effective FIRM and Table 4.27 is based on the Preliminary FIRM.

Table 4.26 – Estimated Building Damage and Content Loss for 1% Annual Chance Flood, Effective

Occupancy Type	Total Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Countywide Totals						
Agriculture	1	$535,470	$1,175	$18,807	$19,982	4%
Commercial	3,863	$5,840,161,933	$147,082,563	$488,627,142	$635,709,705	11%
Educational	47	$58,906,690	$752,780	$4,791,921	$5,544,700	9%
Government	1,485	$1,443,150,783	$9,386,268	$57,115,154	$66,501,422	5%
Industrial	444	$376,694,386	$3,696,287	$10,985,325	$14,681,612	4%
Religious	103	$116,549,732	$570,756	$4,154,455	$4,725,211	4%
Residential	40,749	$27,885,853,843	$5,531,368,544	$2,748,219,679	$8,279,588,223	30%
Total	**46,692**	**$35,721,852,837**	**$5,692,858,373**	**$3,313,912,484**	**$9,006,770,856**	**25%**

Source: Hazus

Table 4.27 – Estimated Building Damage and Content Loss for 1% Annual Chance Flood, Preliminary

Occupancy Type	Total Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Countywide Totals						
Agriculture	1	$535,470	$17,044	$58,053	$75,097	14%
Commercial	4,130	$6,141,640,392	$134,579,885	$446,321,840	$580,901,725	9%
Educational	59	$79,082,110	$864,647	$5,425,160	$6,289,807	8%
Government	1,489	$1,336,252,324	$6,834,422	$42,218,610	$49,053,032	4%
Industrial	447	$382,464,388	$4,089,129	$12,243,880	$16,333,009	4%
Religious	124	$135,199,326	$759,210	$5,886,824	$6,646,034	5%
Residential	41,455	$28,153,856,315	$5,376,628,663	$2,671,216,394	$8,047,845,056	29%
Total	**47,705**	**$36,229,030,325**	**$5,523,772,999**	**$3,183,370,760**	**$8,707,143,760**	**24%**

Source: Hazus

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. Loss ratios for all participating jurisdictions are at or above 10%. Therefore, in the event of a flood with a magnitude of the 1%-annual-chance event or greater, the planning area would face extreme difficulty in recovery. Even smaller, more probabilistic floods may also result in the county having difficulty recovering. Based on the results using the effective FIRM, estimated loss ratios are greatest in Layton and the unincorporated areas of Monroe County; therefore, these jurisdictions may face the greatest potential impacts from a flood event.

Across the planning area there are 388 critical facilities located in the AE zone and 19 facilities located in the VE zone which may be at risk to more severe damages. There are 390 facilities located in the preliminary FIRM's SFHA. Table 4.28 details these critical facilities at risk to flooding by FEMA lifeline based on the effective FIRM and Table 4.29 details results for the preliminary FIRM. There are an additional 19 facilities (effective FIRM) and 43 facilities (preliminary FIRM) in the 0.2%-annual-chance floodplain (Shaded X).

Table 4.28 – Summary of Critical Facilities at Risk to Flood, 1% Annual Chance Event, Effective

FEMA Lifeline	Critical Facilities by SFHA Zone		Total Facilities at Risk
	Zone AE	Zone VE	
Communications	26	0	26
Energy	23	1	24
Food, Hydration, Shelter	40	2	42
Hazardous Materials	2	0	2
Health and Medical	21	0	21
Safety and Security	70	6	76
Transportation	4	1	5
Water Systems	202	9	211
Total	**388**	**19**	**407**

Table 4.29 – Summary of Critical Facilities at Risk to Flood, 1% Annual Chance Event, Preliminary

FEMA Lifeline	Critical Facilities by SFHA Zone				Total Facilities at Risk
	Zone A	Zone AE	Zone AO	Zone VE	
Communications	1	19	0	6	26
Energy	0	22	0	0	22
Food, Hydration, Shelter	0	31	1	3	35
Hazardous Materials	0	1	0	0	1
Health and Medical	0	19	0	0	19
Safety and Security	0	66	0	8	74
Transportation	0	3	1	1	5
Water Systems	0	189	0	19	208
Total	**1**	**350**	**2**	**37**	**390**

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. A severe repetitive loss property is classified as such if it has four or more separate claim payments of more than $5,000 each (including building and contents payments) or two or more separate claim payments (building only) where the total of the payments exceeds the current value of the property. Repetitive loss properties and severe repetitive loss properties are a priority for mitigation because they have a known flood risk and are a drain on the NFIP.

According to 2024 NFIP records, there are a total of 1,210 repetitive loss properties within the Monroe County planning area. of which 1,079 are residential and 131 are commercial or non-residential. Only 658 repetitive loss properties, less than 54% of the total in the region, are insured. There are 114 properties on the list classified as severe repetitive loss properties.

Table 4.30 summarizes repetitive loss properties by jurisdiction in Monroe County as identified by FEMA through the NFIP. Jurisdictional annexes have general areas where repetitive losses have occurred throughout the community.

Table 4.30 – Repetitive Loss Properties by Jurisdiction

Jurisdiction	RL Property Count	Occupancy Type		Total Losses	% Insured	SRL Count	
		Residential	Commercial			Residential	Commercial
Islamorada	56	33	23	182	57%	8	4
Key Colony Beach	26	21	5	91	42%	5	0
Key West	267	229	38	762	74%	29	5
Layton	2	2	0	5	0%	0	0
Marathon	175	157	18	483	56%	14	1
Unincorporated Monroe County	684	637	47	1,673	47%	43	5
Total	**1,210**	**1,079**	**131**	**3,196**	**54%**	**99**	**15**

Source: OpenFEMA Dataset: NFIP Multiple Loss Properties, 2024, Accessed February 2025
RL = Repetitive Loss; SRL = Severe Repetitive Loss

ENVIRONMENT

During a flood event, chemicals and other hazardous substances may end up contaminating local water bodies. Flooding kills animals and in general disrupts the ecosystem. Snakes and insects may also make their way to the flooded areas.

Floods can also cause significant erosion, which can alter streambanks and deposit sediment, changing the flow of waterbodies and potentially reducing their drainage capacity.

Sea level rise can have numerous negative consequences on the environment including increased erosion and associated impacts. Another concern is the inundation of normally dry land, which could lead to the loss of marshes and wetlands and the positive benefits associated with those areas. These areas buffer against waves and storm surge, protect from erosion and even encourage accretion, and provide natural wildlife habitats. Sea level rise may also lead to saltwater intrusion as the groundwater table may also rise, potentially leading to contaminated drinking and agriculture water.

CONSEQUENCE ANALYSIS

Table 4.31 summarizes the potential detrimental consequences of flood.

Table 4.31 – Consequence Analysis – Flood

Category	Consequences
Public	Localized impacts could be severe. Flooding is likely to displace people from their homes. Water can become polluted such that if consumed, diseases and infection can be easily spread.
Responders	First responders are at risk when attempting to rescue people from flooding. They are subject to the same health hazards as the public. Flood waters may prevent access to areas in need of response or the flood may prevent access to the critical facilities themselves which may prolong response time. Impacts to responders are expected to be limited.
Continuity of Operations (including	Floods can severely disrupt normal operations, especially when there is a loss of power. Damage to facilities in flooded areas may require temporary relocation of some operations. Localized disruption of roads, facilities, and/or

Category	Consequences
Continued Delivery of Services)	utilities caused by incident may postpone delivery of some services. Sea level rise may also interrupt continuity of operations, such as delivery of services, by causing mor regular chronic flooding.
Property, Facilities and Infrastructure	Buildings and infrastructure, including transportation and utility infrastructure, may be damaged or destroyed by flooding. Impacts are expected to be localized to the area of the incident. Severe damage is possible.
Environment	Chemicals and other hazardous substances may contaminate local water bodies. Wildlife and livestock deaths possible. The localized impact is expected to be severe for incident areas and moderate to light for other areas affected by the flood or HazMat spills.
Economic Condition of the Jurisdiction	Local economy and finances will be adversely affected, possibly for an extended period. During floods (especially flash floods), roads, bridges, farms, houses and automobiles are destroyed. Additionally, the local government must deploy firemen, police and other emergency response personnel and equipment to help the affected area. It may take years for the affected communities to be re-built and business to return to normal.
Public Confidence in the Jurisdiction's Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery are not timely and effective.

ASSOCIATED HAZARDS

Natural hazards are often interconnected. Any given hazard may lead to, or be spurred by, another hazard – sometimes referred to as cascading disasters. A flood event may be associated with coastal erosion, tropical storms and hurricanes, storm surge, sea level rise, and severe storms and tornadoes.

CHANGES IN DEVELOPMENT

New development or redevelopment, if it occurs in or near the SFHA or localized flooding areas, could increase exposure of people and property to flood impacts.

Additionally, increased development anywhere in the County can create changes in the watershed by increasing impervious surfaces; such development will alter flood patterns as well as intensity of flooding events. This is especially true of increased development within or near identified floodplains. Though the County's Rate of Growth Ordinance determines the speed at which undeveloped parcels may be developed there is still potential for increased impervious surfaces on previously developed parcels. Islamorada, Layton and other locations that are fully built out will not face the same risks as the potential for new development and impervious surface coverage is limited.

PROBLEM STATEMENT

All incorporated jurisdictions have at least 89 percent of their total land area in the Special Hazard Flood area. Riverine floods could likely significantly impact these jurisdictions. It is important to consider how the recently released preliminary floodplain maps will impact flood insurance once effective.

All jurisdictions in the County have a flood loss-ratio of greater than 10%; the loss ratio is higher in unincorporated Monroe (30%) than Countywide (25%).

Per the Hazus analysis, 100 percent of developed parcels in the AE and VE zones are at risk to flooding (Key Colony Beach and Layton); Marathon (99.9%) and Islamorada (90.5%) have larger portions of parcels at risk than the County average (89.2%). Mitigation strategies should prioritize these properties.

As a community with a large seasonal population, the County and incorporated jurisdictions should consider whether shelters have adequate capacity for this influx of people, often during hurricane season.

Less than 50% of repetitive loss buildings in Key Colony Beach (42%), Layton (0%), and unincorporated Monroe (47%) are insured. These buildings should be prioritized for elevation or acquisition.

Localized and stormwater flooding blocking roadways (particularly U.S. Highway 1) may impede evacuation capabilities.

Of the 430 critical facilities reported in this plan, 90 percent are within the effective SFHA; 86.2 percent in the AE zone and 4.4 percent in the VE zone. The communities must identify mitigation strategies that protect these facilities, which might include elevation of critical systems, elevation of the building, floodproofing, or relocation, among others.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes flood hazard risk by jurisdiction. Flood risk due to high tide flooding, flash flooding, and stormwater flooding exists across the entire county. All participating jurisdictions have over 89 percent of their area in the SFHA and thus have a high degree of exposure to flooding; given that other sources of flooding and other levels of flooding may occur beyond these areas, the spatial extent was considered large for all jurisdictions. Impact ratings were based upon Hazus loss estimates as well as the overall risk of death or injury; all jurisdictions have loss ratios over 10. All communities also face a uniform probability of flooding.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Key Colony Beach	4	3	4	3	3	3.5	H
Key West	4	3	4	3	3	3.5	H
Layton	4	3	4	3	3	3.5	H
Marathon	4	3	4	3	3	3.5	H
Islamorada	4	3	4	3	3	3.5	H
Unincorporated Monroe County	4	3	4	3	3	3.5	H

4.5.5 SEA LEVEL RISE

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Sea Level Rise	Highly Likely	Critical	Large	More than 24 hrs	More than 1 week	3.1

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 melt from ice sheets and glaciers. Sea level rise is a result of global climate change. Climate change may be due to natural internal processes or external forces such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use (IPCC, 2023). Climate change is a natural occurrence in which the earth has warmed and cooled periodically over geologic time. The recent and rapid warming of the earth over the past century has been cause for concern as it is very likely due to the accumulation of human-caused greenhouse gases, such as CO_2, in the atmosphere (IPCC, 2023). This warming is occurring almost everywhere in the world which suggests a global cause rather than changes in localized weather patterns. In 2023, the Intergovernmental Panel on Climate Change (IPCC) reported with high confidence that warming due to such emissions will cause long-term changes in the climate system such as sea level rise.

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 exacerbated 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). Monroe County is particularly vulnerable to the effects of sea level rise, due to its coastal location, subtropical environment, low topography and tourism economy.

Warning Time: 1 – More than 24 hours

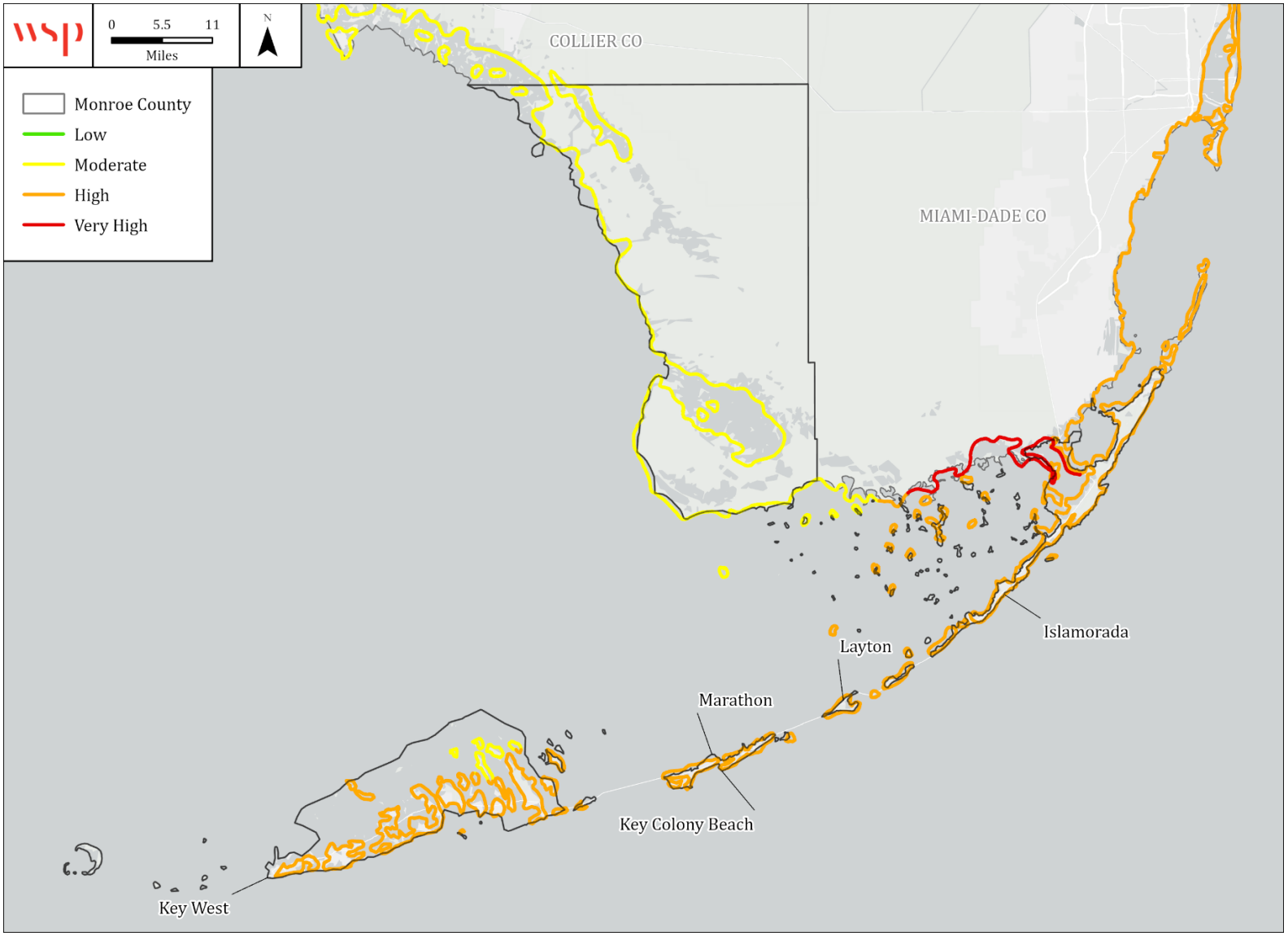
Duration: 4 – More than one week

LOCATION

Sea level rise can occur anywhere along the coast in Monroe County. The Coastal Vulnerability Index (CVI), developed by United States Geological Survey (USGS), 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 4.12 shows the CVI for Monroe County. Most of the Florida Keys have a CVI rating of high, except Big Torch Key and Howe Key, which are rated moderate. The mainland coastline is also rated moderate.

Spatial Extent: 4 – Large

Figure 4.12 – Coastal Vulnerability Index, Monroe County



Source: USGS Coastal Change Hazards Portal

EXTENT

Sea level rise is measured by the number of feet of relative rise and the areas that such rise would inundate. The NOAA Sea Level Rise Viewer provides a tool to examine potential sea level rise (SLR) scenarios which represent possible future sea level changes. This allows users to examine the feet of relative sea level rise for a given year and SLR scenario (low, intermediate, high, etc.). These scenarios were developed and used as inputs into the U.S. Global Change Research Program's Sustained Assessment process and the Fifth National Climate Assessment.

The estimated impacts of 2040 projected sea level rise (SLR) for the intermediate-low scenario and the intermediate – high scenario are shown in Figure 4.13 and Figure 4.14, respectively. Both scenarios were also used in the Monroe County Vulnerability Assessment to evaluate risks and vulnerabilities of the County's infrastructure. The sea level rise estimate maps show inundation above mean higher high water (the average of each day's higher high tide line). Maps of sea level rise impacts by jurisdiction are available in individual jurisdictional annexes.

As shown in the figures below, under the 2040 intermediate-low scenario the majority of the Keys is estimated to be inundated, and an even larger extent is impacted in the intermediate-high scenario. Sea level rise will likely affect coastal marsh lands as well as land along rivers, canals, and their tributaries. Additionally, sea level rise will likely increase future risk of flooding from the other flood hazards discussed in this plan, as more land will have a lower elevation relative to sea level. For example, with much of the barrier islands and wetlands inundated, inland areas will lose their natural protection and may become susceptible to coastal flooding with velocity wave action.

Figure 4.13 – 2040 Intermediate – Low Sea Level Rise Inundation, Monroe County, FL

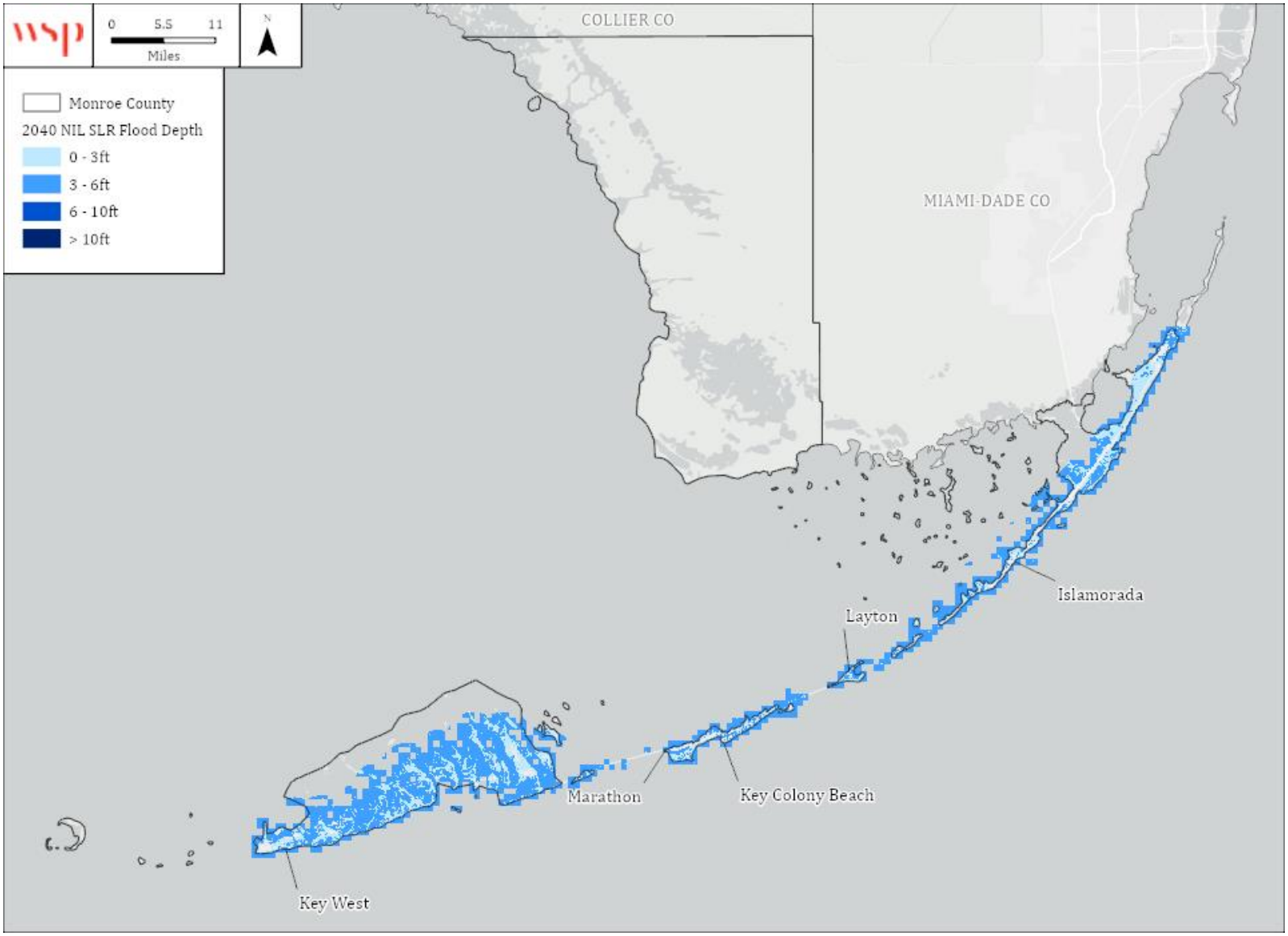
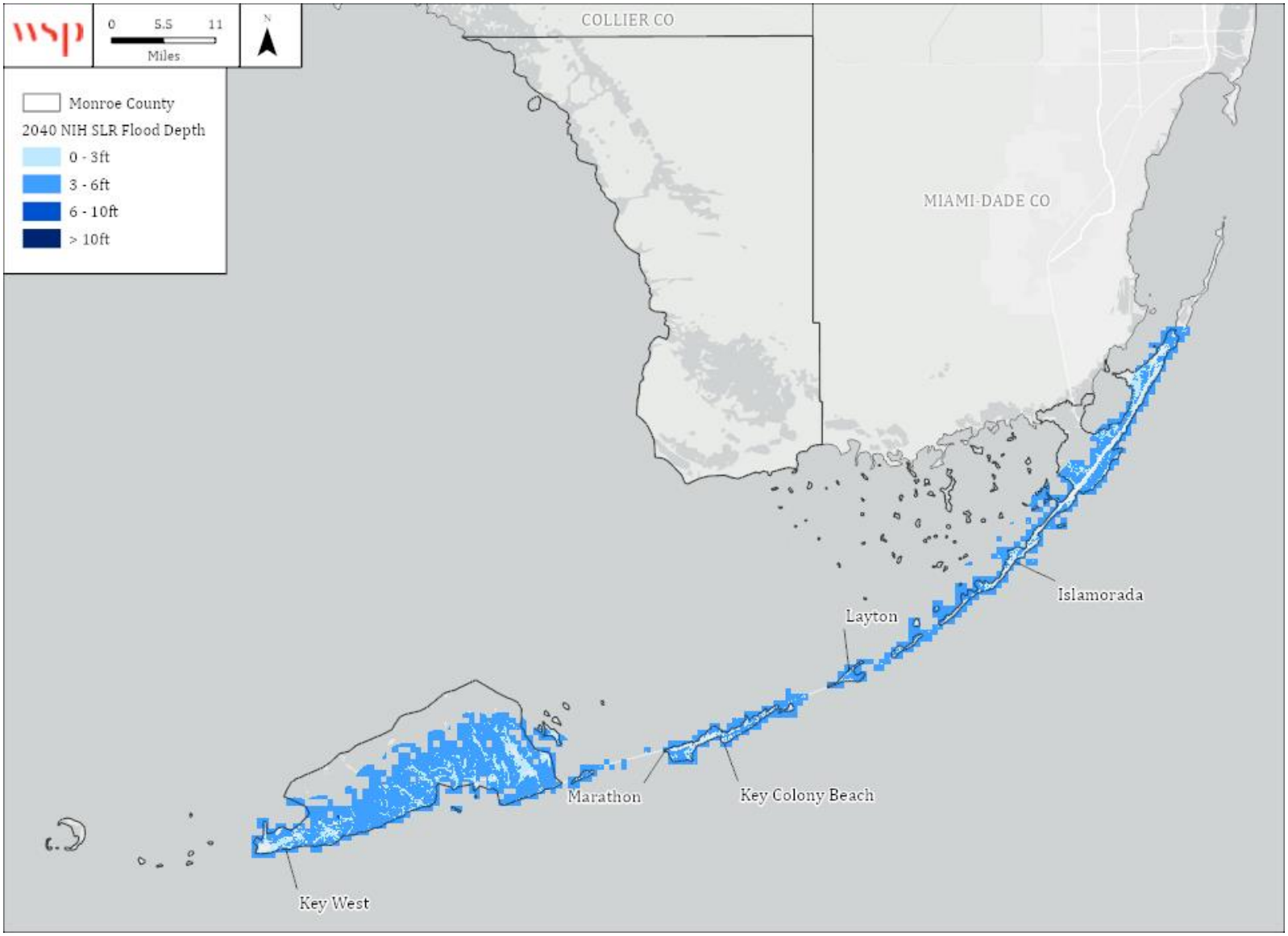


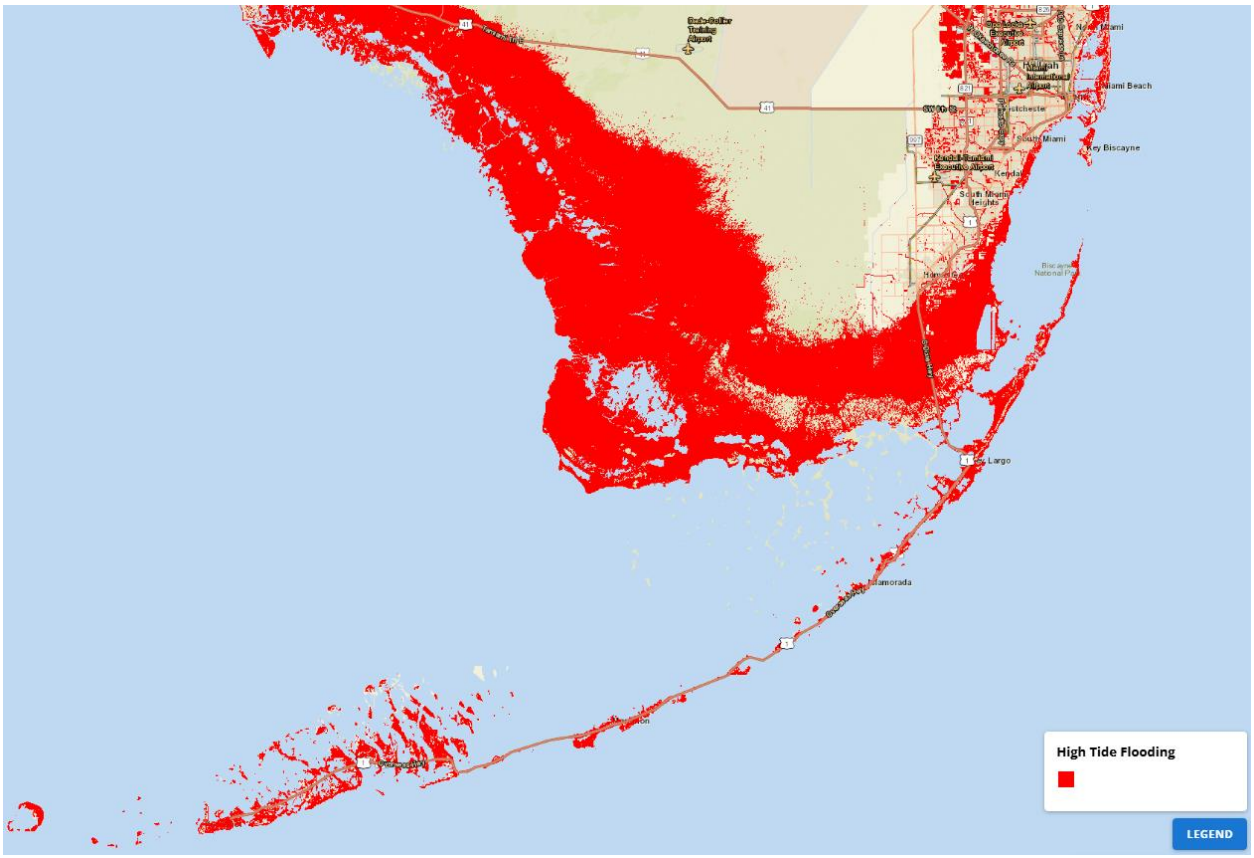
Figure 4.14 – 2040 Intermediate – High Sea Level Rise Inundation, Monroe County, FL



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 4.15 shows areas in Monroe 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 4.15 - Areas Susceptible to High Tide Flooding, Monroe County



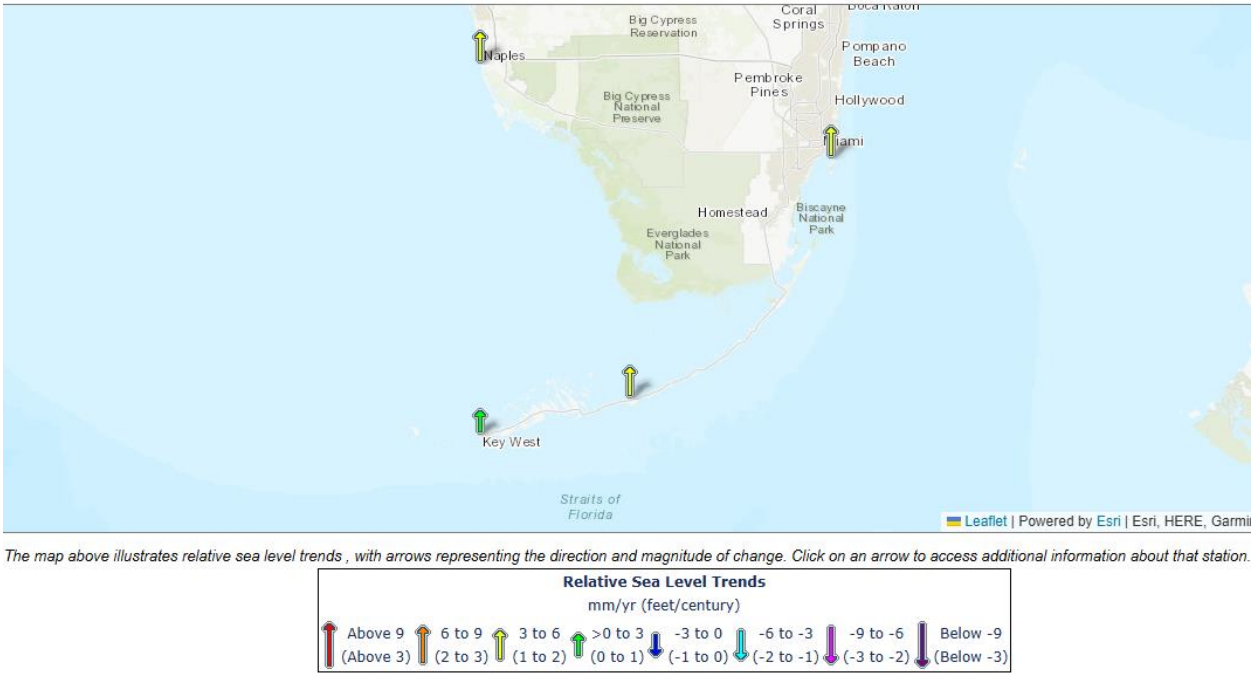
Source: NOAA Coastal Flood Exposure Mapper

HISTORICAL 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. Figure 4.16 illustrates regional trends in sea level from NOAA. At the Key West, FL station (indicated by

the green arrow in western Monroe County), the relative sea level trend is 2.64 mm/year with a 95% confidence interval of +/- 0.15 mm/year based on monthly mean sea level data from 1913 to 2024 which is equivalent to a change of 0.87 feet in 100 years. At the Vaca Key station (indicated by the yellow arrow in the Middle Keys), the relative sea level trend is 4.23 mm/year with a 95% confidence interval of +/- 0.4 mm/year based on data from 1971 to 2024; this is equivalent to a change of 1.39 feet in 100 years.

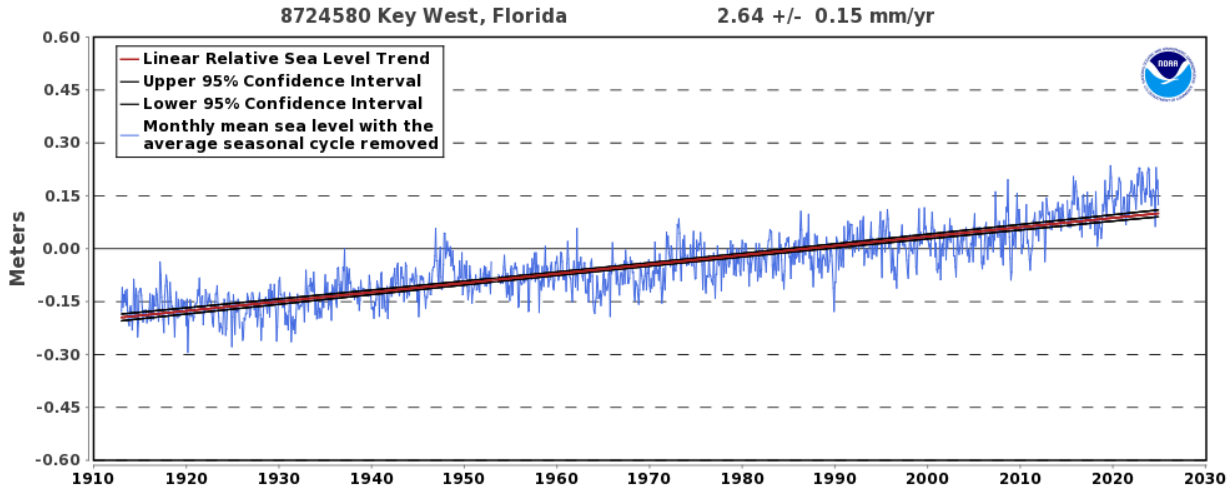
Figure 4.16 – Sea Level Trends, Monroe County



Source: http://tidesandcurrents.noaa.gov/sltrends/sltrends.shtml

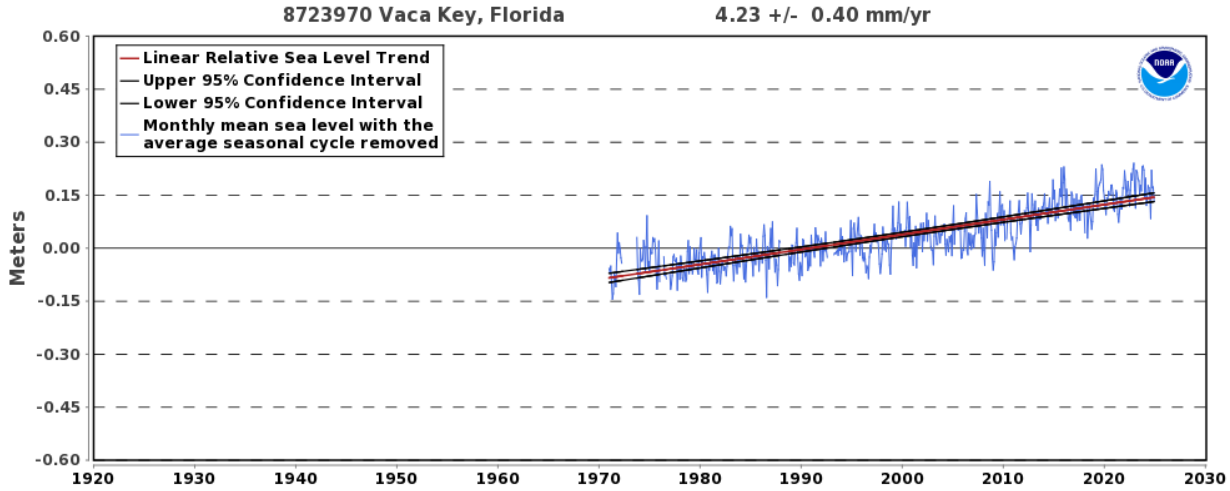
Figure 4.17 and Figure 4.18 show the monthly mean sea level at NOAA's Key West and Vaca Key Florida stations without the regular seasonal fluctuations due to coastal ocean temperatures, salinities, winds, atmospheric pressures, and ocean currents. The long-term linear trend is also shown, including its 95% confidence interval. The plotted values are relative to the most recent Mean Sea Level datum established by CO-OPS.

Figure 4.17 – Mean Sea Level Trends, Key West FL



Source: NOAA Tides and Currents, February 2025

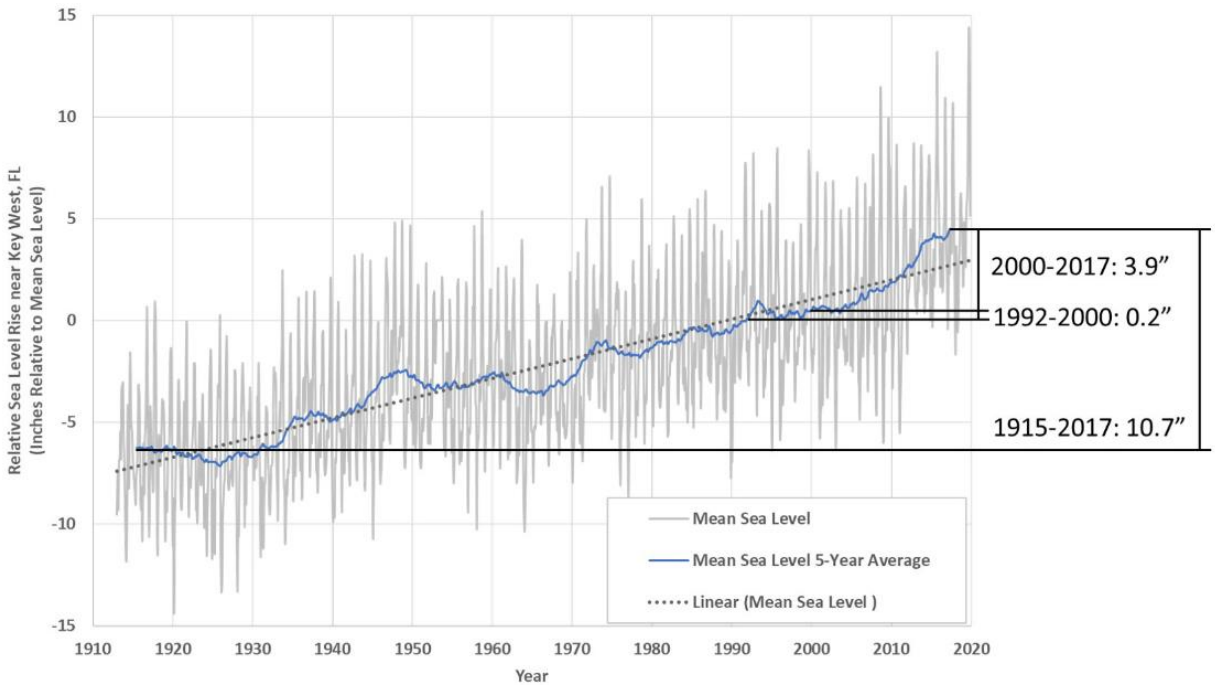
Figure 4.18 – Mean Sea Level Trends, Vaca Key FL



Source: NOAA Tides and Currents, February 2025

The data above relies on a linear trend over more than a decade. As such, the trend misses subtle variations and especially larger increases as climate change and CO_2 levels have increased in recent years. Per the Southeast Florida Regional Climate Change Compact's Unified Sea Level Rise Projection 2019 Update, this linear trend estimates approximately 2 inches of sea level rise at the Key West, FL tide gauge from 2000 through 2019. However, using 5-year averages of mean sea level, this estimate is closer to 3.9 inches of sea level rise from 2000 to 2017. This 5-year average of monthly mean sea level illustrates the variability of sea level and highlights the increase in sea level above the linear trend, especially in the last decade. Figure 4.19 from the Unified Projection document illustrates these variations by displaying monthly mean sea level, 5-year averages of mean sea level, and the linear mean sea level trend.

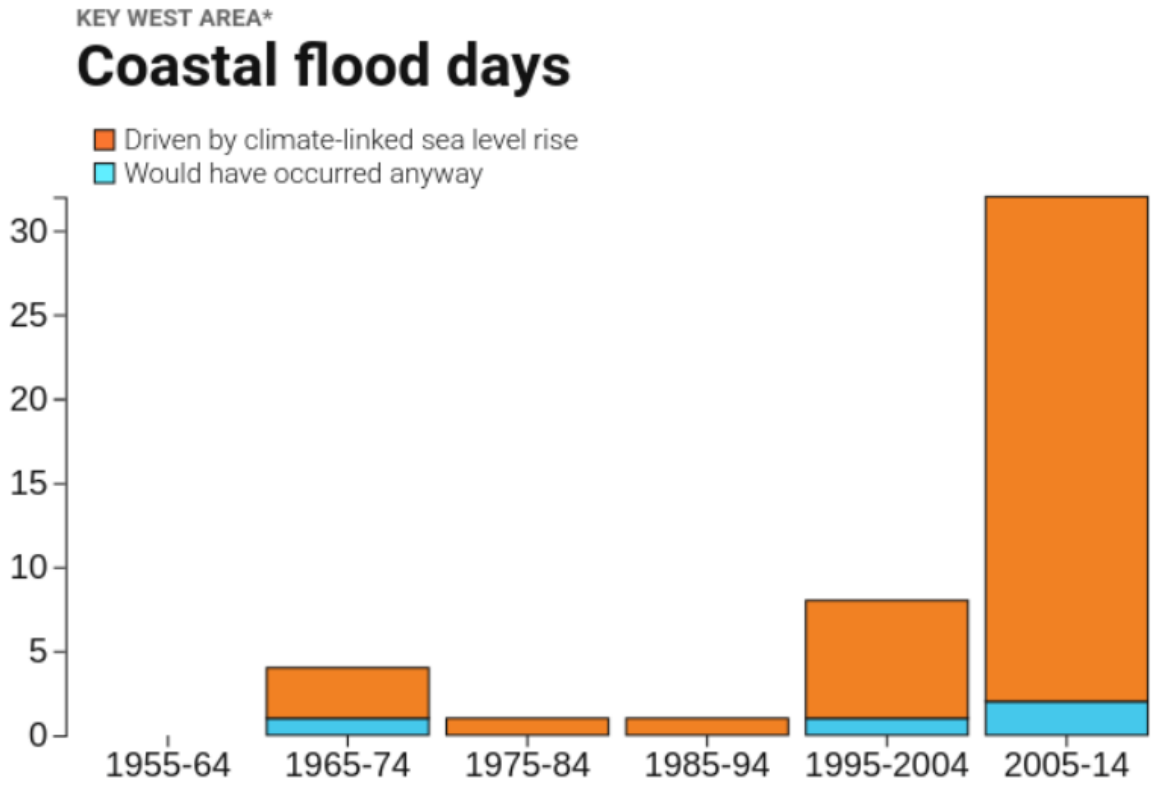
Figure 4.19 – Relative Sea Level Rise in Key West, FL



Source: Unified Sea Level Rise Projection (2019 Update), South Florida Regional Climate Change Compact

As noted previously, climate change and sea level rise can have varying impacts, including more frequent coastal flood days. Climate Central's Surging Seas Risk Finder notes that coastal floods are increasing. Figure 4.20 shows coastal flooding in the Key West Area (based on the Key West water level station) from 1955 through 2014 in 10-year increments. According to this data, from 1995 through 2004, the Key West area experienced 8 coastal flood days – seven of which were driven by climate-linked sea level rise. In the following 10 years, from 2005 through 2014, the number of coastal flood days increased to 32, a 300 percent increase. 30 of these coastal flood days can be attributed to climate-linked sea level rise.

Figure 4.20 – Coastal Flood Days, Key West, FL



Source: Climate Central Surging Seas Risk Finder (https://riskfinder.climatecentral.org/)

In line with increased coastal flood days, the region is also seeing increasing intensity and duration of King Tides. King tides are predictable phenomenon that generally occur each fall when the alignment of the moon, sun, and Earth create a stronger gravitational pull on the ocean. Like many other coastal events, climate change has made King Tide flooding worse. In the Fall of 2019, the Upper Florida Keys experienced nearly three months of King Tide flooding, particularly in the Blackwaters Sound area. That year, Hurricane Dorian and other tropical storms in late August and early September interrupted the Gulf Stream, causing water to back up. Tides recorded along the Atlantic coast from the Carolinas to Florida were 6 to 18 inches higher than expected. Residents noted that in these low-lying areas with nowhere for water to drain, these events generally lasted seven to ten days in the past. In 2024, the peak king tide occurred during the super full moon in mid-October, which was the closest the moon came to the Earth during the whole year.

PROBABILITY OF FUTURE OCCURRENCE

The Earth's changing climate will continue to drive nonlinear trends in Sea Level that deviate from historic trends. This is especially pertinent in the coastal communities of South Florida on the frontlines of climate change and sea level rise and is the reason behind the South Florida Regional Climate Change Compact's Unified Sea Level Rise Projection. This document was created in unify the diversity of local Sea Level Rise projections in order to create a single, unified projection to ensure consistency in adaptation planning, policy, and infrastructure and siting design in the South Florida region. The first unified projection was developed and released in 2011, updated in 2015, and most recently updated in 2019. Each update has incorporated new research and data. The 2019 update incorporated the potential

for faster rates of melting of the Antarctic Ice Sheet as well as regional sea level rise rates as reported in the Fourth National Climate Assessment. It should be noted that in December of 2024, the South Florida Regional Climate Change Compact's Unified Sea Level Rise Projection issued a statement of continued use of the 2019 version as a full 5-year update and revision was not deemed necessary.

The 2019 update begins in the year 2000, as this is the reference year for the most recently published NOAA projections, and uses two planning horizons: 20 years for land use (2040) and 50 years for infrastructure (2070). The projection used the Key West gauge as the reference gauge to maintain consistency with prior projections.

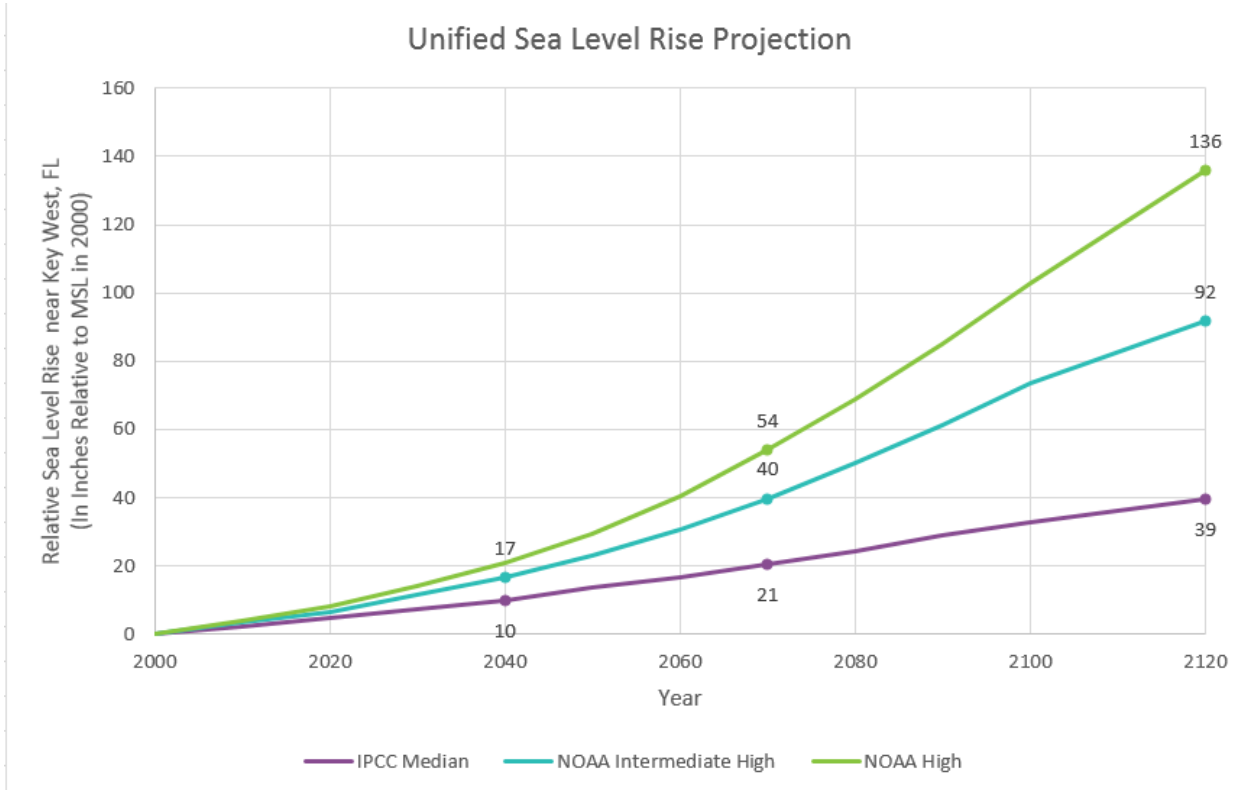
The compact used three curves to guide various development across different time frames in the region. Importantly, the projections are regional rather than previously used global projections. The projections are as follows:

- **Short term:** by 2040, sea level in the region is projected to rise 10 to 17 inches above 2000 mean sea level.
- **Medium term:** by 2070, sea level in the region is projected to rise 21 to 54 inches above 2000 mean sea level.
- **Long term:** by 2120, sea level in the region is projected to rise 40 to 136 inches above 2000 mean sea level.

These projections are based on 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 4.21 below shows these projections. The IPCC Median Curve and the NOAA Intermediate High curve form the lower and upper bounds, respectively, for short-term use (through 2070). The IPCC median curve represents the most likely average sea level before 2070; sea level is rise is unlikely to exceed the NOAA Intermediate High curve by 2100. The NOAA High curve forms the upper bound for medium- and long-term use. Sea level rise is *very unlikely* to be higher than this curve before 2100.

Probability: 4 – Highly Likely

Figure 4.21 – Sea Level Rise Projections for Monroe County (2000-2100)



Source: Southeast Florida Regional Climate Change Compact, Unified Sea Level Rise Projection (2019)

The intended use of the Unified Projection is for planning purposes. The projections are to be used by a variety of audiences, including elected officials, urban planners, engineers, and developers, among others, across short- and long-term planning horizons for new projects or adaptation of existing projects, including infrastructure siting and design. 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.

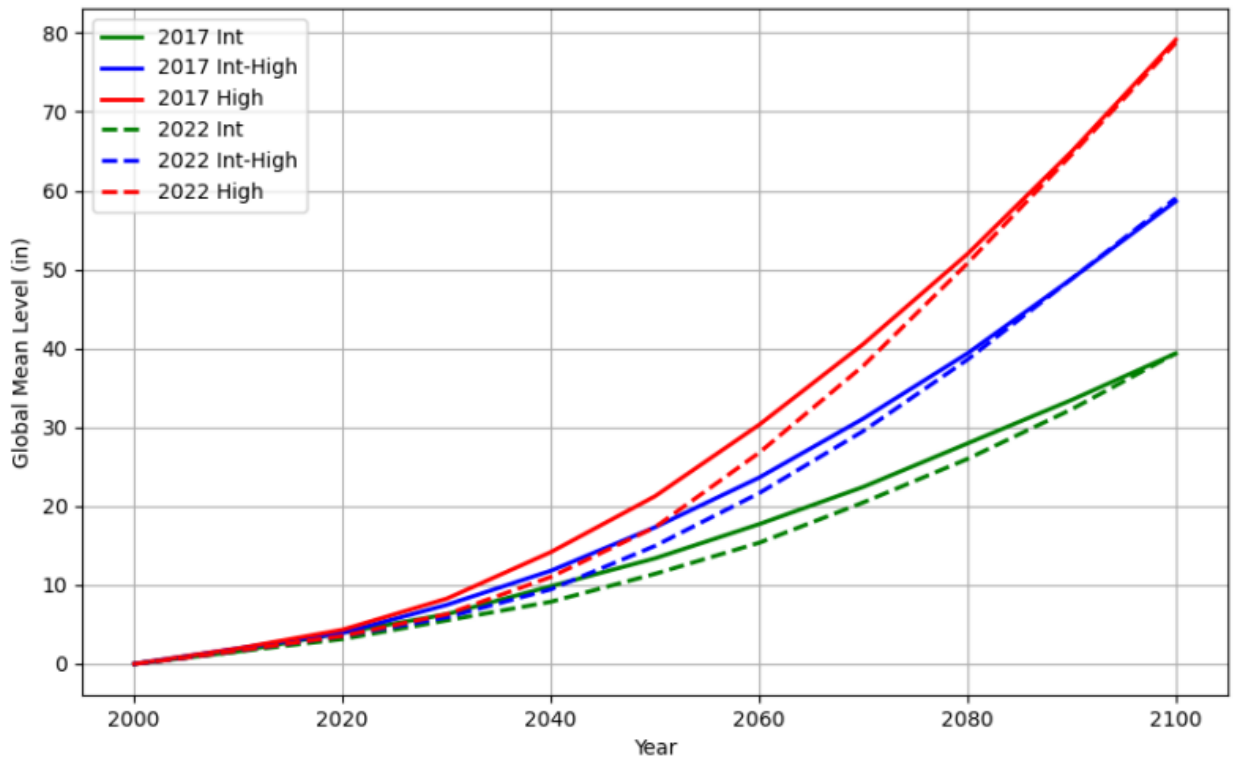
NOAA Intermediate High Curve: Consider designing to this curve for projects in need of a greater factor of safety; this includes projects with a design life beyond 50 years.

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.

As noted in the 2024 Statement of Continued Use of the 2019 Southeast Florida Regionally Unified Sea Level Rise Projection, the Compact reviewed updates from the NOAA 2022 Sea Level Rise Technical Report as well as observational trends of sea level in the region. In the NOAA 2022 Report, it was shown that the projections for the year 2100 for each global scenario stayed the same as previous predictions. However, the timing of the rates of rise in the near-term for the different scenarios was updated based on

new modeling and scientific methods. Figure 4.22 shows the comparison of selected NOAA 2017 scenario to the corresponding NOAA 2022 scenarios. This graph shows that while NOAA 2022 scenarios are slightly lower than NOAA 2017 scenarios, both scenarios still reach the same global mean sea level by 2100.

Figure 4.22 – Comparison of Sea Level Rise Scenario Projections for Monroe County (2000-2100)



Source: Southeast Florida Regional Climate Change Compact, Unified Sea Level Rise Projection 2024 Statement

CLIMATE CHANGE

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.

VULNERABILITY ASSESSMENT

METHODOLOGIES AND ASSUMPTIONS

Vulnerability to sea level rise was assessed based on past occurrences nationally and internationally as well as data from NOAA, USGS, the Intergovernmental Panel on Climate Change (IPCC), and other sources.

In addition to the data presented below, the County's Watershed management plan and the Region's Climate Change Compact provide additional information about risks in the region. The draft of the Florida Keys Coastal Storm Risk Management Feasibility Study done by the United States Army Corps

of Engineers for Monroe County provides additional insights into the impacts to people, the built environment, and the natural environment due not only to sea level rise, but associated hazards likely to become more intense, such as coastal storms, storm surge, and erosion, due to climate change and the ensuing sea level rise.

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. Potential damage to property such as homes, business, and vehicles can also causes emotional and financial stress as people determine how to mange encroaching water.

PROPERTY

The increased number of flood days and general encroachment of shoreline associated with sea level rise will likely cause property damage, although it is unclear exactly what this will look like. Homes, businesses and vehicles will be susceptible to increased water damage. Homes within the areas that may be inundated will potentially be uninhabitable. Additionally, rising seas, and associated increased flood days, can overwhelm and undermine the effectiveness of stormwater drainage system and other infrastructure, such as roads and bridges. Table 4.32 estimates the number of parcels at risk to the 2040 intermediate – low and intermediate – high SLR scenarios. In total, an estimated 30,336 buildings would be impacted by the 2040 intermediate high SLR scenario. of these structures 89 percent are residential.

Table 4.32 – Buildings Affected by Sea Level Rise, Monroe County

Occupancy	Estimated Building Count	Structure Value	Estimated Content Value	Total Value
2040 Intermediate-Low	**22,563**	**$9,503,075,174**	**$5,592,809,716**	**$15,095,884,891**
Agriculture	1	$267,735	$267,735	$535,470
Commercial	1,700	$1,328,393,069	$1,328,393,069	$2,656,786,138
Education	22	$6,536,769	$6,536,769	$13,073,538
Government	399	$226,726,898	$226,726,898	$453,453,797
Industrial	115	$46,696,545	$70,044,817	$116,741,362
Religious	45	$27,226,697	$27,226,697	$54,453,395
Residential	20,281	$7,867,227,461	$3,933,613,730	$11,800,841,191
2040 Intermediate-High	**7,773**	**$3,387,255,039**	**$2,014,720,447**	**$5,401,975,486**
Agriculture	0	$0	$0	$0
Commercial	590	$455,680,278	$455,680,278	$911,360,555
Education	9	$5,565,652	$5,565,652	$11,131,304
Government	296	$127,746,163	$127,746,163	$255,492,326
Industrial	59	$22,613,793	$33,920,689	$56,534,482
Religious	16	$7,966,178	$7,966,178	$15,932,356
Residential	6,803	$2,767,682,976	$1,383,841,488	$4,151,524,464
Total	**30,336**	**$12,890,330,213**	**$7,607,530,164**	**$20,497,860,377**

Sea level rise can also create added pressure on the aquifers that serve Monroe County. The Biscayne Aquifer, which provides most of the drinking water for Monroe County is currently experiencing saltwater intrusion. Saltwater intrusion is a product of many factors – including increased usage of the

water from the aquifer, which is particularly impacted by the growth of Miami-Dade County, where the aquifer is located, as well as Monroe County as well as seepage from the Turkey Point cooling canals. Sea level rise can further exacerbate this pattern. Further saltwater intrusion into the aquifer will impact the entire Monroe County population as it relies on drinking water from this source.

ENVIRONMENT

Sea level rise can have numerous negative consequences on the environment including increased erosion and all impacts associated with that. Another concern is the inundation of normally dry land, which could lead to the loss of marshes and wetlands and the positive benefits associated with those areas. These areas buffer against waves and storm surge, protect from erosion and even encourage accretion, and provide natural wildlife habitats. Finally, sea level rise may lead to saltwater intrusion as the groundwater table may also rise, potentially leading to contaminated drinking and agriculture water.

CONSEQUENCE ANALYSIS

Table 4.33 summarizes the potential negative consequences of sea level rise.

Table 4.33 – Consequence Analysis – Sea Level Rise

Category	Consequences
Public	Sea Level Rise may cause increased flooding which may lead to illness, injury, or death. Additionally, sea level rise may cause psychological stress from loss of home, economy, and culture.
Responders	Sea Level Rise induced flooding may cause increased burden on responders.
Continuity of Operations (including Continued Delivery of Services)	As sea levels rise and cause more regular, chronic flooding, continuity of operations, such as delivery of services may be interrupted due to localized disruption of roads, facilities, and/or utilities.
Property, Facilities and Infrastructure	Sea level rise can cause damage to property as flooding becomes more regular in the short term and as sea levels continue to rise in the long term. SLR can also compromise infrastructure such as drainage systems and roads.
Environment	Sea level rise can lead to increased erosion, salt water intrusion, and inundation of wetlands and previous dry land.
Economic Condition of the Jurisdiction	Sea level rise can severely disrupt the economy, particularly in a region that relies so heavily on tourism.
Public Confidence in the Jurisdiction's Governance	Sea level rise is unlikely to impact public confidence.

ASSOCIATED HAZARDS

Natural hazards are often interconnected. Any given hazard may lead to, or be spurred by, another hazard – sometimes referred to as cascading disasters. Sea level rise may be associated with tropical cyclones, storm surge, flood, and coastal erosion.

CHANGES IN DEVELOPMENT

New development at a local scale will not necessarily impact the rate of sea level rise. Increased development in potentially inundated areas, however, will increase vulnerability. Future development

plans guiding future development must consider sea level rise and areas of the county that will be inundated by sea level rise.

PROBLEM STATEMENT

Residential property is most likely to be affected by sea level rise, which has implications on a local economy – both permanent and season residential units may no longer be livable. Education and outreach programs could increase residential and property owner buy-in on and implementation of mitigation options on an individual property scale.

Various reports on sea level rise in the region exist – mitigation strategies should consider all reports; specifically detailing critical facilities at risk to sea level rise using a standard prediction would clarify mitigation strategies chosen to respond to this hazard.

Key West, Marathon, Layton, and Unincorporated Monroe County will have the most parcels impacted by 2 feet of sea level rise.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes sea level rise risk by jurisdiction. The coastal, low-lying geography of the region mean all jurisdictions face at least some risk from sea level rise. Impacts vary based on the number of parcels at risk to sea level rise - more developed jurisdictions are likely to see larger impacts. Spatial extent was varied by jurisdiction depending on the area exposed to sea level rise impacts.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Key Colony Beach	3	2	2	1	4	2.4	M
Key West	3	3	4	1	4	3.1	H
Layton	3	3	3	1	4	2.9	M
Marathon	3	3	4	1	4	3.1	H
Islamorada	3	2	3	1	4	2.6	M
Unincorporated	3	3	4	1	4	3.1	H

4.5.6 SEVERE STORMS AND TORNADOES

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Severe Storms (Thunderstorms)	Highly Likely	Limited	Large	Less than 6 hrs	Less than 6 hrs	2.6
Severe Storms (Lighting & Hail)	Highly Likely	Minor	Negligible	Less than 6 hrs	Less than 6 hrs	2.2
Tornadoes	Likely	Limited	Small	Less than 6 hrs	Less than 6 hrs	2.4

HAZARD DESCRIPTION

THUNDERSTORM WINDS

Thunderstorms result from the rapid upward movement of warm, moist air. They can occur inside warm, moist air masses and at fronts. As the warm, moist air moves upward, it cools, condenses, and forms cumulonimbus clouds that can reach heights of greater than 35,000 ft. As the rising air reaches its dew point, water droplets and ice form and begin falling the long distance through the clouds towards earth's surface. As the droplets fall, they collide with other droplets and become larger. The falling droplets create a downdraft of air that spreads out at earth's surface and causes strong winds associated with thunderstorms.

There are four ways in which thunderstorms can organize: single cell, multi-cell cluster, multi-cell lines (squall lines), and supercells. Even though supercell thunderstorms are most frequently associated with severe weather phenomena, thunderstorms most frequently organize into clusters or lines. Warm, humid conditions are favorable for the development of thunderstorms. The average single cell thunderstorm is approximately 15 miles in diameter and lasts less than 30 minutes at a single location. However, thunderstorms, especially when organized into clusters or lines, can travel intact for distances exceeding 600 miles.

Thunderstorms are responsible for the development and formation of many severe weather phenomena, posing great hazards to the population and landscape. Damage that results from thunderstorms is mainly inflicted by downburst winds, large hailstones, and flash flooding caused by heavy precipitation. Stronger thunderstorms can produce tornadoes and waterspouts. While conditions for thunderstorm conditions may be anticipated within a few hours, severe conditions are difficult to predict. Regardless of severity, storms generally pass within a few hours.

Warning Time: 4 – Less than six hours

Duration: 1 – Less than six hours

LIGHTNING

Lightning is a sudden electrical discharge released from the atmosphere that follows a course from cloud to ground, cloud to cloud, or cloud to surrounding air, with light illuminating its path. Lightning's unpredictable nature causes it to be one of the most feared weather elements.

All thunderstorms produce lightning, which often strikes outside of the area where it is raining and is known to fall more than 10 miles away from the rainfall area. When lightning strikes, electricity shoots through the air and causes vibrations creating the sound of thunder. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Nationwide, lightning kills 75 to 100 people each

year. Lightning strikes can also start building fires and wildland fires, and damage electrical systems and equipment.

The watch/warning time for a given storm is usually a few hours. There is no warning time for any given lightning strike. Lightning strikes are instantaneous. Storms that cause lightning usually pass within a few hours.

Warning Time: 4 – Less than six hours

Duration: 1 – less than six hours

HAIL

According to the National Oceanic and Atmospheric Administration (NOAA), hail is precipitation that is formed when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere causing them to freeze. The raindrops form into small frozen droplets and then continue to grow as they encounter super-cooled water which will freeze on contact with the frozen rain droplet. This frozen rain droplet can continue to grow and form hail. If the updraft forces can support or suspend the weight of the hailstone, hail can continue to grow.

At the time when the updraft can no longer support the hailstone, it will fall to the earth. For example, a ¼" diameter or pea sized hail requires updrafts of 24 mph, while a 2 ¾" diameter or baseball sized hail requires an updraft of 81 mph. The largest hailstone recorded in the United States was found in Vivian, South Dakota on July 23, 2010; it measured eight inches in diameter, almost the size of a soccer ball. While soccer-ball-sized hail is the exception, but even small pea sized hail can do damage.

Hailstorms in Florida cause damage to property, crops, and the environment, and kill and injure livestock. In the United States, hail causes more than $1 billion in damage to property and crops each year. Much of the damage inflicted by hail is to crops. Even relatively small hail can shred plants to ribbons in a matter of minutes. Vehicles, roofs of buildings and homes, and landscaping are the other things most commonly damaged by hail. Hail has been known to cause injury to humans; occasionally, these injuries can be fatal.

The onset of thunderstorms with hail is generally rapid. However, advancements in meteorological forecasting allow for some warning. Storms usually pass in a few hours.

Warning Time: 4 – Less than 6 hours

Duration: 1 – Less than 6 hours

TORNADO

According to the Glossary of Meteorology (AMS 2000), a tornado is "a violently rotating column of air, pendant from a cumuliform cloud or underneath a cumuliform cloud, and often (but not always) visible as a funnel cloud." Tornadoes can appear from any direction. Most move from southwest to northeast, or west to east. Some tornadoes have changed direction amid path, or even backtracked.

Tornadoes are commonly produced by land falling tropical cyclones. Those making landfall along the Gulf coast traditionally produce more tornadoes than those making landfall along the Atlantic coast. Tornadoes that form within hurricanes are more common in the right front quadrant with respect to the forward direction but can occur in other areas as well. According to the NOAA, more than half of the landfalling hurricanes will spawn at least one tornado. Tornadoes are more likely to be spawned within 24 hours of landfall and are usually within 30 miles of the tropical cyclone's center.

Tornadoes have the potential to produce winds in excess of 200 mph (EF5 on the Enhanced Fujita Scale) and can be very expansive – some in the Great Plains have exceeded two miles in width. Tornadoes

associated with tropical cyclones, however, tend to be of lower intensity (EF0 to EF2) and much smaller in size than ones that form in the Great Plains.

Figure 4.23 – Summary of Tornado Occurrences and Impacts by Magnitude

Weak Tornadoes

- 88% of all tornadoes
- Less than 5% of tornado deaths
- Lifetime 1 – 10+ minutes
- Winds less than 110 mph
- Produces EF0 or EF1 damage

Strong Tornadoes

- 11% of all tornadoes
- Nearly 30% of all tornado deaths
- May last 20 minutes or longer
- Winds 111-165 mph
- Produces EF2 or EF3 damage

Violent Tornadoes

- Less than 1% of all tornadoes
- 70% of all tornado deaths
- Can exceed 1 hour
- Winds greater than 166 mph
- Produces EF4 or EF5 damage

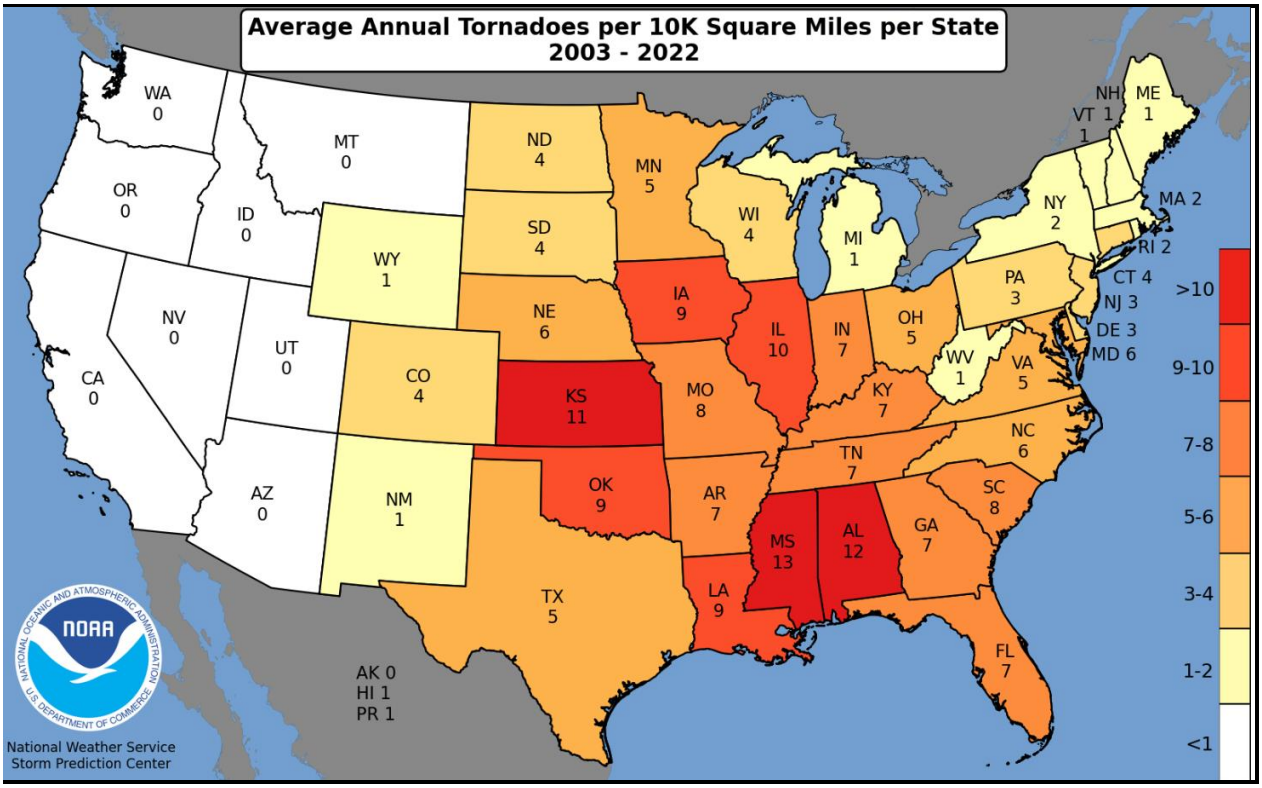
Source: NOAA National Weather Service

Warning Time: 4 – Less than six hours

Duration: 1 – Less than six hours

According to the NOAA Storm Prediction Center (SPC), the United States experiences an average of 1,248 tornadoes per year with the highest concentration of tornadoes occurring in the region surrounding Oklahoma, Texas, and Kansas. Although the Great Plains region of the Central United States does favor the development of the largest and most dangerous tornadoes (earning the designation of "tornado alley"), the southeast experiences tornado threats throughout the cooler months of the year before they move to the central plains during May and June. The below figure shows tornado activity in the United States based on the number of recorded tornadoes per 10,000 square miles.

Figure 4.24 – Tornado Activity in the U.S.



Source: NOAA National Weather Service

WATERSPOUTS

Waterspouts can form when a tornado moves from land to water. Joseph Golden, the distinguished waterspout authority with NOAA, defines a waterspout as a "funnel which contains an intense vortex, sometimes destructive, of small horizontal extent and which occurs over a body of water." In other words, a waterspout is a column of rotating, cloud-filled wind. There are two types of waterspouts. A *tornadic waterspout* generally begins as a true tornado over land in association with a thunderstorm and then moves out over water. They are influenced by winds associated with severe thunderstorms as air rises and rotates on a vertical axis. *Fair weather waterspouts*, on the other hand, are associated with developing storms systems, but not storms themselves. These types of waterspouts only form over open water, where they develop at the water's surface and climb skyward. Both types of waterspouts require high levels of humidity and relatively warm water temperatures compared to overlying air. The fair-weather variety is more common than the tornadic type.

There are five stages of waterspout formation:

Dark Spot: The water's surface takes on a prominent circular, light-colored disk surrounded by a larger dark area of indeterminate shape with diffused edges where the vortex reaches it.

Spiral Pattern: A pattern of light and dark colored surface bands spiral out from the dark spot.

Spray Ring: A swirling ray of dense sea spray, known as a cascade, forms around the dark spot with what appears to be an eye similar to that seen in hurricanes.

Mature Vortex: This is the waterspouts most intense stage. It is now visible from the water surface to an overhead cloud mass as it achieves maximum organization and intensity. The funnel often appears

hollow, with a surrounding shell of turbulent condensate. The spray vortex can rise to a height of several hundred feet or more, often creating a visible wake and an associated wave train as it moves.

Decay: The funnel and spray vortex begin to dissipate as the inflow of warm are into the vortex weakens.

Systems that might produce waterspouts are outline in the National Weather Service's nearshore marine forecast and hazardous weather outlook, and this information is shared 12 to 24 hours prior to waterspout occurrences. NWS will issue a special marine warning when waterspouts are detected by doppler radar or trained spotters.

Warning Time: 3 – 6 to 12 hours

Duration: 1 – Less than 6 hours

LOCATION

THUNDERSTORM WINDS

Thunderstorm wind, lightning, and hail events do not have a defined vulnerability zone. The scope of wind, lightning and hail is generally defined to the footprint of its associated thunderstorm. Given the general size and movement of thunderstorm events, thunderstorm winds from one event may impact a large portion of the planning area. The entirety of Monroe County and its jurisdictions share equal risk to the threat of severe weather.

Spatial Extent: 3 – Moderate

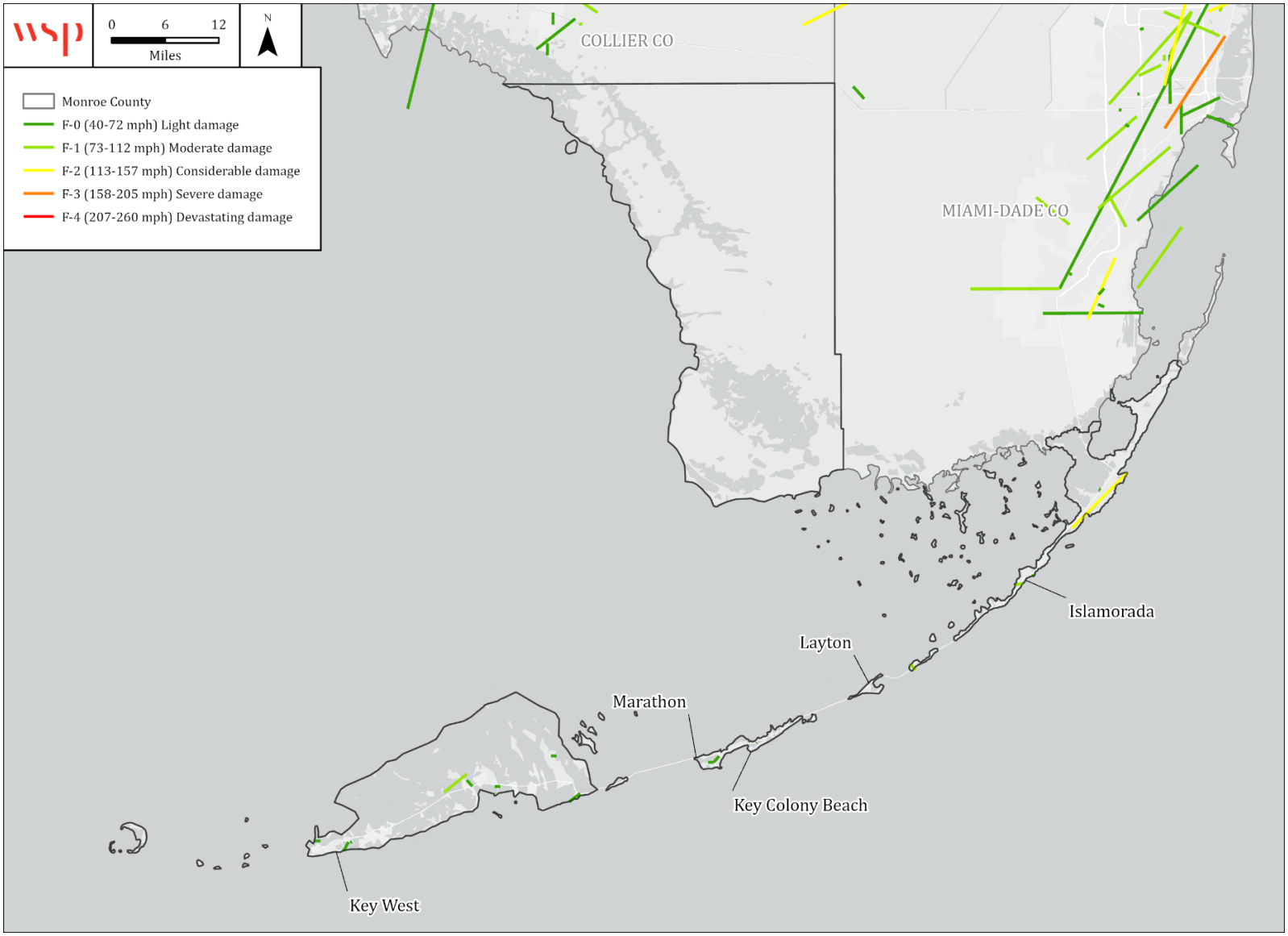
TORNADOES

Tornados can occur anywhere in the County. Tornadoes typically impact a small area, but damage may be extensive. Tornado locations are completely random, meaning risk to tornado isn't increased in one area of the county versus another. Monroe County and its jurisdictions are uniformly exposed to tornadoes.

Waterspouts are most common in tropical and subtropical waters such as the Florida Keys, Greek Islands, or off the coast of Australia. Waterspouts can occur in any of the water bodies in Monroe County.

Spatial Extent: 2 – Small

Figure 4.25 – Tornado Paths through Monroe County, 1950-2022



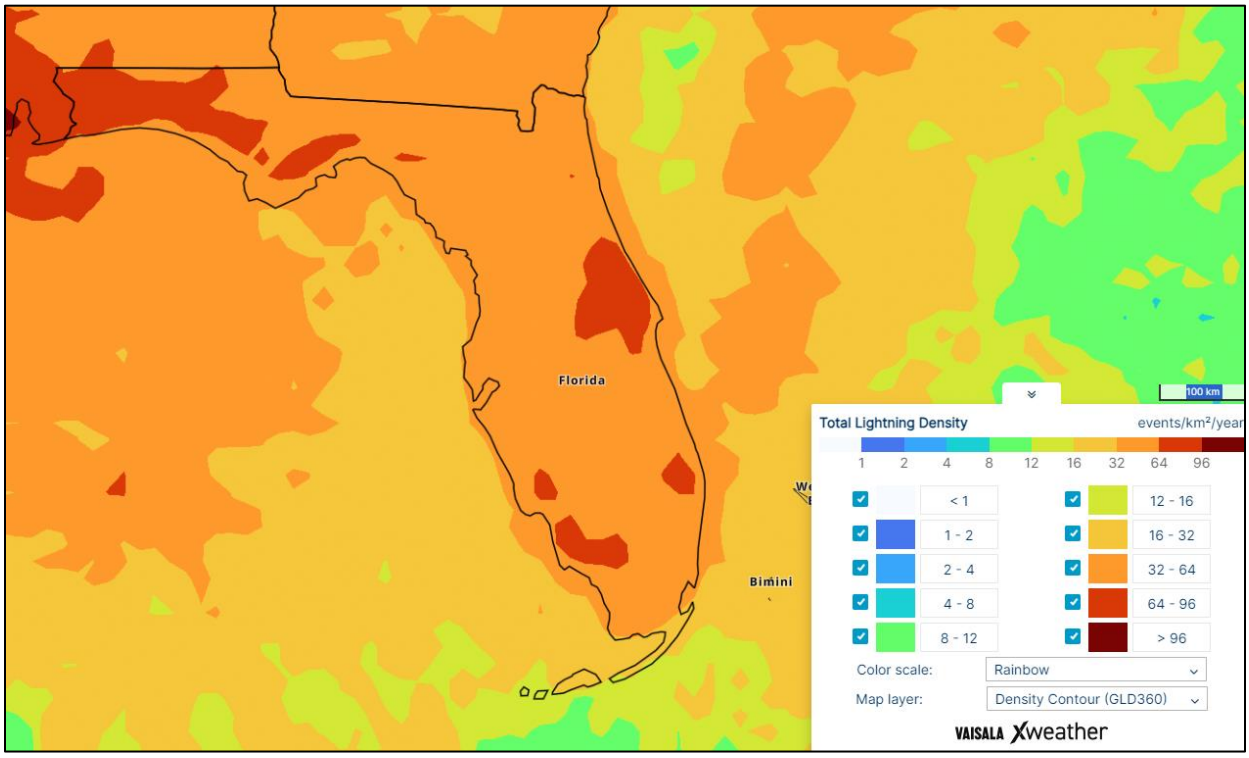
LIGHTNING AND HAIL

The scope of lightning and hail is generally defined to the footprint of its associated thunderstorm. However, large-scale hail tends to occur in a more localized area within the storm, and lightning strikes and associated damages are highly localized and occur randomly. It should be noted that while lightning is most often affiliated with severe thunderstorms, it may also strike outside of heavy rain and might occur as far as 10 miles away from any rainfall. The entirety of Monroe County and its jurisdictions are uniformly exposed to each of these hazards.

According to the Vaisala Interactive Global Lightning Density Map, shown in Figure 4.26, the majority of Florida experiences 32-64 lightning events per square kilometer per year. The Florida Keys do experience slightly less lightning on average at 16-32 events per square kilometers per year.

Spatial Extent (Lightning): 1 – Negligible

Figure 4.26 – Total Lightning Density in the U.S. (2016-2023)



Source: Vaisala Interactive Global Lightning Density Map

EXTENT

THUNDERSTORM WINDS

The magnitude of a thunderstorm event can be defined by the storm's maximum wind speed and its impacts. NCEI divides wind events into several types including High Wind, Strong Wind, Thunderstorm Wind, Tornado and Hurricane. For this severe weather risk assessment, High Wind, Strong Wind and Thunderstorm Wind data was collected. Hurricane Wind and Tornadoes are addressed as individual hazards. The following definitions come from the NCEI Storm Data Preparation document.

- **High Wind** – Sustained non-convective winds of 40mph or greater lasting for one hour or longer or winds (sustained or gusts) of 58 mph for any duration on a widespread or localized basis.
- **Strong Wind** – Non-convective winds gusting less than 58 mph, or sustained winds less than 40 mph, resulting in a fatality, injury, or damage.
- **Thunderstorm Wind** – Winds, arising from convection (occurring within 30 minutes of lightning being observed or detected), with speeds of at least 58 mph, or winds of any speed (non-severe thunderstorm winds below 58 mph) producing a fatality, injury or damage.

The Beaufort Wind Force Scale shown in Table 4.34 is an empirical measure that relates wind speed to observed conditions at sea or on land. In the United States, winds of force 6 to 7 are designated as "strong;" 8 to 9 "gale force;" 10 to 11 "usually results in a storm warning or tropical storm warning; and force 12 results in a hurricane warning.

Table 4.34 – Beaufort Wind Force Scale

Rating	(MPH)	Name	Appearance of Wind Effects	
			On Water	On Land
0	<1	Calm	Sea surface smooth and mirror-like	Calm, smoke rises vertically
1	1-3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction, still wind vanes
2	4-7	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	8-12	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	13-18	Moderate Breeze	Small waves 1-4 ft, becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted, small tree branches move
5	19-24	Fresh Breeze	Moderate waves 4-8 ft taking longer to form, many whitecaps, some spray	Small trees in leaf begin to sway
6	25-31	Strong Breeze	Larger waves 8-13 ft, whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	32-38	Near Gale	Sea heaps up, waves 13-19 ft, white foam streaks of breakers	Whole trees moving, resistance felt walking against wind
8	39-46	Gale	Moderately high (18-25 ft) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Twigs breaking off trees, generally impedes progress
9	47-54	Strong Gale	High waves (23-32 ft), sea begins to roll, dense streaks of foam, spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	55-63	Storm	Very high waves (29-41 ft) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	64-72	Violent Storm	Exceptionally high (37-52 ft) waves, foam patches cover sea, visibility more reduced	Very rarely experienced; widespread damage

Rating	(MPH)	Name	Appearance of Wind Effects	
			On Water	On Land
12	73+	Hurricane	Air filled with foam, waves over 45 ft, sea completely white with driving spray, visibility greatly reduced	Devastation

Source: NOAA Storm Prediction Center

The strongest recorded thunderstorm wind event in the county occurred on February 2, 1998 when a C-MAN instrument recorded a peak wind speed of 119 mph at Long Key. Elsewhere in the County, winds ranged from 46 mph to 96 mph. The event caused one fatality when a man was crushed between a boat and a dock, but no injuries or damages.

Impact: 2 – Limited

LIGHTING

Lightning is measured by the Lightning Activity Level (LAL) scale, created by the NWS to define lightning activity into a specific categorical scale. The LAL is a common parameter that is part of fire weather forecasts nationwide. The scale is shown in Table 4.35.

Table 4.35 – Lightning Activity Level Scale

Lightning Activity Level Scale	
LAL 1	No thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground lightning strikes in a five-minute period
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a five-minute period
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a five-minute period
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a five-minute period
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag warning

Source: National Weather Service

With the right conditions in place, the entire county is susceptible to each lightning activity level as defined by the LAL. Most lightning strikes cause limited damage to specific structures in a limited area, and cause very few injuries or fatalities, and minimal disruption on quality of life.

Impact: 1 – Minor

HAIL

The NWS classifies hail by diameter size, and corresponding everyday objects to help relay scope and severity to the population. Table 4.36 indicates the hailstone measurements utilized by the NWS.

Table 4.36 – Hailstone Measurement Comparison Chart

Average Diameter	Corresponding Household Object
.25 inch	Pea
.5 inch	Marble/Mothball
.75 inch	Dime/Penny
.875 inch	Nickel
1.0 inch	Quarter
1.5 inch	Ping-pong ball
1.75 inch	Golf ball
2.0 inch	Hen egg
2.5 inch	Tennis ball
2.75 inch	Baseball
3.00 inch	Teacup
4.00 inch	Grapefruit
4.5 inch	Softball

Source: National Weather Service

The Tornado and Storm Research Organization (TORRO) has further described hail sizes by their typical damage impacts. Table 4.37 describes typical intensity and damage impacts of the various sizes of hail.

Table 4.37 – Tornado and Storm Research Organization Hailstorm Intensity Scale

Intensity Category	Diameter (mm)	Diameter (inches)	Size Description	Typical Damage Impacts
Hard Hail	5-9	0.2-0.4	Pea	No damage
Potentially Damaging	10-15	0.4-0.6	Mothball	Slight general damage to plants, crops
Significant	16-20	0.6-0.8	Marble, grape	Significant damage to fruit, crops, vegetation
Severe	21-30	0.8-1.2	Walnut	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
Severe	31-40	1.2-1.6	Pigeon's egg > squash ball	Widespread glass damage, vehicle bodywork damage
Destructive	41-50	1.6-2.0	Golf ball > Pullet's egg	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
Destructive	51-60	2.0-2.4	Hen's egg	Bodywork of grounded aircraft dented, brick walls pitted
Destructive	61-75	2.4-3.0	Tennis ball > cricket ball	Severe roof damage, risk of serious injuries
Destructive	76-90	3.0-3.5	Large orange > softball	Severe damage to aircraft bodywork
Super Hailstorms	91-100	3.6-3.9	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
Super Hailstorms	>100	4.0+	Melon	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: Tornado and Storm Research Organization (TORRO), Department of Geography, Oxford Brookes University
Notes: In addition to hail diameter, factors including number and density of hailstones, hail fall speed and surface wind speeds affect severity.

The average hailstone size recorded between 2000 and 2024 in Monroe County was a little over 1" in diameter; the largest hailstone recorded was 1.75", recorded on April 27, 2003. The largest hailstone ever recorded in the U.S. fell in Vivian, SD on June 23, 2010, with a diameter of 8 inches and a circumference of 18.62 inches.

Impact: 1 – Minor

TORNADOES

Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita (EF) scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis, better correlation between damage and wind speed. It is also more precise because it takes into account the materials affected and the construction of structures damaged by a tornado. Table 4.38 shows the wind speeds associated with the enhanced Fujita scale ratings and damage that could result at different levels of intensity.

Table 4.38 – Enhanced Fujita Scale

EF Number	3 Second Gust (mph)	Damage
0	65-85	**Light damage.** Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
1	96-110	**Moderate damage.** Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
2	111-135	**Considerable damage.** Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
3	136-165	**Severe damage.** Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
4	166-200	**Devastating damage.** Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
5	Over 200	**Incredible damage.** Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m; high-rise buildings have significant structural deformation; incredible phenomena will occur.

The most intense tornado to pass through Monroe County in the period for which NCEI has recorded events was and F2 tornado on November 4, 1998. NCEI reports this storm caused $25,000,000 in damages, but no deaths or injuries. The tornado damaged over 600 structures, tore down utility lines, damaged vessels, and destroyed foliage.

Impact: 3 – Critical

WATERSPOUTS

Waterspouts are generally not a threat to any development on land, as they mostly stay over water. Boaters and people participating in marine activities are advised to stay a considerable distance away

from any observed waterspout. There is no scale comparable to the Fujita scale to measure the strength of a waterspout, however they generally are not expected to cause injury, death, or damage to residents or property in Monroe County.

Waterspouts might be measured by their radius or wind speeds. An average waterspout is around 165 feet in diameter with wind speed around 50 mph, corresponding with an EF0 tornado, and last on average 5 to 10 minutes. Larger waterspouts might have a maximum 330-foot diameter and can last as long as one hour.

An October 2011 waterspout caused $10,000 in damages when it moved through the anchorage at Key West Harbor and damaged a vessel's cabin and hull after driving it ashore.

Impact: 1 – Minor

HISTORICAL OCCURRENCES

THUNDERSTORM WINDS

Between January 1, 2000 and November 30, 2024, the NCEI recorded 53 separate incidents of thunderstorm winds, occurring on 38 separate days. These events caused $147,650 in recorded property damage, but no crop damages, fatalities, injuries were reported. The recorded gusts averaged 51.8 miles per hour, with the highest gusts recorded at 92.1 mph, recorded on November 25, 2009. Of these events, 27 caused property damage. Wind gusts with property damage recorded averaged $6,415 in damage, with one gust causing a reported $60,000 in damage (in Marathon on August 9, 2006). These incidents are aggregated by the date the events occurred and are recorded in Table 4.38 below:

Table 4.39 – Recorded Thunderstorm Winds, Monroe County, 2000-2024

Location	Date	Wind Speed (mph)	Fatalities	Injuries	Property Damage
Key Largo	8/15/2000	58	0	0	$0
Marathon	8/26/2000	63	0	0	$0
Marathon	7/21/2001	--	0	0	$0
Islamorada	7/22/2001	--	0	0	$0
Islamorada	7/29/2001	58	0	0	$0
Plantation Key, Islamorada, Stock Island, Big Pine Key	9/29/2001*	58	0	0	$0
Ocean Reef	1/2/2002	64	0	0	$0
Key West	9/11/2002	58	0	0	$500
Key West NAS	12/9/2002	63	0	0	$5,000
Cudjoe Key	5/20/2003	58	0	0	$500
Key West, Key West Int'l Airport	5/5/2005*	58	0	0	$500
Marathon	6/2/2005	69	0	0	$60,000
Cudjoe Key	4/11/2007*	62	0	0	$500
Key Largo, Ocean Reef	6/13/2007*	64	0	0	$8,500

Location	Date	Wind Speed (mph)	Fatalities	Injuries	Property Damage
Sugarloaf Key, Key West Int'l Airport	11/30/2008*	64	0	0	$0
Key Colony Beach, Marathon	2/2/2009*	70	0	0	$1,500
Big Coppitt Island	6/11/2009	51	0	0	$700
Stock Is	8/5/2009	45	0	0	$500
Marathon	11/25/2009*	92	0	0	$50,000
Long Key	2/12/2010	58	0	0	$0
Upper Key Largo	4/26/2010	60	0	0	$1,700
Grassy Key	12/18/2010	52	0	0	$1,000
Marathon, Stock Island, Key West Int'l Airport	1/17/2011*	52	0	0	$2,500
Tavernier	3/28/2011	63	0	0	$10,000
Key West NAS	8/24/2011	49	0	0	$500
Cudjoe Key	10/3/2011	49	0	0	$250
Tavernier	10/8/2011	60	0	0	$0
Key West Int'l Airport	6/10/2015	59	0	0	$0
Pirates Cove	7/21/2020	50	0	0	$0
Grassy Key	8/19/2020	52	0	0	$0
Key West Int'l Airport	8/21/2020	52	0	0	$0
Key Largo PT ARPT	4/11/2021	43	0	0	$500
Key West Int'l Airport	8/28/2021	56	0	0	$0
Rock Harbor	6/22/2023	48	0	0	$2,000
Key West Int'l Airport	9/24/2023	51	0	0	$0
Ocean Reef	11/16/2023	57	0	0	$0
Monroe County/Upper Keys	12/16/2023	35	0	0	$500
Monroe County/Upper Keys	12/16/2023	40	0	0	$500
Tavernier	7/21/2024	74	0	0	$0
		Total	**0**	**0**	**$147,650**

Source: NCEI; Note: *Multiple events occurred on these dates. Injury, fatality, and damage stats are totaled; wind speed is highest reported.

In addition to recorded thunderstorm wind events, NCEI reports 3 high wind events during this same period. One such event, on August 1, 2001, caused one fatality. A separate event, on January 11, 2012, caused $2,000 in property damage.

LIGHTNING

According to NCEI data, there were 12 lightning strikes reported between 2000 and 2024. Of these, 6 recorded property damage totaling $73,000. The highest rate of property damage recorded for a single incident was $40,000. Four events caused a total of four injuries and no fatalities were reported. Event narratives indicate in some cases that property damage occurred but was not estimated; therefore, actual property damage amounts are higher. No crop damage was recorded by these strikes. It should be noted that lightning events recorded by the NCEI are only those that are reported; it is certain that additional lightning incidents have occurred in Monroe County. Table 4.40 details NCEI-recorded lightning strikes from 2000 through 2024.

Table 4.40 – Recorded Lightning Strikes in Monroe County, 2000-2024

Location	Date	Time	Fatalities	Injuries	Property Damage
Key West	7/26/2000	16:50	0	1	$0
Duck Key	8/15/2000	9:57	0	0	$0
Marathon	9/10/2000	7:05	0	0	$0
Islamorada	8/14/2001	17:00	0	1	$0
Tavernier	10/1/2007	7:00	0	0	$20,000
Key West Int'l Airport	7/25/2009	15:45	0	1	$0
Big Pine	6/9/2010	19:24	0	0	$1,000
Key West Int'l Airport	7/22/2012	8:20	0	0	$40,000
Key Colony Beach	6/12/2013	19:30	0	0	$2,500
Stock Is	6/26/2013	9:20	0	1	$0
Ramrod Key	11/2/2018	21:11	0	0	$7,500
Key West Nas	7/19/2023	6:00	0	0	$2,000
		Total	**0**	**4**	**$73,000**

Source: NCEI

The following are a selection of narrative descriptions recorded in NCEI for lightning events that occurred in Monroe County:

July 26, 2000 – Lightning struck a boat just west of Key West. Five people were knocked out of the boat with one person injured with burns.

August 14, 2001 – Female injured by lightning during thunderstorm. She was touching the stainless steel counter of the restaurant she worked at when she was struck.

October 1, 2007 – Strong thunderstorms over the Upper Keys produced heavy rainfall and a damaging lightning strike. The lightning struck the cupola of an unoccupied large oceanfront home in Plantation Key. The strike caused a small fire and damaged plumbing within the roof structure of the home.

July 25, 2009 – A strong thunderstorm centered approximately 8 miles northwest of Key West produced a cloud-to-ground lightning strike. The lightning struck a palm tree near the entrance to White Street Pier

in Key West. The bolt passed from the tree to a 19-year-old male. The strike survivor remained conscious and was treated at Lower Key Medical Center for minor injuries.

July 22, 2012 – A positive-polarity lightning strike struck a residence in Key West within stratiform rainfall behind a northwest-moving squall line. The residence, a duplex, was severely damaged. The lightning struck the ground near the exterior jacuzzi in a side yard, near the front corner of the structure, leaving a hole in the ground roughly 2 feet by 2 feet and 18 inches deep. A ground rod and wire was installed for the jacuzzi but not attached. The charge followed the exterior power conduit to an exterior junction box, where the box's cover was blown free. Wires were charred, the conduit destroyed. The residence's washer/dryer electric supply was charred. The electric meter box exploded with wires charred and burned and all connections melted. In the front of the residence, wood was charred under metal screws securing the exterior soffit. Aluminum window frames in the front of the residence were melted with windows knocked out. Light bulbs in various locations throughout the residence were blown, including the bedroom lamps and ceiling fixture, bathroom wall fixture, and kitchen ceiling light fixture. The bathroom mirror was shattered. The residence was declared unfit for occupation due to damage to the electrical system, although no fire resulted. Keys Energy Services replaced a blown fuse for a transformer serving the residence, and three other residences had tripped circuits but no permanent damage was reported. The struck residence was occupied by one female at the time of the strike, who was observed by rescue personnel to not have any injuries.

November 2, 2018 – An isolated thunderstorm near the lower Florida Keys produced a damaging lightning strike to a residence on Barbados Lane on Ramrod Key. The strike resulted in roof and electrical system damage. A neighboring residence also experienced electrical system damage.

HAIL

NCEI records 7 separate hail incidents across 3 days between January 1, 2000 and December 31, 2024 in Monroe County. Of these, one event resulted in $250 in property damage, and no events resulted in death, injury or crop damage. The largest diameter hail recorded in the County was 1.75 inches, which occurred on April 27, 2003 in Key West. This was the largest hail ever reported since record began in 1871. The event was only the 11th time hail of any size had been recorded in Key West. The average hail size of all events in the County was just under over one inch in diameter. Table 4.41 shows the summary of hail occurrences.

Table 4.41 – Summary of Hail Occurrences by Location

Location	Number of Occurrences	Average Hail Diameter
Key Largo	1	0.75”
Key West Int’l Airport	5	1.2”
Pinecrest	1	0.88”
Total	**7**	**1.09”**

Source: NCEI

Note: All 5 events at the Key West Int’l Airport occurred on the same day.

The following narratives provide detail on select hailstorms from the above list of NCEI recorded events highlight how intertwined thunderstorm and hail events are:

April 27, 2003 – A severe thunderstorm developed and moved southeast over Key West. Small hail of 1/2-inch or smaller began 15:02 EST over Old Town Key West and spread throughout the remainder of Key West, Stock Island, and Boca Chica Key through 15:27 EST. Golf ball-sized hail reported over central Key West on Flagler Avenue was the largest hail ever reported since records began in 1871 and

tied the largest hail size ever reported in Monroe County, Florida. This event was the 11th time hail of any size was recorded in the city of Key West since 1871.

June 13, 2007 – A severe thunderstorm moved south out of Miami-Dade County on the mainland, crossed the east end of Florida Bay, and produced sporadic wind damage throughout North Key Largo, Key Largo and Rock Harbor. A landscaper reported 3/4 inch hail in Rock Harbor.

June 15, 2013 – A surface frontal boundary moved into South Florida during the afternoon and generated numerous to widespread severe thunderstorms during the afternoon and early evening some with very large hail. Hail up to the size of baseballs and slightly larger was reported from two separate thunderstorms and this is only the sixth time since 1950 that baseball sized hail or larger has been reported anywhere in South Florida. A spotter reported nickel sized hail at the Loop Road Education Center.

TORNADOES

NCEI storm reports were reviewed from 2000 through 2024 to assess whether recent trends varied from the longer historical record. According to NCEI, Monroe County experienced 32 tornado incidents between 2000 and 2024, causing over $5.3 million in property damage but no injuries, fatalities, or crop damage. $5 million in damages came from one F2 event in Marathon on August 26, 2005. However, this damage estimate may be under reported, as damage was reported in the narratives of many events but was not recorded in terms of a monetary value. Table 4.42 shows historical tornadoes in Monroe County during this time.

Table 4.42 – Recorded Tornadoes in Monroe County, 2000-2024

Location	Date	Time	Magnitude	Deaths/ Injuries	Property Damage	Crop Damage
Big Pine Key	7/1/2000	1820	F0	0/0	$15,000	$0
Big Pine Key	8/18/2000	1450	F0	0/0	$0	$0
Key West	10/1/2003	1605	F0	0/0	$0	$0
Marathon	6/22/2005	1550	F0	0/0	$5,000	$0
Marathon	8/26/2005	345	F2	0/0	$5,000,000	$0
Sugarloaf Key	6/1/2007	1155	EF0	0/0	$20,000	$0
Marathon	6/24/2007	1258	EF0	0/0	$2,500	$0
Marathon	2/13/2008	1332	EF0	0/0	$2,000	$0
Big Coppitt Is	8/18/2008	1155	EF0	0/0	$1,000	$0
Summerland Key	8/18/2008	1300	EF0	0/0	$1,000	$0
Upper Key Largo	9/9/2008	1250	EF0	0/0	$25,000	$0
Craig Key	9/10/2008	242	EF1	0/0	$120,000	$0
Sugarloaf Key	9/17/2008	1140	EF0	0/0	$0	$0
Stock Island	9/29/2008	1500	EF0	0/0	$0	$0
Key West Int'l Arpt	12/18/2009	1435	EF0	0/0	$10,000	$0
Key Largo Pt Arpt	12/18/2009	1755	EF0	0/0	$5,000	$0
Key Largo Pt Arpt	4/26/2010	1145	EF0	0/0	$15,000	$0
Key Largo Pt Arpt	8/30/2010	1810	EF0	0/0	$500	$0
Big Pine	4/5/2013	110	EF0	0/0	$30,000	$0
Key Colony Beach	1/8/2016	630	EF0	0/0	$2,000	$0

Location	Date	Time	Magnitude	Deaths/ Injuries	Property Damage	Crop Damage
Key West Int'l Arpt	8/11/2017	1603	EF0	0/0	$0	$0
Tavernier	4/15/2018	1912	EF1	0/0	$4,000	$0
Tavernier	4/15/2018	1912	EF0	0/0	$200	$0
Summerland Key	8/4/2019	1820	EF0	0/0	$0	$0
Highland PT	1/31/2020	2235	EFU	0/0	$0	$0
Rock Harbor	5/9/2022	1505	EF0	0/0	$0	$0
Pinecrest	9/27/2022	1610	EFU	0/0	$0	$0
Key West Int'l Arprt	8/16/2023	855	EF0	0/0	$0	$0
Big Coppit Island	11/15/2023	627	EF0	0/0	$1,500	$0
Summerland Key	2/18/2024	1302	EF0	0/0	$75,000	$0
Big Coppit Island	3/19/2024	301	EF0	0/0	$2,000	$0
Key West Int'l Arprt	10/8/2024	2237	EF1	0/0	$0	$0
Total				**0/0**	**$5,336,700.00**	**$0**

Source: NCEI

Narratives from NCEI illustrate that many of these events spawned from waterspouts. Specific incidents with some level of impact include:

July 1, 2000 – A waterspout moved onshore along the south end of Big Pine Key. The event resulted in damage to a bed and breakfast inn.

August 26, 2005 – Tornado damage path began at the oceanfront at 73rd Street Ocean (F1) in Marathon and moved northeast, crossing U.S. Highway 1 near 76th Street Ocean, passing through Marathon Airport before entering Florida Bay near the Sea Air Estates Subdivision. The most significant damage (F2) included concrete block residential structure shifted on foundation, A-frame residence shifted on pilings, and bent large steel I-Beams on recently constructed hangars at Marathon Airport. One boat sunk in canal. Extensive damage to porches and trees along narrow path. Damage from this tornado totaled $5 million.

September 9 & 10, 2008 – Hurricane Ike moved west to west-northwest across eastern Cuba, just offshore the south-central coast, and then crossed through western Cuba into the Gulf of Mexico. Tropical storm force winds and two tornadoes were reported in the Florida Keys. Damage from these tornadoes totaled $145,000.

The first tornado touched down on the Atlantic side of U.S. Highway One and moved toward the northwest. The tornado caused minor damage to facia on a business on the bayside of U.S. Highway One, then moved into a residential area. One residence had two broken windows and another residence had an exterior wall penetrated with a 2x4 carried from a home under construction over 250 yards. Several trees and large limbs downed. Estimated maximum wind speed 60 to 70 mph.

The second tornado occurred when a violent waterspout associated with a supercell made landfall in Lower Matecumbe Key at Sunset Drive and moved northwest, crossing U.S. Highway One and then along Palm Drive through a residential section near Mile Marker 74 on the Overseas Highway. The tornado damage path ended on Buttonwood Lane before reaching Florida Bay. Most damage was to deck railings, screens, windows and soffits on numerous homes. A few homes displayed more significant damage, including penetration through exterior doors and walls, with one home losing 50 percent of its roof decking. The EF1 rating with estimated maximum wind speeds of 90 to 100 mph was based on roof

damage to a residence along Palm Drive. Debris from sheet metal paneling and mangrove branches may have contributed to a major power outage throughout all of the Keys from Islamorada through Key West as it was carried across U.S. Highway One and a major electrical transmission line.

December 18, 2009 – A supercell thunderstorm tracked northeast along the Florida Keys. The thunderstorm first produced a weak tornado at the extreme southeast tip of Key West and south Stock Island, then tracked northeast just north of Big Pine Key before crossing the Upper Florida Keys from the west-southwest at Key Largo. A second weak tornado was reported at several Florida Bay shoreline properties.

A weak tornado produced EF0 damage across the extreme southeast part of Key West through south Stock Island. The tornado was first observed by a motorist just offshore South Roosevelt Boulevard before moving briefly onshore at a hotel. Over a half dozen palm trees with some decay were snapped at the base. Lawn furniture was blown southeast in the tornado's wake. The tornado tracked northeast across Cow Key Channel before moving ashore again on south Stock Island along 12th Avenue. Two trees were downed, and a deck umbrella was lofted northeast from the east end of 11th Avenue onto power lines on 5th Street, bringing down the lines and causing a power outage throughout the area. The tornado continued northeast and likely lifted or dissipated over 5th Avenue northeast of Bernstein Park where a small ornamental tree was found snapped at the base and several trashcans had fallen and rolled to the south or southeast. At the tornado's northeast terminus, a television cable line was downed. Maximum winds were estimated at 60 to 70 mph along the path from Key West through 11th Avenue in Stock Island.

The same supercell also caused a short-lived weak tornado near Mile Marker 104 of the Overseas Highway. The tornado produced minor damage with some outdoor furniture destroyed and ornamental palm trees downed in a parking lot at a Florida Bay-side business, and porch screens blown out at a restaurant next door. Maximum winds estimated at 65 mph.

April 26, 2010 – A waterspout accompanying a line of severe thunderstorms moved onshore the Florida Bay side of Key Largo at the Marriott Florida Bay Resort. A tree was blown down blocking part of U.S. Highway 1 in front of the hotel. An outdoor day spa consisting of a thatched roof and bamboo shutters and interior mirrors was destroyed. Weighted deck loungers were blown across the pool deck and significant landscaping damage occurred on the waterfront side of the hotel. The tornado quickly dissipated over U.S. Highway 1. Estimated maximum winds were near 70 mph.

April 5, 2013 – A complex surface low pressure system supported by a sharp upper trough of low pressure extending southward into the Gulf of Mexico produced strong thunderstorms in the Florida Straits. One thunderstorm produced a waterspout which moved ashore along the oceanside of Long Beach Drive and passed over a bed-and-breakfast inn at its maximum intensity and width of about 80 yards. Widespread damage to large limbs of native hardwood trees occurred, and one royal palm snapped at a level above 15 feet. A ground deck with four kayaks became airborne and dropped in mangroves 30 yards away. A large unmounted above-ground cistern containing nearly 200 gallons of water slid over 15 yards, knocking a large camping trailer off its front mount. Bolts securing a large grill to wood ground decking were sheared off. While numerous tables and lounge chairs were carried to the leeward side of the property, one 40-lb steel lounge chair was lifted to the edge of the roof line of the two-story residence, crushing the rain gutter, before settling in the lee of the structure. Small gravel and pea rock along the waterfront caused moderate to severe paint chipping on the oceanside of several homes. Screens including their wood frames were torn off several residences' oceanside porches, with one home losing about 40 percent of its oceanside vinyl siding. A phone line was downed along Long Beach Drive.

The tornado continued across mud flats along the southeast edge of Coupon Bight, where only isolated damage to mangrove branches was observed. Small limbs were observed downed across Long Beach Drive between Southeast Point and U.S. Highway 1, eventually crossed through a campground just south

of the Spanish Harbor Channel Bridge. Several tents including one large aluminum-framed dome tent structure were overturned before the tornado likely passed into Spanish Harbor Channel. The intensity of the tornado at Spanish Harbor Channel had decreased since its original landfall with estimated winds near 60 mph.

April 15, 2018 – A fast-moving pre-frontal squall line passing through the upper Florida Keys developed an embedded supercell thunderstorm along the Florida Bay side of Upper Matecumbe Key. The supercell thunderstorm moved east-northeast, producing a waterspout which was observed backlit by lightning shortly before making landfall as a tornado at Indian Mound Trail in Plantation Key, Islamorada. Large gumbo limbo tree limbs and the top of a palm tree were downed, as well as other hardwood trees. The rolling driveway gate on an adjacent residence was completely dislodged from its mounts and pushed into a trailered boat and car and an entire gutter and downspout system was removed from another residence. Numerous loose items were moved from the backyards and understory of homes onto front lawns and streets. Most of the observed damage in the Indian Waterways community were consistent with 60 to 70 mph, with possible spot values near 75 mph. The tornado crossed a patch of mangroves and undeveloped forest and reached greatest intensity at San Pedro Catholic Church where a large tree split at the trunk and an old-growth mahogany was uprooted, falling onto a portion of the structure connecting the rectory with the main church. The roof was not substantially damaged. However, several barrel tiles were removed from the peak ridges forming the hip roof pattern over the rectory, as well as from the southeast edge of the church, onto the top of the church's main entrance. Numerous large limbs were downed toward the east, with lightweight free-standing signs deposited northward cross the tornado path from right to left. Estimated wind speeds were maximized in the range of 90 to 100 mph with maximum width near 60 yards. The tornado continued toward the east-northeast, crossing U.S. Highway 1 and the Old Highway, but weakened such that only large tree limbs were downed.

The tornado moved out over the ocean as a waterspout and made a second landfall near Lincoln Avenue on the far southwest portion of Tavernier's oceanside. A progressive narrowing of the damage path down to nearly 30 yards as well as a turn toward the northwest or north-northwest was observed. Impacts lessened and included damaged fences and large limbs gradually down to smaller limbs and twigs. No further impacts were observed northeast of Lowe Street. It is likely the wind speeds 55 to 65 mph were observed, weakening to below 50 mph roughly 3 blocks from the waterfront.

February 18, 2024 - A waterspout originating southwest of Cudjoe Bay made landfall as an EF0 tornado over southern portions of Cudjoe Key. The tornado crossed U.S. Highway 1, and continued northeast as a waterspout until a second landfall as an EF0 tornado over central Big Torch Key. The tornado was associated with a supercell thunderstorm with a well-defined mesocyclone moving northeast over the Lower Florida Keys.

WATERSPOUT

Due to the warm, humid nature and coastal geography, waterspouts occur in the Florida Keys more than anywhere else in the world. In fact, between 50 and 500 waterspouts occur per year. NCEI's storm event database changed how it reports on waterspouts and as of October 2001 ceased reporting waterspouts by county in favor of reporting by region (i.e. South Atlantic). However, for the period in which it did report by county (January 1996 through October 2001) Monroe County experienced 315 waterspout events across 184 separate days. Two of these events caused damage to property; none caused damage to crops, injuries or fatalities. Table 4.43 below lists waterspout events by date from 2000 through Sept. 2001; Table 4.43 summarizes waterspouts by location from Oct. 2001 through November 30, 2024 to illustrate the frequency at which these events occur.

Table 4.43 – Recorded Waterspouts, Monroe County, 2000 – Sept. 2001

Location(s)	Date	# of Events	Fatalities/ Injuries	Property Damage
Key West Int'l Airport	2/3/2000	3	0/0	$0
Summerland Key	3/5/2000	1	0/0	$0
Key Largo	3/18/2000	1	0/0	$0
Big Pine Key, Marathon	3/31/2000	5	0/0	$0
Key West Int'l Airport, Ramrod Key	4/8/2000	3	0/0	$0
Key West Int'l Airport	5/7/2000	2	0/0	$0
Key West Int'l Airport	5/17/2000	3	0/0	$0
Marathon	5/23/2000	1	0/0	$0
Key West Int'l Airport, Plantation, Marathon	5/30/2000	3	0/0	$0
Key West Int'l Airport	5/31/2000	1	0/0	$0
Key West Int'l Airport, Duck Key	6/1/2000	3	0/0	$0
Key West Int'l Airport	6/3/2000	2	0/0	$0
Key West Int'l Airport	6/4/2000	3	0/0	$0
Upper Key Largo	6/5/2000	1	0/0	$0
Key West Int'l Airport	6/11/2000	1	0/0	$0
Key West Int'l Airport	6/21/2000	1	0/0	$0
Big Pine Key	6/28/2000	1	0/0	$0
Key West Int'l Airport	7/1/2000	1	0/0	$0
Marathon	7/2/2000	1	0/0	$0
Key West Int'l Airport	7/6/2000	1	0/0	$0
Marathon, Duck Key	7/16/2000	2	0/0	$0
Duck Key, Big Coppitt Island, Summerland Key	7/22/2000	3	0/0	$0
Key West Int'l Airport	7/23/2000	2	0/0	$0
Marathon	7/26/2000	1	0/0	$0
Duck Key, Key West Int'l Airport, Big Coppitt Island	7/28/2000	5	0/0	$0
Marathon	7/29/2000	1	0/0	$0
Key West Int'l Airport	8/3/2000	1	0/0	$0
Key West Int'l Airport	8/9/2000	2	0/0	$0
Marathon	8/11/2000	1	0/0	$0
Duck Key	8/15/2000	2	0/0	$0
Islamorada	8/16/2000	1	0/0	$0
Key West Int'l Airport	8/17/2000	2	0/0	$0
Big Pine Key	8/18/2000	1	0/0	$0
Long Key, Summerland Key, Key West, Duck Key	8/19/2000	4	0/0	$0
Key West Int'l Airport	8/21/2000	2	0/0	$0
Key West NAS	8/27/2000	1	0/0	$0
Key West Int'l Airport	8/28/2000	1	0/0	$0
Marathon	9/9/2000	1	0/0	$0
Summerland Key	9/10/2000	1	0/0	$0
Marathon	9/11/2000	1	0/0	$0
Key West NAS	9/26/2000	1	0/0	$0
Marathon, Key West Int'l Airport	9/28/2000	3	0/0	$0

Location(s)	Date	# of Events	Fatalities/ Injuries	Property Damage
Big Pine Key	9/30/2000	1	0/0	$0
Key West NAS, Key West Int'l Airport, Ramrod Key	10/1/2000	4	0/0	$0
Big Pine Key	10/5/2000	1	0/0	$0
Summerland Key	10/6/2000	1	0/0	$0
Key West Int'l Airport, Key West NAS, Marathon	10/8/2000	3	0/0	$0
Marathon	3/2/2001	1	0/0	$0
Islamorada	4/26/2001	1	0/0	$0
Key West, Key West Int'l Airport	5/1/2001	3	0/0	$0
Key West Int'l Airport	5/20/2001	1	0/0	$0
Key West Int'l Airport	5/31/2001	1	0/0	$0
Key West Int'l Airport, Big Pine Key, Ramrod Key	6/14/2001	3	0/0	$0
Big Pine Key, Big Coppit Island, Key West Int'l Airport	6/16/2001	4	0/0	$0
Big Coppit Island	6/17/2001	1	0/0	$0
Key West Int'l Airport	7/11/2001	1	0/0	$0
Tavernier, Long Key, Duck Key	7/15/2001	3	0/0	$0
Key West Int'l Airport	7/18/2001	1	0/0	$0
Key Largo	7/21/2001	1	0/0	$0
Key West Int'l Airport, Key West NAS	8/10/2001	2	0/0	$0
Key West Int'l Airport	8/11/2001	1	0/0	$0
Rock Harbor, Upper Key Largo	8/26/2001	2	0/0	$0
Key Colony Beach	9/8/2001	2	0/0	$0
Craig Key	9/12/2001	1	0/0	$0
Key West Int'l Airport	9/18/2001	2	0/0	$0
Marathon	9/19/2001	1	0/0	$0
East Cape	9/22/2001	1	0/0	$0
Sugarloaf Key, Key West Int'l Airport	9/26/2001	2	0/0	$0
Total		**122**	**0/0**	**$0**

Source: NCEI

Table 4.44 – Recorded Waterspouts, Monroe County, Oct. 2001 – Nov. 2024

Location	# of Events	Fatalities/Injuries	Property Damage
Alligator Reef Light	23	0/0	$0
American Shoal Light	28	0/0	$0
Big Coppitt Key	64	0/0	$0
Big Pine Key	160	0/0	$200
Cosgrove Shoal Light	1	0/0	$0
Dry Tortugas	4	0/0	$0
Duck Key	37	0/0	$0
Islamorada	19	0/0	$0
Key Largo	37	0/0	$0
Key West	343	0/0	$4,000
Marathon	103	0/0	$0
Marquesas Keys	3	0/0	$0

Location	# of Events	Fatalities/Injuries	Property Damage
Molasses Reef Light	8	0/0	$0
Plantation Key	11	0/0	$0
Sand Key Light	26	0/0	$0
Smith Shoal Light	18	0/0	$0
Snipe Point	36	0/0	$0
Sombrero Key Light	25	0/0	$0
Summerland Key	61	0/0	$0
Tennessee Reef Light	10	0/0	$0
Total	**1,017**	**0/0**	**$4,200**

Source: NCEI

Two of the recorded waterspouts caused $4,200 in property damage; no recorded events caused death or injury. Waterspouts have occurred in close proximity to all jurisdictions and unincorporated areas except for Layton and Key Colony Beach, however that does not mean they have not occurred. The following narrative descriptions describe the potential damage caused by waterspouts:

August 5, 2008 – Towering cumulus cloud lines produced a couple waterspouts along the north side of the Lower Florida Keys. A short-duration waterspout was approximately one-mile northeast of Sugarloaf Key. The waterspout drifter over a vessel, producing minor damage.

May 5, 2019 – Two waterspouts formed in succession and in association with a cloud line along the north side of Key West. The second waterspout was observed to develop within Garrison Bight outside of the Palm Drive Bridge, and drifted slowly west, reaching a dock at a sailing center. 3 catamarans were considerably damaged due to overturning while tied to the dock, causing the dock planking to twist and detach from the pilings. 3 other vessels at the same dock had minor damage with ripped covers and canopy tops. A video relayed by social media showed the width of the spray ring was only a few yards across, with the spray ring dissipating before the waterspout reached shore. No damage was observed onshore at the sailing center nor an adjacent marina.

PROBABILITY OF FUTURE OCCURRENCE

Based on historical occurrences recorded by NCEI for the 25-year period from 2000 through 2024, Monroe County averages 2.1 thunderstorm wind events per year – 27 of these events caused property damage.

Over this same period, 12 lightning events were reported which equates to an average of 0.48 lightning strikes per year. Additionally, the average hailstorm in Monroe County occurs in the afternoon and has a hail stone with a diameter of just over one inch. Over the 25-year period from 2000 through 2024, Monroe County experienced 7 reported hail incidents; this averages 0.28 reported incidents per year somewhere in the planning area.

Based on these historical occurrences, there is a 100% chance that the County will experience severe weather each year. The probability of a damaging impacts is highly likely.

TORNADO

In a 25-year period between 2000 and 2024, Monroe County experienced 32 separate tornado incidents. This correlates to over a 100 percent annual probability that the Region will experience a tornado somewhere in its boundaries. However, only one of these events was an F2; therefore, the annual probability of a significant tornado event is around 5 percent. Additionally, it his highly likely the County

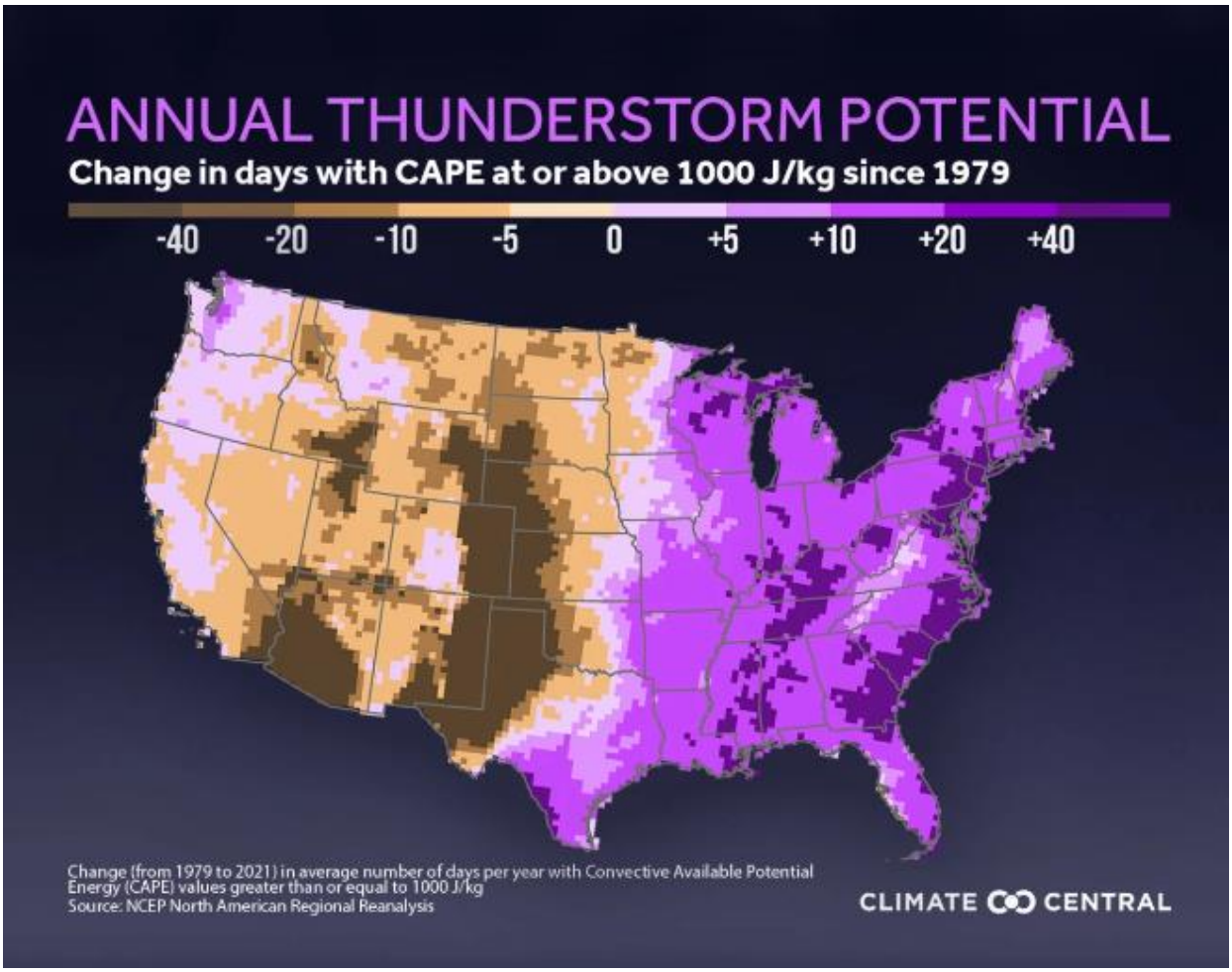
will experience a waterspout, although waterspouts themselves cause minimal damage, many of the damaging tornadoes experienced in Monroe County began as waterspouts.

Probability: 4 – Highly Likely

CLIMATE CHANGE

According to the National Aeronautics and Space Administration (NASA), thunderstorm events in the future are likely to become more frequent in the southeast because of weather extremes. Thunderstorm potential is measured by an index that NASA created called the Convective Available Potential Energy (CAPE) index. This measures how warm and moist the air is, which is a major contributing factor in thunderstorm/tornado formation. Between 1979 and 2021, Monroe County experienced 10-40 more days on average with CAPE at or above 1,000 J/kg, which is considered a high cape value. Figure 4.27 below shows the change in days with high potential for thunderstorms nationwide.

Figure 4.27 – Change in Days with High Thunderstorm Potential from 1979 to 2021



Source: NCEP North American Regional Reanalysis, Climate Central 2022

For a thunderstorm to become a supercell event, meaning that it produces more severe weather like large hail, damaging winds, and tornadoes, it relies on not only warm moist air, but also wind at different levels moving in different directions at different speed (wind shear). As the planet warms, wind shear, unlike warm, moist air, is expected to decrease. Therefore, it is difficult to predict if more supercell thunderstorm events and the tornadoes they can bring with them are more likely to occur.

Additionally, while supercell events are associated with tornadoes, only about 20% of supercell thunderstorms produce tornadoes. To complicate things further, no one fully understands how tornadoes are formed. Therefore, there is no identified conclusion on how climate change will impact tornadoes.

The relationship between hail and climate change is also unclear, however, a 2022 study shows that climate change could increase severe and/or significant spring hailstorms within the Central U.S. (Fan, et.al, 2022). Lightning has a more direct correlation with increasing temperatures as it occurs more frequently when the temperature is hotter than when it is colder. Romps, et. al postulate that lightning will increase by 12% for every degree of rise global average air temperature.

VULNERABILITY ASSESSMENT

PEOPLE

People and populations exposed to the elements are most vulnerable to severe weather. A common hazard associated with wind events is falling trees and branches. Risk of being struck by lightning is greater in open areas, at higher elevations, and on the water. Lightning can also cause cascading hazards, including power loss. Loss of power could critically impact those relying on energy to service, including those that need powered medical devices. Additionally, the ignition of fires is always a concern with lightning strikes.

The availability of sheltered locations such as basements, buildings constructed using hail-resistant materials and methods, and public storm shelters, all reduce the exposure of the population. Individuals who work outdoors may face increased risk. Residents living in mobile homes are also more vulnerable to hail events due to the lack of shelter locations and the vulnerability of the housing unit to damages.

The availability of sheltered locations such as basements, buildings constructed using hail-resistant materials and methods, and public storm shelters, all reduce the exposure of the population. Residents living in mobile homes are more vulnerable to hail, wind, and tornado events due to the lack of shelter locations and the vulnerability of the housing unit to damages. Overall, the housing stock in Monroe County includes 3,286 mobile home units, representing 9% of housing.

Waterspouts are unlikely to cause death or injury – none were reported by NCEI. However, an exceptionally strong waterspout may lead to death or injury of individuals trapped on boat or in the water in its path.

Since 2000, the NCEI records 4 injuries, and no fatalities attributed to lightning in Monroe County. NCEI records no fatalities, and no injuries attributed to wind, hail, or tornado events in Monroe County.

PROPERTY

All property, including residential and commercial buildings as well as critical facilities and infrastructure, are vulnerable to impacts from severe storms and tornadoes.

Property damage caused by lightning usually occurs in one of two ways – either by direct damages through fires ignited by lightning, or by secondary impacts due to power loss. According to data collected on lightning strikes in Monroe County, recorded property damage was due to structure fires and damage to electrical systems.

NCEI reports $73,000 in property damage due to lightning impacts over 25 years (2000-2024). Based on these records, the planning area experiences an annualized loss of $2,920 in property damage. The average impact from lightning per incident in Monroe County is $6,083.

General damages to property from hail are direct, including destroyed windows, dented cars, and building, roof and siding damage in areas exposed to hail. Hail can also cause enough damage to cars to

cause them to be totaled. The level of damage is commensurate with both a material's ability to withstand hail impacts, and the size of the hailstones that are falling. Construction practices and building codes can help maximize the resistance of the structures to damage. Large amounts of hail may need to be physically cleared from roadways and sidewalks, depending on accumulation. Hail can cause other cascading impacts, including power loss.

During a 25-year span between 2000 to 2024 in Monroe County, NCEI reported $250 in property damage as a direct result of hail. It should be noted that property damage due to hail is usually insured loss, with damages covered under most major comprehensive insurance plans. Because of this, hail losses are notoriously underreported by the NCEI. It is difficult to find an accurate repository of hail damages in Monroe County, thus the NCEI is still used to form a baseline.

Wind events reported in NCEI for the 25-year period from 2000 through 2024 totaled $147,650 in property damage, which equates to an annualized loss of $5,906 across the planning area.

Damage from tornadoes to property are both direct (what the tornado physically destroys) and indirect, which focuses on additional costs, damages and losses attributed to secondary hazards spawned by the tornado, or due to the damages caused by the tornado. Depending on the size of the tornado and its path, a tornado is capable of damaging and eventually destroying almost anything. Construction practices and building codes can help maximize the resistance of the structures to damage.

Secondary impacts of tornado damage often result from damage to infrastructure. Downed power and communications transmission lines, coupled with disruptions to transportation, create difficulties in reporting and responding to emergencies. These indirect impacts of a tornado put tremendous strain on a community. In the immediate aftermath, the focus is on emergency services.

Since 2000, damaging tornadoes in the County are directly responsible for nearly $5,336,700 worth of damage to property according to NCEI data. This equates to an annualized loss of $213,468.

Waterspouts are unlikely to cause significant property damage unless they come on land as a tornado, in which case damage would be similar to that of a tornado. Otherwise, waterspouts may cause damage to property in the water, such as boats and other recreational items. Per NCEI, no property was damaged from waterspouts in Monroe County.

ENVIRONMENT

The main environmental impact from wind is damage to trees or crops. Wind events can also bring down power lines, which could cause a fire and result in even greater environmental impacts. Lightning may also result in the ignition of wildfires. This is part of a natural process, however, and the environment will return to its original state in time.

Hail can cause extensive damage to the natural environment, pelting animals, trees and vegetation with hailstones. Melting hail can also increase both river and flash flood risk.

Tornadoes can cause massive damage to the natural environment, uprooting trees and other debris within the tornado's path. This is part of a natural process, however, and the environment will return to its original state in time. Waterspouts may cause damage to marshes and wetlands. This is part of a natural process, however, and the environment will return to its original state in time.

CONSEQUENCE ANALYSIS

Table 4.45 summarizes the potential negative consequences of severe storms and tornadoes.

Table 4.45 - Consequence Analysis – Severe Storms and Tornadoes

Category	Consequences
Public	Injuries; fatalities
Responders	Injuries; fatalities; potential impacts to response capabilities due to storm impacts
Continuity of Operations (including Continued Delivery of Services)	Potential impacts to continuity of operations due to storm impacts; delays in providing services
Property, Facilities and Infrastructure	Possibility of structure fire ignition; potential for disruptions in power and communications infrastructure; destruction and/or damage to any exposed property, especially windows, cars and siding; mobile homes see increased risk. The weakest tornadoes, EF0, can cause minor roof damage, while strong tornadoes can destroy frame buildings and even badly damage steel reinforced concrete structures. Buildings are vulnerable to direct impact from tornadoes and from wind borne debris. Mobile homes are particularly susceptible to damage during tornadoes.
Environment	Potential fire ignition from lightning; hail damage to wildlife and foliage. Potential devastating impacts in storm's path.
Economic Condition of the Jurisdiction	Lightning damage contingent on target; can severely impact/destroy critical infrastructure and other economic drivers. Contingent on tornado's path; can severely impact/destroy critical infrastructure and other economic drivers.
Public Confidence in the Jurisdiction's Governance	Public confidence is not generally affected by severe weather events if response and recovery are not timely and effective.

ASSOCIATED HAZARDS

Natural hazards are often interconnected. Any given hazard may lead to, or be spurred by, another hazard – sometimes referred to as cascading disasters. Severe storms and tornadoes may be associated with floods and tropical cyclones.

CHANGES IN DEVELOPMENT

Development is not expected to impact the incidence of severe storms and tornadoes. As the county grows, overall asset exposure will increase, which may increase risk. Increases in mobile home and manufactured home units would cause more significant increases in vulnerability.

PROBLEM STATEMENTS

Severe weather events are highly likely to continue occurring in Monroe County. Communities should consider examining power redundancy and surge protection solutions for critical facilities to maintain operations in the event of a power outage.

Past severe storm events caused injuries to individuals outside and/or in high-risk locations during these events. Solutions might include an awareness campaign to educate the public on severe weather risk and preparedness. A robust tornado preparedness education and outreach program would benefit the community to understand risk and reduce damage; this might include the link between waterspouts and tornadoes, how to shelter from tornadoes, and damage caused from flying debris, among others.

The City of Marathon and the Unincorporated areas of the County have larger shares of mobile home units within their jurisdiction, the population living in these mobile homes are more vulnerable to tornado and wind impacts.

Although the County utilizes the most recent Florida Building Code to ensure new buildings – especially critical facilities – can withstand severe winds associated with severe storms and tornadoes (as well as tropical cyclones), buildings that predate building codes are more vulnerable. A study of such buildings and potential retrofits would decrease vulnerability of these structures.

HAZARD SUMMARY BY JURISDICTION

The following tables summarize tornadoes and thunderstorm risk by jurisdiction. Most aspects of tornadoes and thunderstorm risk do not vary substantially by jurisdiction; however, wind and hail impacts may be greater in more highly developed areas with higher exposure in terms of both property and population density. Additionally, mobile home units are more vulnerable to wind damage. While mobile home units do not comprise a significant proportion of any jurisdictions' housing mix, mobile units make up 13% and 10% of the housing stock in unincorporated Monroe County and the City of Marathon, respectively.

THUNDERSTORM WINDS

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Key Colony Beach	4	1	3	4	1	2.6	M
Key West	4	1	3	4	1	2.6	M
Layton	4	1	3	4	1	2.6	M
Marathon	4	2	3	4	1	2.9	M
Islamorada	4	1	3	4	1	2.6	M
Unincorporated Monroe County	4	2	3	4	1	2.9	M

LIGHTNING AND HAIL

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
All Jurisdictions	4	1	1	4	1	2.2	M

TORNADOES

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Key Colony Beach	3	2	2	4	1	2.4	M
Key West	3	2	2	4	1	2.4	M
Layton	3	2	2	4	1	2.4	M
Marathon	3	3	2	4	1	2.7	M
Islamorada	3	2	2	4	1	2.4	M
Unincorporated Monroe County	3	3	2	4	1	2.7	M

4.5.7 TROPICAL CYCLONES

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Tropical Cyclones	Highly Likely	Catastrophic	Large	More than 24 hrs	Less than 1 week	3.6

HAZARD DESCRIPTION

Hurricanes and tropical storms are classified as cyclones and defined as any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and whose diameter averages 10 to 30 miles across. A tropical cyclone refers to any such circulation that develops over tropical waters. Tropical cyclones act as a "safety-valve," limiting the continued build-up of heat and energy in tropical regions by maintaining the atmospheric heat and moisture balance between the tropics and the pole-ward latitudes. The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation, and tornadoes.

The key energy source for a tropical cyclone is the release of latent heat from the condensation of warm water. Their formation requires a low-pressure disturbance, warm sea surface temperature, rotational force from the spinning of the earth, and the absence of wind shear in the lowest 50,000 feet of the atmosphere. Most hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico during the official Atlantic hurricane season, which encompasses the months of June through November. The peak of the Atlantic hurricane season is in early to mid-September and the average number of storms that reach hurricane intensity per year in the Atlantic basin is about six.

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.

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 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. Hurricanes are given a classification based on the Saffir-Simpson Scale; this scale is reproduced in Table 4.46. 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).

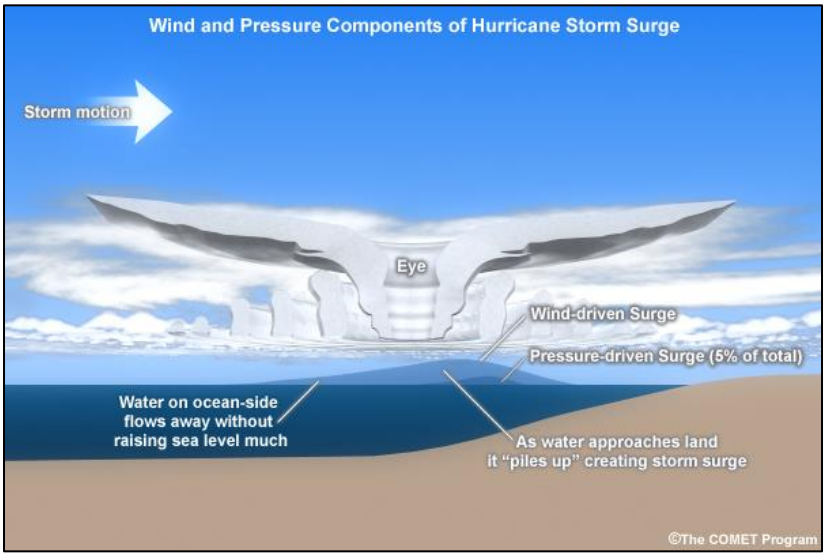
Hurricane: A tropical cyclone with maximum sustained winds of 74 mph (64 knots) or higher. In the western North Pacific, hurricanes are called typhoons; similar storms in the Indian Ocean and South Pacific Ocean are called cyclones.

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 greatest potential for loss of life related to a hurricane is from the storm surge. Storm surge is water that is pushed toward the shore by the force of the winds swirling around the storm as shown in Figure 4.28. 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 location depends on several 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 and the depth of the ocean bottom. A narrow shelf, or one that drops steeply from the shoreline and subsequently produces deep water close to the shoreline, tends to produce a lower surge but higher and more powerful storm waves. A shallow slope, as is found off the coast of Monroe County, will produce a greater storm surge than a steep shelf.

Figure 4.28 – Components of Hurricane Storm Surge



Source: NOAA/The COMET Program

Damage during hurricanes may also result from inland flooding from associated heavy rainfall.

Like hurricanes, nor'easters are ocean storms capable of causing substantial damage to coastal areas in the Eastern United States due to their strong winds and heavy surf. Nor'easters are named for the winds that blow in from the northeast and drive the storm up the East Coast along the Gulf Stream. They are caused by the interaction of the jet stream with horizontal temperature gradients and generally occur during the fall and winter months when moisture and cold air are plentiful.

Nor'easters are known for dumping heavy amounts of rain and snow, producing hurricane-force winds, and creating high surf that causes severe beach erosion and coastal flooding. There are two main components to a nor'easter: (1) a Gulf Stream low-pressure system (counter-clockwise winds) generated off the southeastern U.S. coast, gathering warm air and moisture from the Atlantic, and pulled up the East Coast by strong northeasterly winds at the leading edge of the storm; and (2) an Arctic high-pressure system (clockwise winds) which meets the low-pressure system with cold, arctic air blowing down from Canada. When the two systems collide, the moisture and cold air produce a mix of precipitation and can produce dangerously high winds and heavy seas. As the low-pressure system deepens, the intensity of the winds and waves increases and can cause serious damage to coastal areas as the storm moves northeast.

Warning Time: 1 – More than 24 hours

Duration: 3 – Less than 1 week

LOCATION

Hurricanes and tropical storms can occur anywhere within Monroe County and its jurisdictions. While coastal areas are most vulnerable to hurricanes, their wind and rain impacts can be felt hundreds of miles inland. Storm surge impacts are more limited, affecting areas along coastal and estuarine shorelines and reaching further inland depending on the height of the surge. All of Monroe County and its jurisdictions are vulnerable to hurricane and tropical storm surge. Figure 4.29 shows potential storm surge inundation for a 100-yr storm surge event and Figure 4.30 shows inundation for the 500-yr storm surge event. As shown in these maps, almost all of Monroe County and its jurisdictions are vulnerable to storm surge impacts from the 100yr storm surge event. The 500yr storm surge event inundates a similar extent but produces higher flood depths further inland. Maps of storm surge impacts by jurisdiction are available in individual jurisdictional annexes.

Spatial Extent: 4 – Large

Figure 4.29 – 100yr Storm Surge Event Inundation

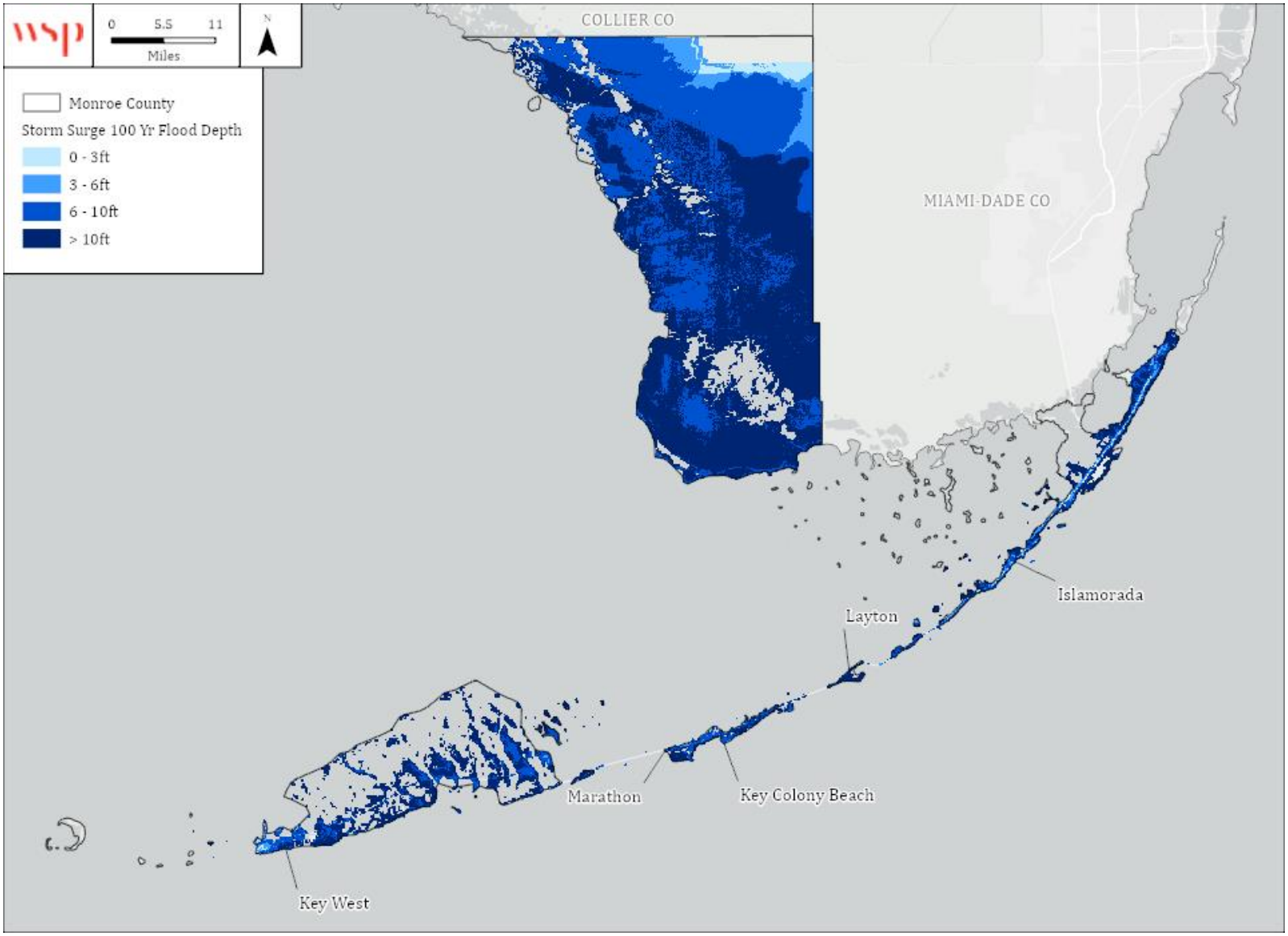
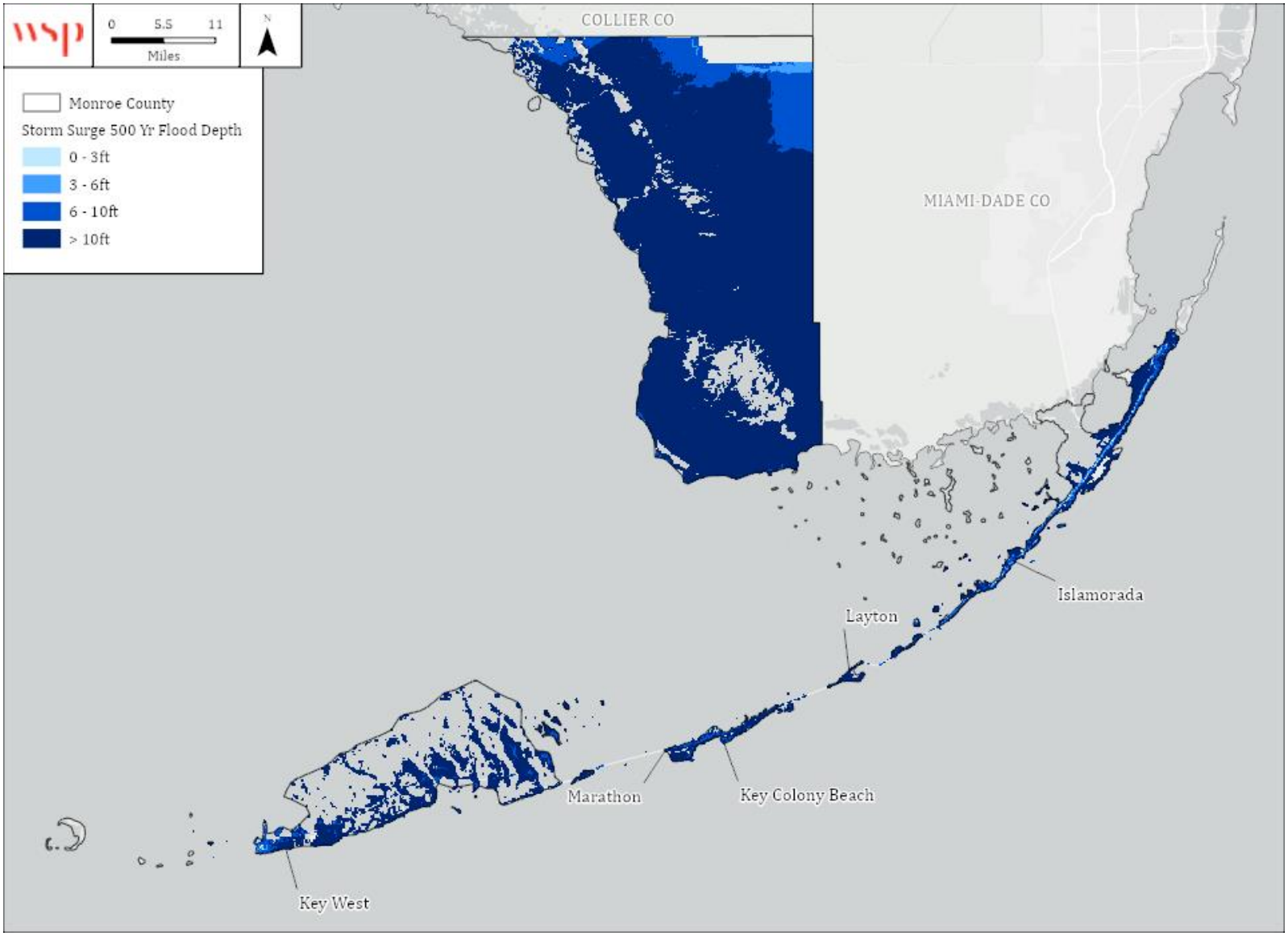


Figure 4.30 – 500yr Storm Surge Event Inundation



EXTENT

Hurricanes and tropical storms can cause catastrophic damage to coastlines and several hundred miles inland. Wind speed is the determining factor in the Saffir-Simpson Scale (Table 4.46), which is used as a measure of hurricane intensity and rated on a scale of 1 to 5, with 5 being the most intense.

Hurricane force winds can extend outward by about 35 miles from the eye of a small hurricane to more than 150 miles from the center of a large hurricane. 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.

Table 4.46 – Saffir-Simpson Scale

Category	Maximum Sustained Wind Speed (MPH)	Types of 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.
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

The Saffir-Simpson Scale categorizes hurricane intensity linearly based upon maximum sustained winds and barometric pressure, which are combined to estimate potential damage. Categories 3, 4, and 5 are classified as "major" hurricanes and, while hurricanes within this range comprise only 20 percent of total tropical cyclone landfalls, they account for over 70 percent of the damage in the United States. Table 4.47 describes the damage that could be expected for each category of hurricane. Damage during

hurricanes may also result from spawned tornadoes, storm surge, and inland flooding associated with heavy rainfall that usually accompanies these storms. Tornadoes are discussed in Section 4.5.3.

Table 4.47 – Hurricane Damage Classifications

Storm Category	Damage Level	Description of Damages	Photo Example
1	MINIMAL	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal flooding and minor pier damage.	
2	MODERATE	Some roofing material, door, and window damage. Considerable damage to vegetation, mobile homes, etc. Flooding damages piers and small craft in unprotected moorings may break their moorings.	
3	EXTENSIVE	Some structural damage to small residences and utility buildings, with a minor amount of curtainwall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures, with larger structures damaged by floating debris. Terrain may be flooded well inland.	
4	EXTREME	More extensive curtainwall failures with some complete roof structure failure on small residences. Major erosion of beach areas. Terrain may be flooded well inland.	
5	CATASTROPHIC	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Flooding causes major damage to lower floors of all structures near the shoreline. Massive evacuation of residential areas may be required.	

Source: National Hurricane Center; Federal Emergency Management Agency

The county is susceptible to the full force of every category of hurricane.

In addition to the combined destructive forces of wind, rain, and lightning, hurricanes can cause a surge in the ocean, which also affects the severity of hurricane and tropical storm impacts. Storm surge affects areas along coastal shorelines and further inland depending on the height of the surge. Storm surge can raise the sea level as high as 25 feet or more in the strongest hurricanes. Storm surge can also cause extensive damage on the backside of a hurricane as storm surge waters are sucked back out to sea. Figure 4.29 and Figure 4.30 display potential depth of storm surge flooding for the 100yr and 500yr storm surge event, respectively.

Impact: 4 – Catastrophic

HISTORICAL OCCURRENCES

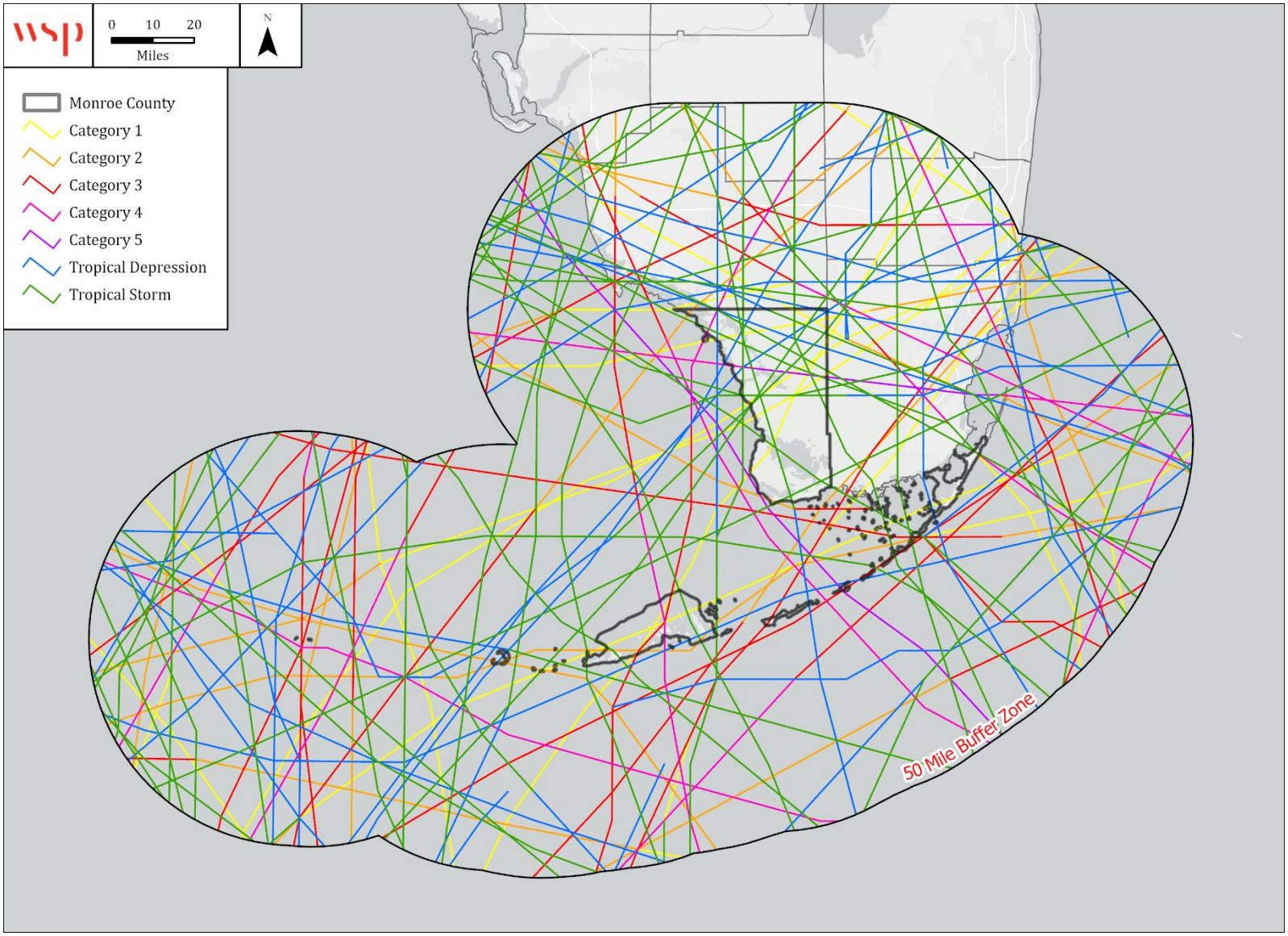
According to NOAA Historical Hurricane Tracks data, 648 hurricanes and tropical storms made landfall in Monroe County between 1900 and 2024. These storm tracks are shown in Figure 4.31. A summary of the storms by hurricane category is provided in Table 4.58.

Table 4.48 – Landfalling Tropical Cyclone in Monroe County, 1900-2024

Storm Category	Count
Cat 1	71
Cat 2	64
Cat 3	74
Cat 4	46
Cat 5	11
Tropical Storm	215
Tropical Depression	167
Total	**648**

The map below is not an exhaustive list of hurricanes that have affected Monroe County. Several storms have not made landfall in the County, yet had strong enough wind or rain impacts to cause impacts.

Figure 4.31 – Hurricane/Tropical Storm Tracks within 50 miles of Monroe County, 1900-2022



NCEI records hurricane and tropical storm events across the region by county and zone; therefore, one event that impacts multiple jurisdictions may be recorded multiple times. During the 24-year period from 2000 through 2024, NCEI records 29 hurricane and tropical storm events. The named storms associated with these events are summarized in Table 4.49. This table only represents those events reported to NCEI as a Hurricane or Tropical Storm. Where property damage estimates were broken out by type, NCEI reports only the value of wind-related damages.

Hurricane Irma (2017) is reported by NCEI as a Hurricane, however there are no reported damages for Hurricane Irma despite the storm having a significant impact on the County. No official monetary figures have been reported, however Monroe County reports over 1,000 homes were destroyed and almost 3,000 suffered major damage. In total, 50 Florida counties were included in the disaster declaration and eligible for individual assistance. FEMA has approved over $1 billion individual and household program dollars across these counties.

Table 4.49 – Recorded Hurricanes and Typhoons in Monroe County, 2000-2024

Date	Storm	Deaths/ Injuries	Property Damage	Crop Damage
9/13/2001	Tropical Storm Gabrielle	1/0	$0	$0
11/4-11/5/2001	Hurricane Michelle	0/0	$0	$0
8/11/2004	Hurricane Charley	0/0	$160,000	$160,000
9/1/2004	Hurricane Frances	0/0	$20,000	$20,000
9/12/2004	Hurricane Ivan	0/0	$0	$0
9/24/2004	Hurricane Jeanne	0/0	$5,000	$5,000
6/9-6/10/2005	Tropical Storm Arlene	0/0	$90,000	$90,000
7/8/2005	Hurricane Dennis	1/0	$7,150,000	$7,150,000
8/26/2005	Hurricane Katrina	0/0	$6,900,000	$6,900,000
9/20/2005	Hurricane Rita	0/0	$0	$0
10/23/2005	Hurricane Wilma	0/2	$33,000,000	$99,000,000
8/29-8/30/2006	Tropical Storm Ernesto	0/0	$200	$200
8/17-8/18/2008	Tropical Storm Fay	0/2	$2,800,000	$8,400,000
8/30/2008	Hurricane Gustav	1/0	$0	$0
9/8-9/9/2008	Hurricane Ike	0/0	$13,500,000	$26,000,000
8/25/2012	Tropical Storm Isaac	0/0	$2,170,000	$2,170,000
10/24-10/25/2012	Hurricane Sandy	0/0	$4,000	$4,000
9/9/2017	Hurricane Irma	2/20	$0	$0
9/3/2018	Tropical Storm Gordon	0/0	$500	$500
8/24/2020	Hurricane Laura	0/0	$2,500	$0
11/7 – 11/11/2020	Tropical Storm Eta	0/1	$506,000	$0
7/5/2021	Tropical Storm Elsa	0/0	$0	$0
8/13/2021	Tropical Storm Fred	0/0	$0	$0
9/27 – 9/28/2022	Hurricane Ian	0/0	$0	$0
8/29/2023	Hurricane Idalia	0/0	$35,000	$0
8/3/2024	Tropical Storm Debby	0/0	$0	$0
9/25 – 9/26/2024	Hurricane Helene	0/0	$0	$0
10/9/2024	Hurricane Milton	0/0	$0	$0
11/6/2024	Hurricane Rafael	0/0	$0	$0
Total		**5/25**	**$66,343,200**	**$149,899,700**

Source: NCEI

Table 4.50 further details storm surge events that have impacted Monroe County in the 24-year period from 2000 to 2024 – note that no storm surge events were recorded until 2005. Event narratives following this table provide a fuller scope of the impacts from selected wind and storm surge events.

Table 4.50 – Recorded Storm Surge events in Monroe County, 2000-2024

Date	Storm	Deaths/ Injuries	Property Damage	Crop Damage
6/10/2005	Tropical Storm Arlene	0/0	$0	$0
9/20/2005	Hurricane Rita	0/1	$0	$0
10/24/2005	Hurricane Wilma	0/0	$0	$0
8/19/2008	Tropical Storm Fay	0/0	$1,000,000	$0
8/31/2008	Hurricane Gustav	0/0	$0	$0
9/10/2008	Hurricane Ike	0/0	$1,300,000	$0
10/26/2012	Hurricane Sandy	0/0	$1,000	$0
9/9-9/10/2017	Hurricane Irma	1/0	$0	$0
11/8-11/9/2020	Tropical Storm Eta	0/0	$100,000	$0
9/27/2022	Hurricane Ian	0/0	$0	$0
8/29/2023	Hurricane Idalia	0/0	$0	$0
8/4/2024	Tropical Storm Debby	0/0	$0	$0
9/26/2024	Hurricane Helene	0/0	$0	$0
10/8 – 10/10/2024	Hurricane Milton	0/0	$0	$0
11/6/2024	Hurricane Rafael	0/0	$0	$0
Total		**1/1**	**$2,401,000**	**$0**

Source: NCEI

August 11, 2004 – During the evening of August 12, Hurricane Charley moved north through the Florida Straits, the Keys east of the Seven Mile Bridge, and into Florida Bay. Peak wind gusts to 64 mph were recorded at Sombrero Key Light, 61 mph at Long Key and 54 mph at Molasses Reef C-MAN stations during this convective band, along with reported wind gust to 52 mph from a spotter on Duck Key. Damage along the island chain from Marathon through Ocean Reef was limited to downed tree limbs, power lines and unreinforced signs, and almost entirely from the convective band. Beginning around 3:30 AM EST, strong gradient winds began in the Lower Keys and Dry Tortugas. Peak wind gusts of 62 mph were recorded at Sand Key C-MAN station, with gusts to 58 mph at Key West International Airport. Peak wind measurements of 46 to 52 mph were measured along the island chain from Boca Chica Key through Summerland Key. Wind damage including a few uprooted and snapped trees, large tree limbs, power lines, fences and unreinforced signs. A sailboat broke loose from moorings around 7:30 AM EST on August 13, striking a phase of a 115 kilovolt transmission line serving the lower Keys, causing a widespread power outage west of Marathon through Key West.

Maximum storm surge was estimated to near 6 feet at Dry Tortugas/Garden Key. Wave action produced extensive flooding of the park grounds outside of the Fort Jefferson walls. Approximately 1000 feet of brickwork was lost on the outer moat wall, which was completely submerged at the time of high tide. Numerous finger docks and the deck of the main dock were destroyed. Scaffolding used during the Fort's multi-year renovation project was also damaged and found floating in the moat. The Dry Tortugas C-MAN station, which included instrumentation less than 15 feet above mean sea level, was also destroyed, likely from the combination of wave action and elevated tide levels. Maximum storm surge was estimated at one foot above normal at Key West. Wave action produced minor coastal flooding along the oceanfront. An estimated 11,000 visitors evacuated the Keys, causing an estimated tourism loss of 5.3 million dollars.

September 1, 2004 – As Hurricane Frances tracked from the northwest Bahamas through the central Florida peninsula, several outer rain bands crossed the Florida Keys producing short episodes of strong wind gusts. A peak wind gust of 93 mph was measured at the Sombrero Key Light C-MAN station, at an elevation of over 150 feet above mean sea level. Other notable wind gusts included 63 mph at Sand Key C-MAN and 68 mph at Molasses Reef C-MAN. Over land, peak wind gusts included 54 mph at the U.S. Coast Guard Group Key West, and 51 mph at the Key West Harbor. Stronger wind gusts were estimated along the south side of Marathon, near Flamingo Island, and in the squall that produced the extreme winds at Sombrero Key Light. These winds tore screens in porches in isolated fashion from Big Pine Key through Grassy Key and blew out plastic or vinyl panels of commercial signs in Marathon. Otherwise, damage was limited to downed tree limbs and minor power outages.

As Frances passed to the north, strong northwest and west winds drove waters higher than normal along the Florida Bay shoreline up to 1 foot above normal at Vaca Key and estimated to near 2.5 feet above normal along the bayside of North Key Largo and Jewfish Creek. These tides produced minor flooding of side streets and a parking lot near Mile Marker 106 of the Overseas Highway.

July 8, 2005 – Hurricane Dennis passed within 75 miles southwest of Key West as a category 2 hurricane. Over the Monroe County. In the Lower Keys, maximum winds were sustained at 61 mph with gusts to 74 mph at Key West and 59 mph gusting to 78 mph at Sand Key. Unofficial wind gusts to 107 mph were reported at Cudjoe Key. Maximum storm tides were estimated to 4.5 feet above mean sea level on the Atlantic shore of Key West near the International Airport. One fatality occurred aboard a vessel moored at Stock Island due to drowning. No injuries were reported. Property damage estimated at $6.8M due to wind damage mainly to roofing, electrical equipment, landscaping and mobile homes, with estimated $100K due to combined wind and rain damages to the Key West Airport. Minimum pressure reported was 998.8 mb at Sand Key.

In the Middle Keys, maximum rainfall was 2.00 inches at Curry Hammock State Park, east of Marathon. Maximum winds were 74 mph gusting to 87 mph at Sombrero Key Light. Maximum storm tides were estimated at 2 to 3 feet above mean sea level, producing minor flooding under elevated homes at Marathon. Damage was estimated at $250K from wind damage to commercial signs, landscaping and electrical equipment.

In the Upper Keys, the maximum rainfall was 1.55 inches at Tavernier. Maximum Storm Tides were estimated at 2 to 3 feet above mean sea level, overtopping bulkheads and producing minor street flooding. Maximum winds were recorded at 59 mph gusting to 68 mph at Carysfort Reef Light. Damage was estimated at $100K mostly to landscaping and electric utility equipment.

August 26, 2005 – Hurricane Katrina passed 40 miles north of Key West as a category one hurricane. Katrina passed 15 miles north Dry Tortugas National Park as a category 2 hurricane. Over the Monroe County Lower Keys, maximum winds were 62 mph with gusts to 77 mph at Sand Key. In the Middle Keys, Maximum winds were 67 mph with gusts to 80 mph at Sombrero Key Light, and in the Upper Keys, max winds were 61 mph with gusts to 77 mph at Molasses Reef Light. In Key West, rainfall totally 10.05 inches caused extensive street flooding and some residential flooding. At Curry Hammock State Park rainfall totaled 9.89 inches, resulting in widespread flooding. At John Pennekamp State Park in Key Largo, rainfall measured 5.94 inches. Storm tides were estimated at 2.5 feet above mean sea level at Key West, 1 foot at Molasses Reef Light, and 1.5 feet at Curry Hammock State park. Total property damage from the event in Monroe County was estimated at $6.9 million. $5 million of this damage was caused by a tornado in Marathon, and the remainder due to wind and rain damage.

October 23, 2005 – The center of Hurricane Wilma moved northeast from the vicinity of Dry Tortugas northeast through 65 miles northwest of Key West during the night of October 23 to 24, 2005. Hurricane Wilma resulted in at least 2 injuries and at least $33 million in damages to Monroe County. In the Upper Keys, maximum winds were measured at 75 mph with gusts to 91 mph and averaged around 70 to 80

mph. In the Middle Keys, maximum winds measured 87 mph with gusts to 105 mph at Sombrero Key Light and averaged an estimated 80 to 90 mph. In the Lower Keys, maximum winds were measured at 71 mph with gusts to 83 mph before instrumentation failed. Peak wind gusts of 123 mph at Cudjoe Key and 133 mph at Dry Tortugas National Park were recorded by spotters and park personnel. Overall, winds averaged 80 to 90 mph across the Lower Keys. Monroe County experienced general Category 1 Saffir Simpson damage from wind. Rainfall associated with the storm was fairly light, ranging from 1.5 inches at Pennekamp State Park to 2.39 inches at Duck Key.

The most destructive aspect of Hurricane Wilma was the storm surge. In the Upper Keys, Wilma primarily produced one storm tide along the bayside ranging from 4 to 5 feet above sea level with the worst in Lower Matecumbe Key. North of Key Largo, U.S. Route 1 was temporarily flooded at least 3 inches. In the Middle Keys, Wilma caused two separate storm tides. The first was 3 feet above mean sea level along the south shore of Marathon. The second tide was up to 9.5 feet above mean sea level along the north shore of Marathon. At one point during the storm, the City of Marathon was completely under water. Most homes and businesses sustained damage by flooding of 2 to 4 feet with severe electrical, drywall and mold-related damages. Wilma also caused two separate storm tides in the Lower Keys. The first was 4.5 feet above mean sea level along the south shore of Key West. The second ranged from near 6 feet above mean sea level at Key West to 8.5 feet along the north shore of Big Coppitt Key, Cudjoe Key, and Big Pine Key. About 60 percent of Key West was under water, and nearly 12000 vehicles were flooded. Most homes sustained damage by flooding of 2 to 3 feet with severe electrical, drywall and mold-related damages.

August 17, 2008 – Tropical Storm Fay moved north from Cuba, through the Florida Straits, and passed north through the Lower Florida Keys. Fay affected mainland Monroe when the storm made landfall on August 19th near Cape Romano. Across the Upper Florida Keys, storm total rainfall ranged from 3.42 inches at Plantation Key to 4.38 inches at Islamorada. The highest sustained wind in the Upper Florida Keys was 37 mph with a peak gust of 53 mph recorded at Upper Matecumbe Key. A peak gust of 60 mph was recorded at the Islamorada Fire Station. Across the Middle Florida Keys, storm total rainfall ranged from 2.45 inches at Long Key to 7.27 inches at Marathon. The highest sustained wind in the Middle Florida Keys of 49 mph with a peak gust of 56 mph was recorded at Long Key. In the Lower Keys, storm total rainfall ranged from 3.35 inches at Key West International Airport to 7.05 inches at Ramrod Key. The highest sustained wind of 38 mph with a peak gust of 51 mph was recorded at Key West International Airport. A peak gust of 54 mph was recorded at Cudjoe Key. In mainland Monroe County, maximum sustained winds were estimated to be around 60mph at landfall and increased to around 65 mph.

The Keys also experienced minor coastal storm tides during this event. In the Upper Keys such tides peaked at 2.5 feet above mean sea level along the south shore of Lower Matecumbe Key, equating to a storm surge less than one foot above astronomical tide levels. Similarly coastal storm tide peaked at 2.5 feet above mean sea level along the south shore of Marathon and in the Lower Keys.

One direct serious injury due to wind-blown debris occurred in Marathon, but no fatalities were reported. 25,000 people, mainly visitors and non-residents of the Florida Keys, were evacuated. Countywide Tourism losses were estimated at 8 to 10 million dollars. Damage and preparedness costs to government facilities and infrastructure totaled 2.8 million dollars, with about one million dollars due to coastal flooding damage to roads, and 200,000 dollars due to erosion. Approximately 120,000 dollars damaged occurred due to wind. 2 tornadoes occurred in the Lower Keys, with no structural damage reported. Total damage due to the tornadoes was approximately one thousand dollars.

September 9-10, 2017 – Hurricane Irma made landfall over the Lower Florida Keys as a category 4 hurricane on the Saffir-Simpson Scale, with the eye crossing directly over Cudjoe Key. Due to the large radius of hurricane-force winds, destructive hurricane-force winds and storm surge impacted all of the Florida Keys. Extensive damage to residences, businesses, electric, water and communications utilities resulted. When Irma made landfall over Cudjoe Key, it had maximum sustained winds near 130 mph.

The highest sustained winds in the Lower Florida Keys were measured at 70 mph at the Key West Harbor, with a peak measured gust at 120 mph at the Key Deer National Wildlife Refuge and a private residence on Big Pine Key. Storm survey evidence estimated the highest 3-second wind gusts on Big Pine Key and Scout Key, at 150 to 160 mph. Rainfall totals of 6 to 12 inches were measured at available rain gauges, with a maximum of 12.54 inches at the Key Deer Wildlife Refuge on Big Pine Key.

Maximum storm surge in the Lower Florida Keys was measured at 5 to 8 feet from Sugarloaf Key through Duck Keys, with total water height reaching a maximum of 5 to 6 feet above ground level in eastern Big Pine Key, and wave wash marks up to 20 feet above mean high water along Long Beach Road on the south side of Big Pine Key. In the Middle Florida Keys, storm surge estimates of 5 to 8 feet were evident from Marathon and Key Colony Beach, Grassy Key, and Duck Key. Storm surge values of 3 to 5 feet were observed from Conch Key through Long Key and Layton. Total water height ranged from around 4 to 5 feet above ground level along the western edge of Marathon and Key Colony Beach to about 2 feet above ground level in Layton. In the Upper Keys, storm surge of 3 to 4 feet was observed throughout Islamorada through Ocean Reef, as well as along Barnes Sound near Manatee Bay. Total water heights were generally 2 to 4 feet above ground level.

In the Upper Keys, flooding of oceanside residences and businesses up to 2 feet occurred. In the Middle Keys, numerous mobile homes were destroyed in Marathon as the storm surge pushed them off their foundations. In the Lower Keys, major damage to mobile homes and marinas was observed along the oceanside, especially from Ramrod Key, through Big Pine Key, through Ohio Key. The eastbound lanes of U.S. Highway 1 were washed out just east of the Bahia Honda State Park entrance. Many residences and businesses were flooded at the maximum surge. More than 1,300 vessels were damaged or destroyed, requiring removal from the coastal waters.

Differing reports detail injuries and fatalities attributed to the storm differently. NCEI reports a total of 10 fatalities – 4 of which were directly attributed to the storm – and 40 direct injuries. Direct reports from Monroe County and the incorporated jurisdictions list no deaths (Layton, Key Colony Beach, Islamorada), 3 deaths (Key West), and 13 deaths (Monroe). Key West also reported 6 injuries. The list below summarizes other damages reported by the County and incorporated jurisdictions:

- 85% of housing stock impacted, more than 4,000 homes destroyed or damaged (Monroe County);
- Commercial lobster industry lost $3.7 million in traps, estimated economic loss of $38.9 million;
- 80% of businesses suffered extended losses;
- Tourism industry ($2.7 billion) suffered long term impacts;
- Extended power outages (11 days in most areas, up to 20 days to restore entire grid), some water system impacts;
- Airports, schools, re-entry, and ports closed for as little as 7 and up to 15 days;
- $25 million in property damages and $12 million in infrastructure damage, $16 million in economic impacts. NFIP flood damage claims paid $12.4 million (Key West);
- 1 destroyed commercial building, 30 majorly damaged commercial buildings, 83 minorly damaged commercial buildings, 193 destroyed homes, 355 majorly damaged homes, 766 minorly damaged homes.

November 7, 2020 – Tropical Storm Eta passed northwest through the middle Florida Keys. Primary impacts from wind occurred as result of a rain band which drifted very slowly north through the Upper Florida Keys. Peak wind gusts were between 50 to 60 mph, downing trees and large tree limbs, utility lines, and a billboard. One residence was destroyed by a fallen tree resulting in one minor injury. Two other residential structures were significantly damaged, with three inaccessible due to blocked streets. About 20 separate power outages affected about 1,000 customers, mostly in Key Largo.

Storm Surge flooding was generally in the 1.5-to-2.5-foot range, producing significant street flooding in oceanside Key Largo neighborhoods. The northbound right-of-way was damaged including major erosion, loss of riprap, and about 3,000 feet of fencing along northbound U.S. Highway 1 along the west end of Barnes Sound and Manatee Bay. Minor overwash occurred in the middle Florida Keys at Key Colony Beach, along with yard and dock flooding along the Florida Bay side of Marathon. Widespread rainfall of 3.5 to over 8 inches was measured throughout the Keys, with the highest totals in Key Largo. Damages were estimated near $500K due to homes damaged by falling trees and tree limbs, as well as utility damage. Storm Surge damage was estimated around $100K due to wave action to the U.S Highway 1 right-of-way.

July 5, 2021 – Tropical Storm Elsa brought numerous rain bands through the Lower and Middle Florida Keys, with strong tropical-storm-force wind gusts measured near Key West. Maximum winds over the Florida Keys of Monroe County were recorded at 52 mph with gusts to 70 mph at Key West. Wind impacts were confined to damage to trees and utility lines, mostly in Key West proper. A few power distribution circuits were out in the city of Key West due to fallen trees and tree limbs. Total customers impacted were estimated around 3,500 in the Lower Keys.

No storm surge was recorded in the Florida Keys, however the onshore southerly winds raised water levels just below 1.0 foot above normal at Key West closer to low astronomical tide. Moderate oceanside beach erosion occurred at Key West along with overwash from heavy wave action. Rainfall estimates of 7.5 inches resulted in brief but significant street flooding in Key West.

September 27, 2022 – Hurricane Ian moved north from far western Cuba into the western Straits of Florida. As Ian moved north over the Dry Tortugas and into the southeastern Gulf of Mexico, tropical storm force winds and damaging storm surge occurred across the Florida Keys. A secondary but lesser storm surge occurred along the Gulf of Mexico and Florida Bay side of the Lower and Middle Keys after Major Hurricane Ian moved inland the west coast of Florida, and well after tropical storm force winds had subsided.

Sustained tropical storm force winds occurred in the Lower Florida Keys and were measured in the 45 to 60 mph range. Peak gusts of 79 mph at the Key West International Airport, 68 mph at the Naval Air Station Key West Boca Chica Field, and 75 mph at an electric substation on Big Coppitt Key. Wind damage occurred in the form of scattered large tree limbs downed, with isolated uprooted or snapped trees. Scattered fences were downed in the city of Key West, with isolated building damage. Total power outages peaked near 10,000 customers in the Lower Florida Keys, representing approximately one-third of the Keys Energy service area.

August 29, 2023 – Hurricane Idalia produced tropical storm-force wind gusts occurred in squalls which passed mainly through portions of the Lower Florida Keys. The maximum winds and rainfall occurred with the passage of one strong rainband which resulted in isolated fallen trees and tree limbs, isolated power outages primarily affecting a street block or two at a time. The combination of an approaching spring tide and strong southerly winds sustained just below tropical storm force resulted in storm tides ranging from 1.0 to 2.5 feet above MHHW along the oceanside. Moderate to heavy ocean wave overwash and street flooding within a few oceanside neighborhoods on the southwest portion of Key West occurred within a few hours of high tide.

August 3, 2024 – Hurricane Debby caused tropical storm-force wind gusts with rain bands extending throughout the Straits of Florida and Florida Keys. Sustained tropical storm force winds occurred over the coastal waters mainly from along the Lower Florida Keys west of the Seven Mile Bridge through Dry Tortugas. The tropical-storm force wind gusts resulted in fallen large tree limbs and isolated power outages primarily affecting a street block or a multi-unit residential complex at a time. The combination high tide and strong southerly winds sustained just below tropical storm force resulted in storm tides up to an estimated 1.8 feet above MHHW|along the oceanside of the Lower Florida Keys, but lower water

levels were measured at gauges in the lee along the Gulf of Mexico and Florida Bay side of the Florida Keys. Moderate to heavy ocean wave overwash resulted in temporary flooding on oceanfront low elevation streets in Key West. In combination with brief heavy rainfall from the rain bands, a section of State Road A1A in Key West was closed due to having little or no drainage in a construction zone.

September 25, 2024 – Hurricane Helene moved northeast across the eastern Gulf of Mexico, strengthening to category 2 strength. Widespread lower-end tropical storm force winds overspread the Florida Keys and its adjacent coastal waters producing isolated large tree limb and utility line damage. Coastal flooding in lowest elevation parts of the Florida Keys occurred initially with storm surge around 1.5 feet MHHW along the oceanside of the Florida Keys accompanied by heavy wave action with coastal flooding across eastern Florida Bay.

October 9, 2024 – Hurricane Milton moved northeast across the eastern Gulf of Mexico, gradually weakening from category 5 to category 4 strength while passing, at the closest approach, about 180 statue miles to the northwest of Key West. Widespread lower-end tropical storm force winds overspread the Lower Florida Keys and its adjacent coastal waters producing isolated large tree limb and utility line damage. Coastal flooding in lowest elevation parts of the Florida Keys occurred initially with storm surge around 1.5 feet MHHW along the oceanside of the Florida Keys accompanied by heavy wave action on, with storm surge in Gulfside and Florida Bayside. The highest storm surge values near 3.0 feet above MHHW occurred in Key Largo along Blackwater Sound. One tornado was observed as a waterspout moved ashore the far southwest portion of Key West.

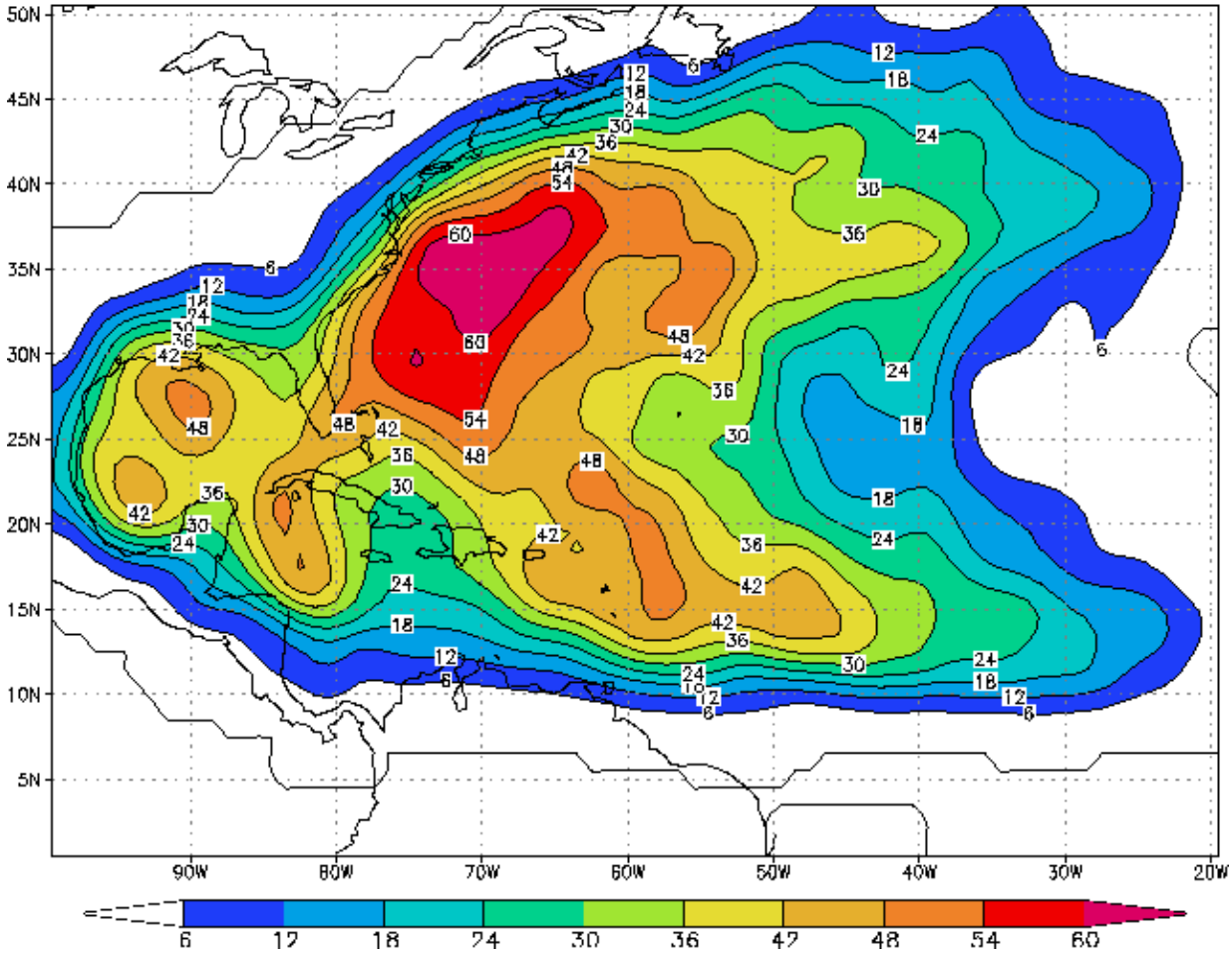
November 6, 2024 –The center of Hurricane Rafael passed 125 miles southwest of Key West as a category 2 hurricane. Lower-end tropical storm force winds impacted portions of the Lower Florida Keys producing isolated small tree limb damage. Minor coastal flooding and Atlantic-side wave overwash occurred in Key West. Brief street flooding occurred in Key West due to brief, heavy squalls from outer rainbands mainly impacted the Lower Florida Keys. Minor coastal flooding also occurred in Stock Island, and Boca Chica Key with water levels reaching near 1.2 feet above mean higher high water (MHHW). Minor street flooding occurred along with a temporary closure of State Road A1A (South Roosevelt Boulevard) in Key West within an ongoing construction zone.

PROBABILITY OF FUTURE OCCURRENCE

Florida has over 8,000 miles of coastline that often gets hit by direct storms. The state is very vulnerable to the impacts of hurricanes and tropical storms as detailed in this section. Substantial hurricane damage is typically most likely to be expected in the coastal counties of the state; however, hurricane and tropical storm-force winds have significantly impacted areas far inland.

Figure 4.32 shows, for any location, the chance of a hurricane or tropical storm affecting the area sometime during the Atlantic hurricane season. The figure was created by the National Oceanic and Atmospheric Administration's (NOAA) Hurricane Research Division, using data from 1944 to 1999. The figure shows the number of times a storm or hurricane was located within approximately 100 miles (165 kilometers) of a given spot in the Atlantic basin. Per this data, there has historically been approximately a 42% - 48% chance of a hurricane occurring in Monroe County in any given year.

Figure 4.32 – Empirical Probability of a Named Hurricane or Tropical Storm



Source: National Oceanic and Atmospheric Administration, Hurricane Research Division

In the 24-year period from 2000 through 2024, 28 hurricanes and tropical storm have impacted Monroe County, which equates to over 100 percent annual probability of hurricane winds impacting the planning area in any given year. This probability does not account for impacts from hurricane rains or storm surge, which may also be severe. The probability of a hurricane or tropical storm impacting Monroe County is highly likely.

Probability: 4 – Highly Likely

CLIMATE CHANGE

Monroe County's coastal location makes it a prime target for hurricane landfalls and changing climate and weather conditions may increase the number and frequency of future hurricane events. 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 is projected to increase anywhere from $4-6 billion in the near future.

According to NOAA, weather extremes will likely cause more frequent, stronger storms in the future due to rising surface temperatures. 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 do form, it is more likely that they will become large storms that can create massive damage.

WARNING AND EVACUATION PROCEDURES

WARNING

Monroe County Emergency Management employs Alert!Monroe mass notification system to share emergency notifications with residents quickly. Messages are pushed out to residents on preferred primary and secondary contact paths, including cell phone, SMS/text, home phone, or email. Residents listed in public phonebook databases are automatically subscribed, but the County encourages residents to self-register cell phones and emails. The system can provide alerts to all users in the County as well as tailored information to specific geographical areas and neighborhoods.

EVACUATION

Per Monroe County ‘s 2022 Comprehensive Emergency Management Plan, the County is the most vulnerable area in the United States to the threat of tropical cyclones. The low-lying islands that make up the Florida Keys are connected by 42 bridges and one single thoroughfare, the Overseas Highway or U.S. 1. For these reasons, an evacuation plan is especially necessary. The county has five main evacuation objectives:

- Return of non-residents to the mainland;
- Promote early voluntary evacuation;
- Relocate vulnerable populations;
- Selective evacuation of specific zones; and
- Phased, general evacuation to mainland.

Various factors are considered when the Director of Emergency Management decides to implement a mandatory phased evacuation and how far in advance to do so. Historic trends illustrate base clearance times for evacuating the keys ranges from 24 to 48 hours, with a minimum of 12 hours and a maximum of 30-plus hours. Another factor to consider is the time of year based on population changes due to tourism. For Tropical Storms and Category 1 and 2 hurricanes, all visitors will be asked to evacuate out of the County, Special Needs residents will be transported to an in-county shelter or out of the County to the Monroe County shelter at Florida International University, and mobile home residents will either be sheltered in-county or asked to evacuate. For a category 3 storm or greater, a phased evacuation is implemented, including all visitors, hospitals, special needs residents, and the general population. The evacuation timeline is as follows:

Approximately 48 hours in advance of tropical storm winds, mandatory evacuation is initiated for non-residents, visitors, recreational vehicles, travel trailers, live-aboards, and military personnel.

Approximately 36 hours in advance of tropical storm winds, mandatory evacuation is initiated for mobile home residents, special needs residents, and hospital and nursing home patients.

Approximately 24 to 30 hours in advance of tropical storm winds, mandatory phased evacuation of permanent residents is initiated.

The phased evacuation is accomplished through the determination of zones. The five zones, as seen in Figure 4.33, allow for selective evacuation, phased evacuation, and in-county shelter options. The five zones are as follows:

Zone 1: City of Key West, including Stock Island and Key Haven, to the Boca Chica Bridge (U.S. 1 Mile Marker (MM) 1 – MM 6)

Zone 2: Boca Chica Bridge to the west edge of the 7-Mile Bridge (MM6-MM40)

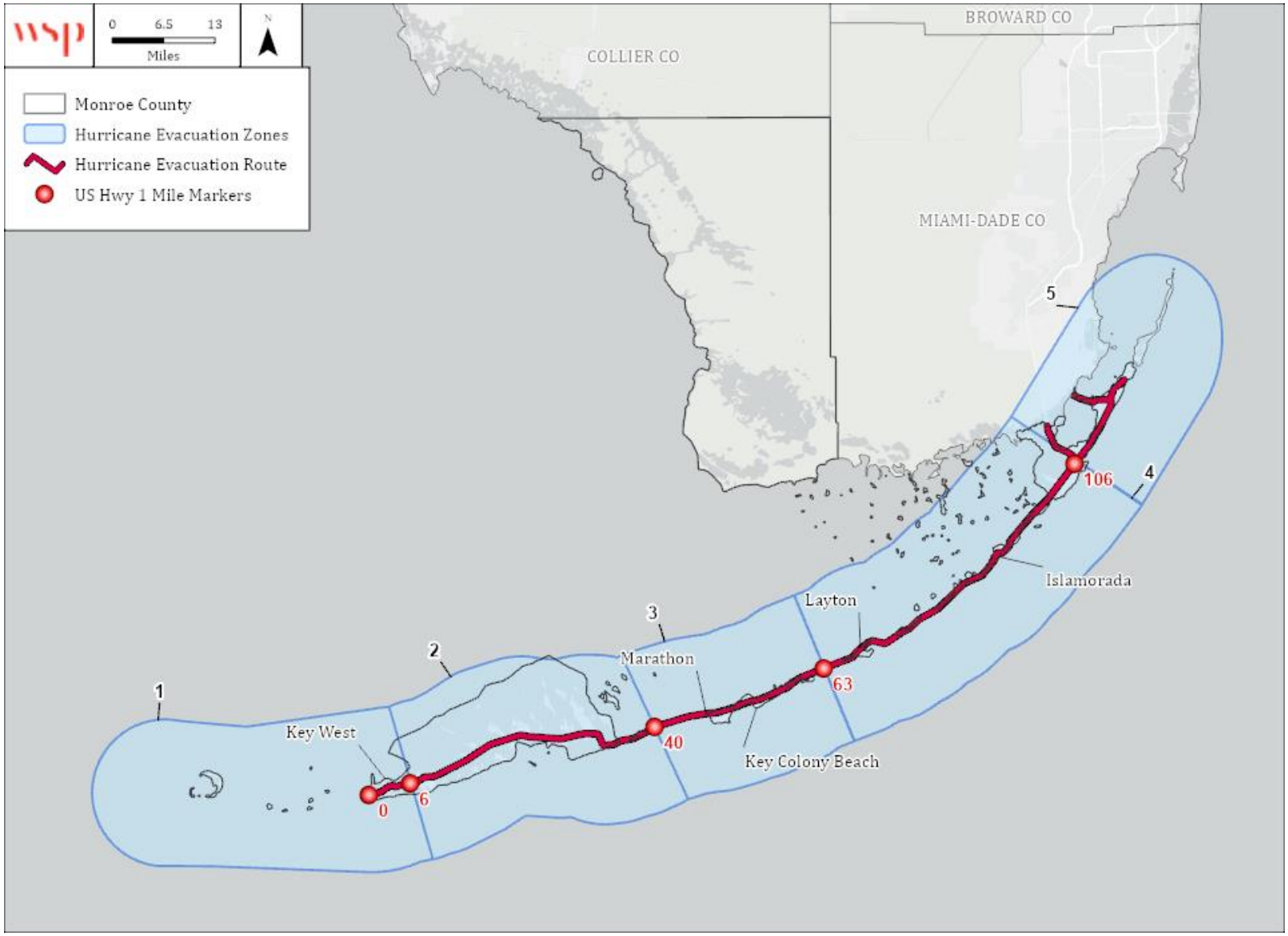
Zone 3: West end of the 7-Mile Bridge to the end of Long Key Bridge (MM40-MM63)

Zone 4: West end of the Long Key Bridge to the confluence of CR 905 and 905A (3-way stop) (MM63-MM106)

Zone 5: CR 905A to and including Ocean Reef (MM106-MM126.5)

Although mainland Monroe is not heavily populated, National Parks Services employees and their families who reside there, and the Native American population, which occupies their trial land would evacuate to hurricane rated hotels, motels, or to the facility designated for hurricane shelter at Flamingo Park. Private residents would evacuate to Miami-Dade shelters. The sequence of the evacuation by zone may vary by individual storms. This evacuation plan applies to all municipalities to ensure safety of all county residents.

Figure 4.33 – Hurricane Evacuation Zones



VULNERABILITY ASSESSMENT

PEOPLE

Children, elderly, individuals with disabilities, and others who may have difficulty evacuating are especially vulnerable to harm from hurricanes. 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.

Individuals in mobile homes are more vulnerable to hurricane winds, especially if their unit does not have tie downs and other wind safety measures. This is further evidenced by Monroe County's emphasis on evacuating manufactured home residents. Overall, there are 4,696 mobile home units in Monroe County, making up almost 9 percent of the County's total housing stock. Over 12 percent of the housing stock in Marathon is mobile home units. Additionally, there are over 3,300 mobile home units in unincorporated Monroe County, again making up close to 13 percent of the total housing stock. These communities may face more severe impacts from hurricane events as a result. Table 4.51 shows mobile home units by jurisdiction.

Table 4.51 – Mobile Home Units by Jurisdiction, 2023

Jurisdiction	Total Housing Units	Mobile Home Units	Mobile Home Units, Percent of Total
City of Key Colony Beach	1,132	0	0%
City of Key West	14,414	330	2.3%
City of Layton	181	2	1.1%
City of Marathon	6,442	781	12.1%
Village of Islamorada	5,993	208	3.5%
Unincorporated Monroe County	26,256	3,375	12.9%
Total	**54,418**	**4,696**	**8.6%**

Source: American Community Survey 5-Year Estimates, 2023

ESTIMATED SHELTER NEEDS

The Hazus analyses performed for this vulnerability assessment estimate the number of households that are expected to be displaced from their homes due to various hurricane risks as well as the number of displaced people that will require accommodations in temporary public shelters. Table 4.52 below summarizes shelter needs for a storm event similar to Hurricane Irma, as well as probabilistic 50-, 100-, and 500-year hurricane events.

Table 4.52 – Estimated Shelter Needs, Hurricane Scenarios, Monroe County

Event Type	Displaced Households	Residents in Need of Temporary Shelter
Hurricane Irma Equivalent	1,714	1,157
50-year hurricane event	4,298	2,767
100-year hurricane event	7,189	5,125
500-year hurricane event	17,679	13,158

Source: Hazus

PROPERTY

General damages to property are both direct (what the winds associated with hurricanes physically destroy) and indirect, which focuses on additional costs, damages and losses attributed to secondary hazards spawned by the hurricane, or due to the damages caused by the storm. Depending on the size and strength of the hurricane, associated winds are capable of damaging and eventually destroying almost anything. Construction practices and building codes can help maximize structures' resistance to damage.

Secondary impacts of damage due to hurricane winds often result from damage to infrastructure. Downed power and communications transmission lines, coupled with disruptions to transportation, create difficulties in reporting and responding to emergencies. These impacts of a hurricane put tremendous strain on a community. In the immediate aftermath of a hurricane, the focus is on emergency services.

Two Hazus level 1 analyses were used to determine hurricane risk. The first simulated the wind losses experienced during Hurricane Irma in 2017. The second was based on probabilistic parameters for the 50-year, 100-year, and 500-year return periods. This analysis produced estimates of the likelihood of varying levels of damage as well as building-related economic losses. Note that Hazus only assesses hurricane wind and does not account for any other hazards associated with hurricane.

Table 4.53 provides the likelihood of damage at varying levels of severity by occupancy type expected for a storm of magnitude similar to Hurricane Irma (2017). Table 4.54 provides the likelihood of damage at varying levels of severity by occupancy type during three probabilistic hurricane events – a 50-year, 100-year, and 500-year return period. During an event of magnitude similar to Hurricane Irma's, more than 44% of buildings in the County are estimated to potentially sustain damages. 30%, 80%, and 72% of buildings in the county are likely to sustain damage during the 50-year, 100-year, and 500-year return period events, respectively.

Table 4.53 – Likelihood of Damage by Severity and Occupancy, Hurricane Irma Equivalent

Occupancy	Buildings at Risk	Value at Risk	Likelihood of Damage (%)				
			None	Minor	Moderate	Severe	Destruction
Agriculture	89	$31,508,000	54.39%	18.79%	14.16%	9.99%	2.66%
Commercial	5,898	$3,957,651,000	56.38%	15.70%	16.80%	10.73%	0.38%
Education	74	$$377,278,000	55.03%	16.52%	20.71%	7.69%	0.05%
Government	168	$237,917,000	44.07%	17.27%	26.81%	11.80%	0.04%
Industrial	1,088	$1,434,668,000	52.58%	14.82%	15.98%	15.23%	1.38%
Religion	235	$227,602,000	54.86%	20.06%	16.22%	8.80%	0.07%
Residential	38,080	$11,813,847,000	55.16%	23.11%	14.60%	4.71%	2.41%
Total	**45,632**	**$18,080,471,000**	**55.22%**	**21.90%**	**14.98%**	**5.80%**	**2.10%**

Source: Hazus

Table 4.54 – Likelihood of Damage by Severity and Occupancy, 50-, 100-, and 500-year Hurricane Event

Occupancy	Buildings at Risk	Value at Risk	Likelihood of Damage (%)				
			None	Minor	Moderate	Severe	Destruction
50-year Hurricane Event							
Agriculture	89	$31,508,000	69.80%	5.42%	6.36%	11.73%	6.69%
Commercial	5,898	$3,957,651,000	71.39%	5.56%	7.34%	13.25%	2.45%
Education	74	$$377,278,000	75.18%	3.69%	7.22%	11.95%	1.96%
Government	168	$237,917,000	77.05%	4.36%	5.60%	12.20%	0.78%
Industrial	1,088	$1,434,668,000	71.72%	4.69%	6.25%	12.95%	4.39%
Religion	235	$227,602,000	73.84%	5.75%	5.88%	12.97%	1.57%

Occupancy	Buildings at Risk	Value at Risk	Likelihood of Damage (%)				
			None	Minor	Moderate	Severe	Destruction
Residential	38,080	$11,813,847,000	69.21%	8.38%	7.04%	7.90%	7.47%
Total	**45,632**	**$18,080,471,000**	**69.61%**	**7.88%**	**7.05%**	**8.76%**	**6.68%**
100-year Hurricane Event							
Agriculture	89	$31,508,000	18.74%	22.71%	27.12%	23.09%	8.34%
Commercial	5,898	$3,957,651,000	20.45%	19.49%	29.37%	28.72%	1.97%
Education	74	$$377,278,000	18.30%	17.67%	35.09%	28.44%	0.50%
Government	168	$237,917,000	13.21%	13.68%	35.43%	37.08%	0.59%
Industrial	1,088	$1,434,668,000	17.64%	16.02%	25.47%	35.21%	5.65%
Religion	235	$227,602,000	18.77%	21.86%	29.37%	29.11%	0.89%
Residential	38,080	$11,813,847,000	19.37%	28.17%	27.93%	15.92%	8.60%
Total	**45,632**	**$18,080,471,000**	**19.44%**	**26.65%**	**28.10%**	**18.21%**	**7.59%**
500-year Hurricane Event							
Agriculture	89	$31,508,000	27.11%	9.54%	17.77%	28.00%	17.59%
Commercial	5,898	$3,957,651,000	27.10%	8.32%	16.78%	40.30%	7.50%
Education	74	$$377,278,000	22.15%	7.87%	17.17%	48.87%	3.94%
Government	168	$237,917,000	13.80%	6.39%	18.07%	58.07%	3.66%
Industrial	1,088	$1,434,668,000	23.17%	6.76%	15.15%	40.95%	13.97%
Religion	235	$227,602,000	22.18%	8.98%	18.76%	43.75%	6.32%
Residential	38,080	$11,813,847,000	27.82%	10.52%	16.38%	24.52%	20.77%
Total	**45,632**	**$18,080,471,000**	**27.52%**	**10.11%**	**16.42%**	**27.21%**	**18.72%**

Source: Hazus

Table 4.55 details estimated property damages from a replication of Hurricane Irma by occupancy type. Table 4.56 details estimated property damages from the 50-year, 100-year, and 200-year hurricane wind events by occupancy type.

Table 4.55 – Estimated Property Damages, Hurricane Irma Replication

Area	Residential	Commercial	Industrial	Others	Total
Hurricane Irma (2017) Replication					
Building	$791,379,520	$223,635,050	$117,403,650	$48,198,950	$1,180,617,160
Content	$257,437,070	$129,094,620	$107,508,030	$28,535,190	$522,574,920
Inventory	$0	$16,208,600	$17,148,900	$893,830	$34,251,330
Total	**$1,048,816,590**	**$368,938,270**	**$24,206,058,000**	**$77,627,980**	**$1,737,443,410**

Source: Hazus

Table 4.56 – Estimated Property Damages, 50-year, 100-year, and 500-year Hurricane Wind Events

Area	Residential	Commercial	Industrial	Others	Total
50-year Hurricane Event					
Building	$1,689,481,300	$356,913,000	$129,336,880	$89,638,610	$2,265,370,700
Content	$695,671,000	$293,778,560	$147,599,090	$78,771,200	$1,215,819,850
Inventory	$0	$35,745,360	$22,692,650	$2,250,750	$60,688,760
Total	**$2,385,152,310**	**$686,437,820**	**$299,628,620**	**$170,660,560**	**$3,541,879,320**
100-year Hurricane Event					
Building	$2,499,949,700	$695,501,390	$344,514,630	$155,771,150	$3,695,736,870

Area	Residential	Commercial	Industrial	Others	Total
Content	$939,557,070	$457,243,510	$350,220,580	$109,328,370	$1,856,349,530
Inventory	$0	$59,891,180	$55,520,810	$3,096,140	$118,508,130
Total	**$3,439,506,770**	**$1,212,636,080**	**$750,256,020**	**$268,195,670**	**$5,670,594,530**
500-year Hurricane Event					
Building	$4,338,205,980	$1,347,834,130	$604,597,740	$306,303,630	$6,596,941,480
Content	$1,815,025,590	$1,056,430,690	$687,184,050	$257,364,380	$3,816,004,720
Inventory	$0	$134,564,930	$107,102,630	$6,035,430	$247,703,000
Total	**$6,153,231,580**	**$2,538,829,750**	**$1,398,884,430**	**$569,703,450**	**$10,660,649,210**

Source: Hazus

Estimated property damages for an event similar to Hurricane Irma (2017) total $1,737,443,410 according to this Hazus level 1 analysis. This equates to a loss ratio of 9.6 percent. Estimated losses for a 50-year, 100-year, and 500-year probabilistic wind event total $3,541,879,320, $5,670,594,530, and $10,660,649,210, respectively; this equates to a loss ratio of 20 percent for a 50-year event, 31 percent for a 100-year event, and 59 percent for a 500-year return period event. These loss ratios are determined by dividing total estimated losses (from Table 4.55 and Table 4.56) by the total value at risk in the county (from Table 4.53 and Table 4.54). Estimates from a Hazus level 1 analysis use 2018 ACS 1-year estimates; actual losses or loss ratios may be higher depending on development changes in recent years.

FEMA considers a loss ratio of 10 percent or more to be an indicator that a community will have significant difficulty recovering from an event. The 50-year, 100-year, or 500-year event will cause significant difficulties for recovery. Damages from an actual hurricane event would likely also involve storm surge and flood impacts that would raise the damage total. Therefore, even a 100-year hurricane event may cause more serious damages that what is reported here from Hazus. Table 4.57 below summarizes the number of buildings impacted by 100yr and 500 yr storm surge events. Buildings are counted only once for the lowest category storm they will be affected by; it can be assumed that a building affected by storm surge associated a 100yr event will also be impacted by a 500yr storm surge event.

Table 4.57 – Storm Surge Exposure by 100yr and 500yr event, Monroe County, FL

Occupancy	Estimated Building Count	Structure Value	Estimated Content Value	Total Value
100yr Event	**48,524**	**$23,455,250,646**	**$13,869,681,211**	**$37,324,931,858**
Agriculture	1	$267,735	$267,735	$535,470
Commercial	4,221	$3,160,987,416	$3,160,987,416	$6,321,974,832
Education	59	$39,541,055	$39,541,055	$79,082,110
Government	1,490	$697,950,350	$697,950,350	$1,395,900,700
Industrial	456	$157,650,870	$236,476,305	$394,127,176
Religious	128	$70,063,480	$70,063,480	$140,126,961
Residential	42,169	$19,328,789,740	$9,664,394,870	$28,993,184,609
500yr Event	**1,689**	**$750,158,690**	**$512,936,550**	**$1,263,095,240**
Agriculture	0	$0	$0	$0
Commercial	325	$189,452,819	$189,452,819	$378,905,638
Education	2	$2,320,805	$2,320,805	$4,641,610
Government	43	$71,480,016	$71,480,016	$142,960,033
Industrial	7	$2,453,522	$3,680,283	$6,133,805
Religious	8	$7,553,727	$7,553,727	$15,107,453
Residential	1,304	$476,897,801	$238,448,900	$715,346,701
Total	**50,213**	**$24,205,409,336**	**$14,382,617,762**	**$38,588,027,098**

Due to the limitations of a Hazus level 1 analysis, damage estimates for critical facilities could not be calculated. Critical infrastructure, including the Keys' energy transmission pipelines, could also be impacted by hurricane winds. Given equal vulnerability to hurricane winds across all of Monroe County, all critical facilities are considered to be at risk. Certain buildings may perform better than others based on their age and construction, among other factors. Depending on their locations, critical facilities may also be at risk to storm surge flooding. Table 4.58 below provides counts for the number of critical facilities at risk to the 100yr and 500yr storm surge event. Based on these results, 94 percent of the assessed facilities are exposed to one storm surge.

Table 4.58 – Critical Facilities at Risk of 100yr and 500yr Storm Surge Event

Facility Type	Total Facilities at Risk
100yr Storm Surge	**378**
Communications	25
Energy	17
Food, Hydration, Shelter	40
Hazardous Materials	1
Health and Medical	20
Safety and Security	73
Transportation	5
Water Systems	197
500yr Storm Surge	**27**
Communications	-
Energy	5
Food, Hydration, Shelter	5
Hazardous Materials	-
Health and Medical	1
Safety and Security	12
Transportation	-
Water Systems	4

ESTIMATED DEBRIS GENERATION

Hazus estimates the total amount of debris that will be generated by a hurricane, breaking the debris down into four general categories: Brick/Wood, Reinforce Concrete/Steel, Eligible Tree Debris, and Other Tree Debris. Hazus also estimates the number of trucks needed to remove the building debris, assuming 25 tons of debris per truck. Table 4.59 summarizes debris and trucks needed by storm event.

Table 4.59 – Estimated Debris Generation (tons)

Event Type	Tree Debris		Brick/ Wood	Concrete/ Steel	Total	Building Debris Truckloads
	Eligible	Other				
Hurricane Irma Equivalent	2,847	65,997	127,502	5,110	201,456	5,304
50-year hurricane event	4,280	91,601	280,534	25,984	402,399	12,261
100-year hurricane event	5,242	70,989	406,490	24,036	506,757	17,221
500-year hurricane event	4,711	41,609	758,970	55,368	860,658	32,574

Source: Hazus

ECONOMY

The disruption of the local economy is an anticipated consequence of hurricanes that directly effects Monroe County. Beyond debris generation and destruction of property that require monetary inputs to haul away and rebuild, hurricanes and tropical storms have other significant impacts on the Monroe County economy. The primary industries in the Keys – retail, service, tourism, and fishing – are all likely to be negatively impacted by a hurricane or tropical storm. Any event causing visitors to stay away would result in losses to local businesses as well as tax revenue for the local economy. Any event that causes a power outage or damage to U.S. 1 is likely to have such impacts on tourism. Further, it has been noted that the perception of damage that lingers after recovery period may continue to keep visitors away. Additionally, the fishing industry would suffer from loss of power (for ice production), loss of communication infrastructure, and damage to U.S. 1 (transport to the mainland.

Hazus reports the business interruption losses for a Hurricane Irma equivalent as well as a 50-, 100-, and 500-year probabilistic hurricane wind event as follows:

Table 4.60 – Business Interruption Losses, Hurricane Event Scenarios, Monroe County

Business Interruption	Residential	Commercial	Industrial	Others	Total
Hurricane Irma Equivalent					
Income	$3,436,900	$89,815,800	$1,572,120	$826,360	$95,651,180
Relocation	$90,981,700	$34,906,000	$7,226,720	$10,545,290	$143,659,710
Rental Income	$51,899,210	$22,355,240	$1,624,670	$1,621,630	$77,500,760
Wage	$8,096,770	$77,502,020	$2,602,340	$6,334,190	$94,535,330
Total	**$154,414,580**	**$224,579,060**	**$13,025,860**	**$19,327,470**	**$411,346,970**
50-year Hurricane Event					
Income	$21,878,560	$117,184,980	$1,536,580	$1,016,790	$141,616,910
Relocation	$155,300,440	$44,346,270	$5,532,750	$12,802,390	$217,981,850
Rental Income	$96,823,590	$29,766,300	$1,478,970	$1,287,130	$129,355,990
Wage	$51,522,110	$109,657,080	$2,543,240	$6,617,800	$170,340,230
Total	**$325,524,690**	**$300,954,630**	**$11,091,540**	**$21,724,110**	**$659,294,980**
100-year Hurricane Event					
Income	$23,784,240	$285,505,320	$4,342,860	$1,374,520	$315,006,930
Relocation	$259,353,820	$99,128,960	$17,273,860	$29,934,620	$405,691,240
Rental Income	$165,268,280	$66,216,650	$4,502,330	$4,649,470	$240,636,730
Wage	$56,030,010	$251,959,670	$7,196,040	$10,160,310	$325,346,030
Total	**$504,436,340**	**$702,810,600**	**$33,315,080**	**$46,118,920**	**$1,286,680,940**
500-year Hurricane Event					
Income	$64,787,890	$522,325,220	$7,601,500	$3,061,180	$597,775,790
Relocation	$384,432,210	$164,118,790	$24,645,670	$50,306,670	$623,503,340
Rental Income	$279,299,610	$115,319,720	$7,201,580	$8,435,510	$410,256,430
Wage	$152,626,150	$461,891,130	$12,626,530	$22,257,810	$649,401,630
Total	**$881,145,870**	**$1,263,654,860**	**$52,075,290**	**$84,061,180**	**$2,280,937,190**

Source: Hazus

ENVIRONMENT

Hurricane winds can cause massive damage to the natural environment, uprooting trees and other debris within the storm's path. Animals can either be killed directly by the storm or impacted indirectly through

changes in habitat and food availability caused by high winds and intense rainfall. Endangered species can be dramatically impacted. Forests can be completely defoliated by strong winds.

Although South Florida ecosystems have adapted to episodic massive disturbances such as hurricanes, the growth of urban environments have altered the natural ecology and thus the ability for those ecosystems to respond and recover from these events. In the Keys, the predominantly coastal floodplain serves different functions than a traditional floodplain and responds to disturbances differently. Although hurricanes are necessary and natural occurrences for the maintenance of the unique natural environment, they can still cause significant damage.

The mangroves, which provide protective buffers from wind and storm surge, marshes, pine rockland forests, hardwood hammocks, and reef systems are all important parts of this unique natural environment. Many of these features have suffered significant damage during prior hurricanes. During Hurricane Andrew, many of the mangroves in Everglades National park were damaged; delayed mortality meant this continued well past the end of the storm, a phenomenon that has been observed after prior storms as well. After Hurricane Wilma, storm surge was especially detrimental to the pine rockland forest throughout the Florida Keys National Wildlife Refuge. Additionally, virtually all pines on Cudjoe Key were killed along with high mortality of young and mature trees on Big Pine, Sugarloaf, and Little Torch Keys.

CONSEQUENCE ANALYSIS

Table 4.61 summarizes the potential negative consequences of hurricanes and tropical storms.

Table 4.61 – Consequence Analysis – Hurricane and Tropical Storm

Category	Consequences
Public	Impacts include injury or death, loss of property, outbreak of diseases, mental trauma and loss of livelihoods. Power outages and flooding are likely to displace people from their homes. Water can become polluted such that if consumed, diseases and infection can be easily spread. Residential, commercial, and public buildings, as well as critical infrastructure such as transportation, water, energy, and communication systems may be damaged or destroyed, resulting in cascading impacts on the public.
Responders	Impacts to responders and response capabilities may occur during severe storms. Localized impact expected to limit damage to personnel in the inundation area at the time of the incident.
Continuity of Operations (including Continued Delivery of Services)	Damage to facilities/personnel from wind or flooding may require temporary relocation of some operations. Operations may be interrupted by power outages. Disruption of roads and/or utilities may postpone delivery of some services. Regulatory waivers may be needed locally. Fulfillment of some contracts may be difficult. Impact may reduce deliveries.
Property, Facilities and Infrastructure	Structural damage to buildings may occur; loss of glass windows and doors by high winds and debris; loss of roof coverings, partial wall collapses, and other damages requiring significant repairs are possible in a major (category 3 to 5) hurricane.

Category	Consequences
Environment	Hurricanes can devastate wooded ecosystems and remove all the foliation from forest canopies, and they can change habitats so drastically that the indigenous animal populations suffer as a result. Specific foods can be taken away as high winds will often strip fruits, seeds and berries from bushes and trees. Secondary impacts may occur; for example, high winds and debris may result in damage to an above-ground fuel tank, resulting in a significant chemical spill.
Economic Condition of the Jurisdiction	Local economy and finances adversely affected, possibly for an extended period of time, depending on damages. Intangible impacts, including business interruption and additional living expenses, may also occur.
Public Confidence in the Jurisdiction's Governance	Public confidence may be affected by a major storm event requiring substantial response and long-term recovery effort.

ASSOCIATED HAZARDS

Natural hazards are, more often than not, interconnected. Any given hazard may lead to, or be spurred by, another hazard – sometimes referred to as cascading disasters. Tropical Cyclones may be associated with: Storm Surge, Flood, Coastal Erosion, Sea Level Rise, and Tornado.

CHANGES IN DEVELOPMENT

While increased development will not impact the incidence of hurricane wind, it will lead to more exposure, which in turn may increase risk. This is especially true for mobile home development, which is more at risk to wind. In Monroe County, mobile home development is limited by its ordinances – particularly limiting new mobile homes to designated mobile home parks and dictate the height at which these homes may be elevated. Like flooding, increased development will likely lead to increased impervious surfaces, which could potentially increase the impacts and patterns of storm surge.

Because the County relies almost entirely on the Overseas Highway for evacuation purposes, any future development will impact evacuation time. The County has implemented a Rate of Growth Ordinance for both residential and non-residential development to keep evacuation time under 24 hours.

PROBLEM STATEMENTS

The evacuation of the Florida Keys occurs entirely on US Highway 1 – if this highway becomes impassable due to rain or other roadblocks, evacuation will become increasingly difficult.

The County and participating jurisdictions must continue to prioritize vulnerable communities, including keeping the special needs registry used during evacuations up to date. There is continued concern that these groups may not respond to evacuation orders; transportation to the mainland is also a concern.

The County and jurisdictions rely on shelters on the mainland during evacuation times – availability of shelter space within and outside of the County is a concern as the County and region grow.

Communities with greater shares of mobile home units – such as Marathon and Unincorporated Monroe County – are more vulnerable to hurricane winds.

Visitors to Monroe County during the summer months may burden evacuation times.

The population of Monroe County increases during the late autumn and winter; late in hurricane season, this increase in population may overburden the shelter capacity.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes tropical cyclone hazard risk by jurisdiction. Due to its coastal geography, the entire county is susceptible to the impacts of hurricanes, tropical storms, and the associated storm surges and flooding. While hurricanes have the possibility of being catastrophic across all jurisdictions, certain areas have higher vulnerability. Impacts may be greater in more highly developed areas with greater amounts of impervious surface and higher exposure in terms of both property and population density. Areas with more mobile homes are also more vulnerable to damage, while areas with higher property values have greater overall exposure and potential for damages. Despite these differences, all jurisdictions have the possibility for catastrophic impacts.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Key Colony Beach	4	4	4	1	3	3.6	H
Key West	4	4	4	1	3	3.6	H
Layton	4	4	4	1	3	3.6	H
Marathon	4	4	4	1	3	3.6	H
Islamorada	4	4	4	1	3	3.6	H
Unincorporated Monroe County	4	4	4	1	3	3.6	H

4.5.8 WILDFIRE

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Wildfire	Likely	Limited	Small	Less than 6 hrs	Less than 1 week	2.6

HAZARD DESCRIPTION

A wildfire is an uncontained fire that spreads through the environment. Wildfires can consume large areas, including infrastructure, property, and resources. When massive fires, or conflagrations, develop near populated areas, evacuations possibly ensue. Not only do the flames impact the environment, but the massive volumes of smoke spread by certain atmospheric conditions also impact the health of nearby populations. There are three general types of fire spread that are recognized.

- **Ground fires** – burn organic matter in the soil beneath surface litter and are sustained by glowing combustion.
- **Surface fires** – spread with a flaming front and burn leaf litter, fallen branches and other fuels located at ground level.
- **Crown fires** – burn through the top layer of foliage on a tree, known as the canopy or crown fires. Crown fires, the most intense type of fire and often the most difficult to contain, need strong winds, steep slopes and a heavy fuel load to continue burning.

Fuels to wildfires are subject to a variety of ignition sources, both natural and human caused. Generally, wildfires are started by humans, either through arson or carelessness. Fire intensity is controlled by both short-term weather conditions and longer-term vegetation conditions. During intense fires, understory vegetation, such as leaves, small branches, and other organic materials that accumulate on the ground, can become additional fuel for the fire. The most explosive conditions occur when dry, gusty winds blow across dry vegetation. Historically, fire starts have been contained quickly with minimal loss to property and structures.

Weather plays a major role in the birth, growth and death of a wildfire. Weather conditions favorable to wildfire include drought, which increases flammability of surface fuels, and winds, which aid a wildfire 's progress. The combination of wind, temperature, and humidity affects how fast wildland fires can spread. Rapid response can contain wildfires and limit their threat to property. In support of forecasting for fire weather, the National Weather Service Fire Weather Program emerged. This service is provided to federal and state land management agencies for the prevention, suppression, and management of forest and rangeland fires.

Monroe County experiences a variety of wildfire conditions found in the Keetch-Byram Drought Index, which is described in Table 4.62. The Keetch-Byram Drought Index (KBDI) for February 26, 2025, is shown in Figure 4.34. The KBDI for Monroe County and the surrounding areas at this time was between 200 and 400.

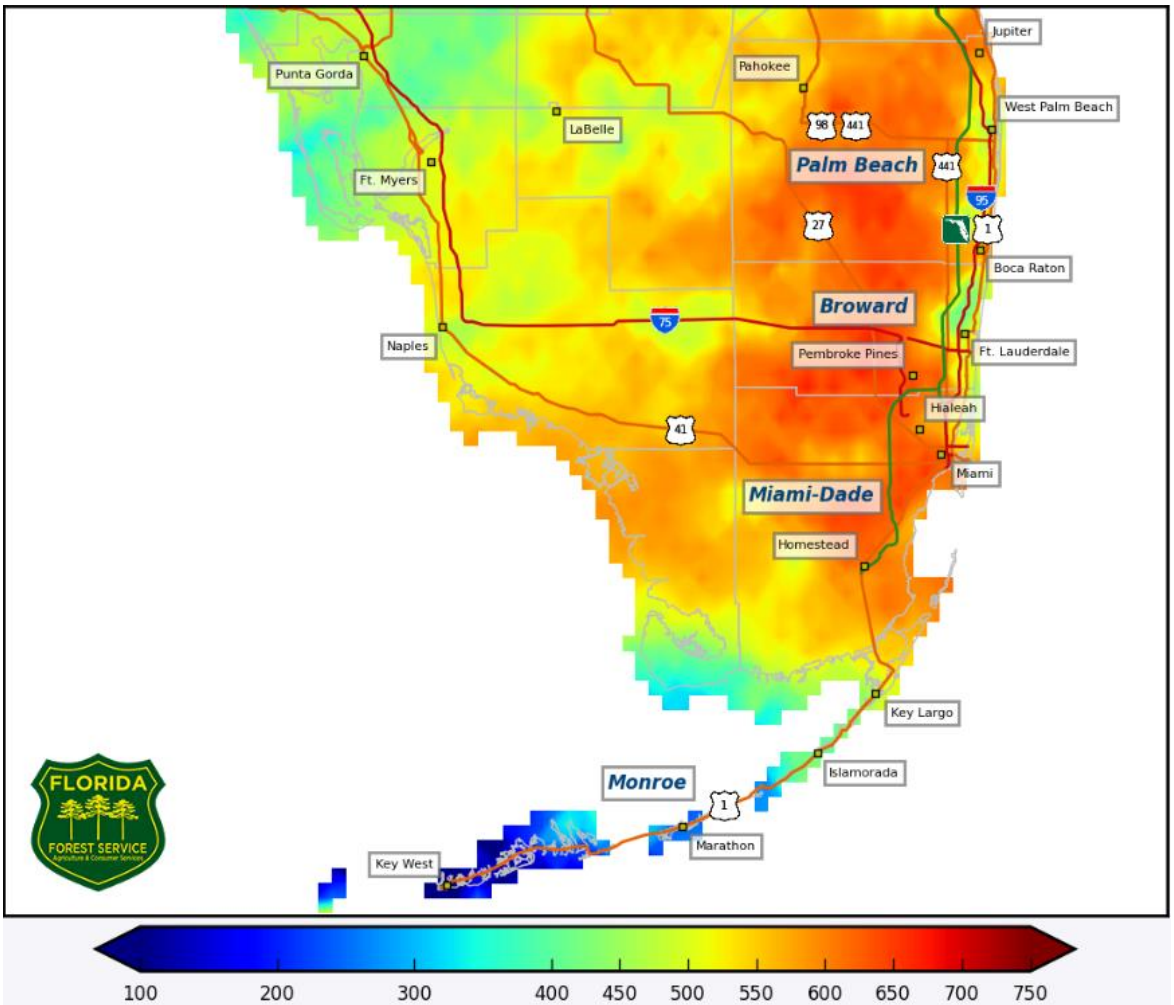
Table 4.62 – Keetch-Byram Drought Index Fire Danger Rating System

KBDI	Description
0-200	Soil and fuel moisture are high. Most fuels will not readily ignite or burn. However, with enough sunlight and wind, cured grasses and some light surface fuels will burn in sports and patches.
200-400	Fires more readily burn and will carry across an area with no gaps. Heavier fuels will still not readily ignite and burn. Also, expect smoldering and the resulting smoke to carry into and possibly through the night.

KBDI	Description
400-600	Fire intensity begins to significantly increase. Fires will readily burn in all directions exposing mineral soils in some locations. Larger fuels may burn or smolder for several days creating possible smoke and control problems.
600-800	Fires will burn to mineral soil. Stumps will burn to the end of underground roots and spotting will be a major problem. Fires will burn through the night and heavier fuels will actively burn and contribute to fire intensity.

Source: United State Forest Service Wildland Fire Assessment System

Figure 4.34 – Keetch-Byram Drought Index, February 2025



Source: Florida Department of Agriculture and Consumer Services

Warning Time: 4 – Less than 6 hours

Duration: 3 – Less than 1 week

LOCATION

The location of wildfire risk can be defined by the acreage of Functional Wildland Urban Interface (WUI). The Functional WUI is described as the classification of the land near buildings into zones that describe the wildfire risk mitigation activities appropriate for each zone. Buildings used in producing the

Functional WUI are defined as greater than 40 square meters. There are five Functional WUI categories recognized. There are five Functional WUI categories recognized.

- **Direct Exposure:** Burnable land cover within 75 m of a building. Buildings in this zone are exposed to ignition from convective and radiative heat from a wildfire, embers, and adjacent burning structures/outbuildings.
- **Indirect Exposure:** Nonburnable land cover within 75 m of a building and less than 1530 m from a 500-ha contiguous block of wildland fuel. Buildings in this zone are exposed to ignition from embers and/or adjacent burning structures
- **Critical Fireshed:** The burnable land cover from which a wildfire can reach a significant number of buildings within a single burning period.
- **Little-to-no Exposure:** Nonburnable land cover within 75 m of a building and more than 1530 m from a 500-ha contiguous block of wildland fuel. Buildings in this zone are relatively safe from ember ignition and building-to-building spread.
- **Sources of Ember Load to Buildings:** Burnable land cover more than 75 m from a building that produces embers capable of reaching nearby buildings. Ember production is a function of fire type and intensity; ember travel is a function of wind speed and direction. Ember modeling is based on fire modeling based on gridded historical climatology.

The Southern Wildfire Risk Assessment (SWRA) estimates that 15 percent of Monroe County's population lives within the critical fire shed and 1 percent live in direct exposure to the Functional WUI. The expansion of residential development from urban centers out into rural landscapes increases the potential for wildland fire threat to public safety and the potential for damage to forest resources and dependent industries. Population growth within the WUI substantially increases the risk of wildfire.

Spatial Extent: 3 – Moderate

Table 4.63 details the extent of the Functional WUI in Monroe County, and Figure 4.35 maps the WUI in Monroe County.

Table 4.63 – Wildland Urban Interface, Population and Acres

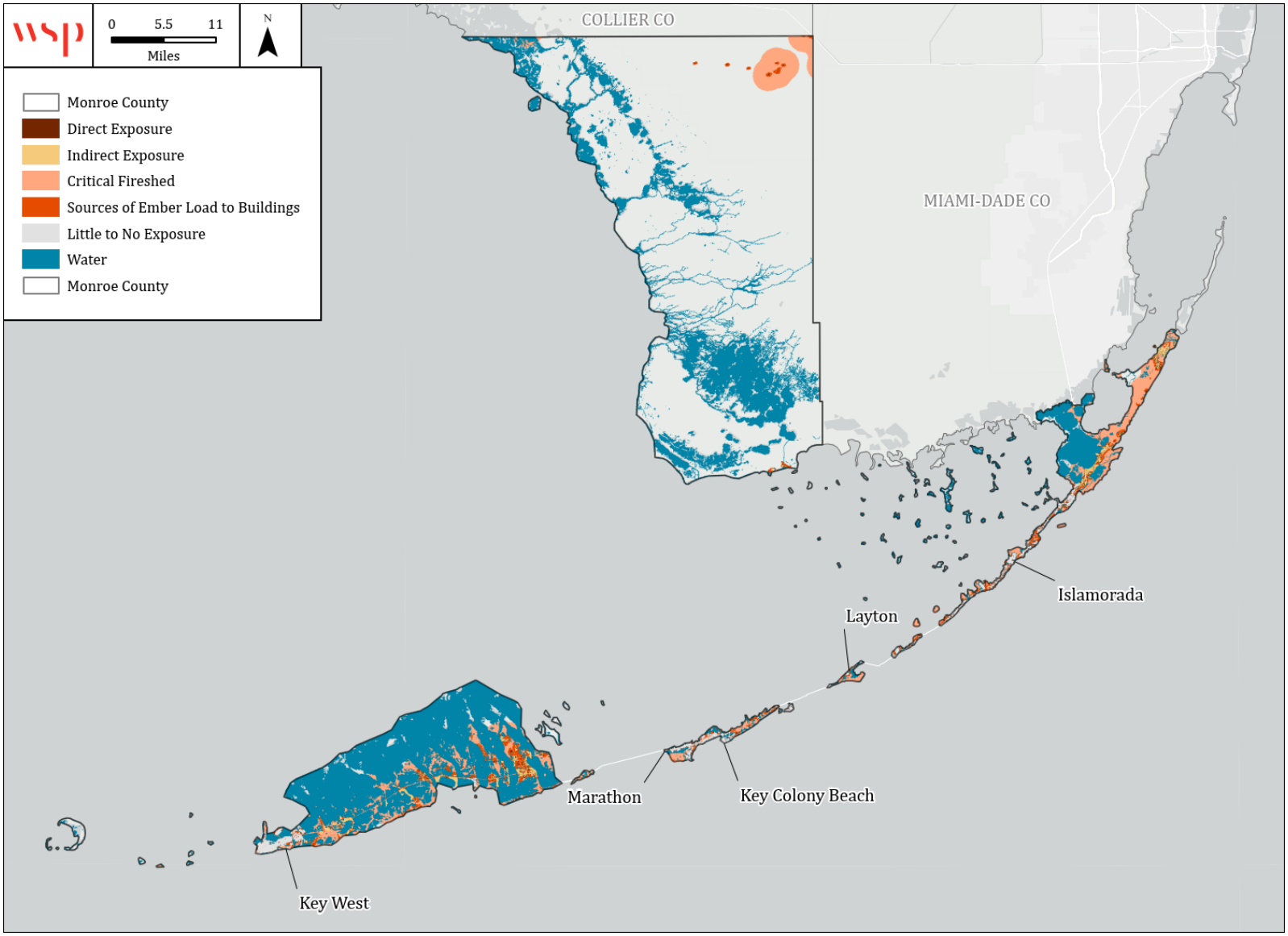
	Functional Wildland Urban Interface (WUI) Category	Acres	Percent
	Direct Exposure	4,874	1%
	Indirect Exposure	6,518	2%
	Critical Fireshed	48,772	15%
	Sources of Ember Load to Buildings	11,071	3%
	Little to No Exposure	11,026	3%
	Water	251,593	75%
	Total	333,854	100%

Source: Southern Wildfire Risk Assessment

Per the County CEMP and prior LMS, areas more susceptible to wildfire in Monroe County include Everglades National Park on the Mainland, and Big Pine, No Name, Cudjoe, and Sugarloaf Keys in the Lower Keys where there are remnant tracts of Native Pine Rockland Forest. In fact, the largest contiguous block of vegetation in the Lower Keys is 500 acres on Big Pine Key. The County is part of the Everglades District of the Florida Fire Service, which also Includes Broward, Palm Beach, and Miami-Dade Counties.

Spatial Extent: 2 – Small

Figure 4.35 – Wildland Urban Interface, Monroe County



EXTENT

Wildfire extent can be defined by the fire's intensity and measured by the Characteristic Fire Intensity Scale, which identifies areas where significant fuel hazards which could produce dangerous fires exist. Fire Intensity ratings identify where significant fuel hazards and dangerous fire behavior potential exist based on fuels, topography, and a weighted average of four percentile weather categories. The Fire Intensity Scale consists of five classes, as defined by Southern Wildfire Risk Assessment and is shown in Table 4.64. Table 4.65 and Figure 4.36 show the potential fire intensity within the WUI across Monroe County. Detailed maps of fire intensity by jurisdiction are provided in each community's annex.

Table 4.64 – Fire Intensity Scale

Class	Description
1, Very Low	Very small, discontinuous flames, usually less than 1 foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and non-specialized equipment.
2, Low	Small flames, usually less than two feet long; small amount of very short-range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.
3, Moderate	Flames up to 8 feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozer and plows are generally effective. Increasing potential for harm or damage to life and property.
4, High	Large Flames, up to 30 feet in length; short-range spotting common; medium range spotting possible. Direct attack by trained firefighters, engines, and dozers is generally ineffective, indirect attack may be effective. Significant potential for harm or damage to life and property.
5, Very High	Very large flames up to 150 feet in length; profuse short-range spotting, frequent long-range spotting; strong fire-induced winds. Indirect attack marginally effective at the head of the fire. Great potential for harm or damage to life and property.

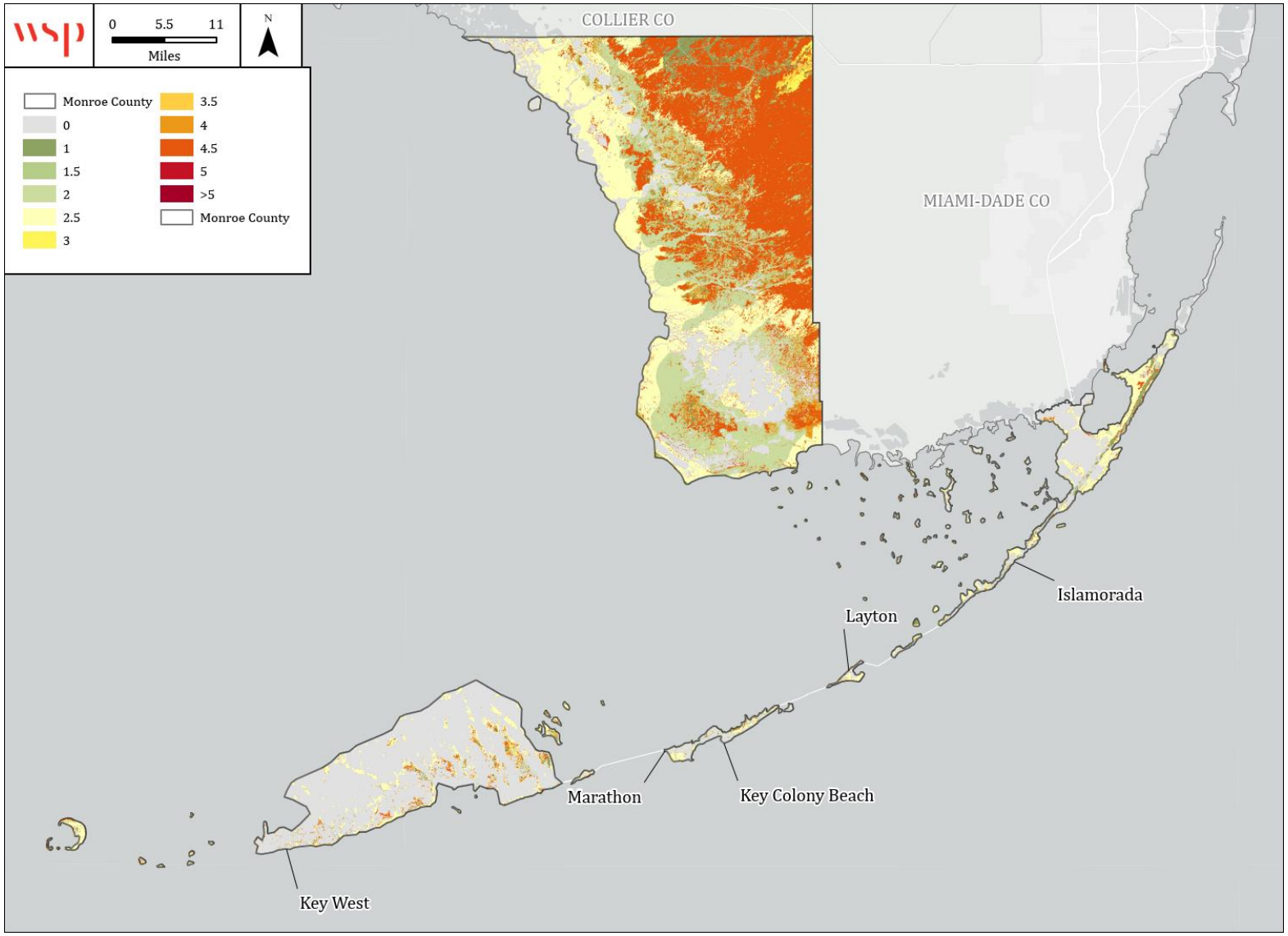
Source: Southern Wildfire Risk Assessment

Table 4.65 – Characteristic Fire Intensity, Monroe County

	Characteristic Fire Intensity Scale Category	Acres	Percent
	0	273,776	31%
	1	32,325	4%
	1.5	10,160	1%
	2	127,534	14%
	2.5	170,286	19%
	3	6,039	1%
	3.5	8,213	1%
	4	31,741	4%
	4.5	220,778	25%
	5	0	0%
	> 5	0	0%
	Total	**880,853**	**100%**

Source: Southern Wildfire Risk Assessment

Figure 4.36 – Characteristic Fire Intensity, Monroe County



Per the Southern Wildfire Risk Assessment, 31 percent of Monroe County is non-burnable. Note that this includes areas of the County that are open water. A significant portion of the land area, approximately 29 percent, of Monroe County may experience a Class 4 or higher Fire Intensity, which poses significant harm or damage to life and property. However, the areas with greatest potential fire intensity are largely outside the WUI -including Everglades National Park. Potential fire intensity is also high on Big Pine Key. Approximately 2 percent of the county may experience Class 3 or 3.5 Fire Intensity, which has potential for harm to life and property but is easier to suppress with dozer and plows. The remainder of the burnable area (approximately 38 percent) would face a Class 1 or Class 2 Fire Intensity, which are easily suppressed.

Florida participates in the national Ready, Set, Go! program which helps prepare first responders to best address wildfires when they occur. This program is also used as outreach to help citizens understand their risk and how to be prepared. As part of this program, the State produced a Wildfire Mitigation Plan. Monroe County has addressed fire hazards in their County Emergency Management Plan; however, it is considered a minimal threat.

Impact: 2 – Limited

HISTORICAL OCCURRENCES

NCEI does not report any records of wildfire in Monroe County within the 25-year period from 2000 through 2024. However, the Florida Department of Agriculture and Consumer Services maintains records of acreage burned and number of fires within the State of Florida. According to this department, there were 167 fires between January 1st, 2000 and December 31st, 2024, averaging 6.7 fires per year. However, these fires burned only 186.8 acres in total, averaging 1.12 acres per fire. Table 4.66 lists fires and acreage burned by year.

Table 4.66 – Number of Fires and Acreage Burned by Year, Monroe County

Year	Number of Fires	Acres Burned	Avg. Acres Burned
2000	14	4.5	0.32
2001	40	22.5	0.56
2002	32	4.4	0.14
2003	14	54.1	3.86
2004	10	3.3	0.33
2005	5	3.4	0.68
2006	6	1.4	0.23
2007	6	12.3	2.05
2008	5	1.6	0.32
2009	4	2.2	0.55
2010	4	0.4	0.10
2011	7	1.2	0.17
2012	1	0.1	0.10
2013	3	0.5	0.17
2014	7	1.6	0.23
2015	3	0.6	0.20
2016	1	0.1	0.10
2017	2	0.2	0.10
2018	2	72.1	36.05

Year	Number of Fires	Acres Burned	Avg. Acres Burned
2019	1	0.3	0.30
2020	0	0	0
2021	0	0	0
2022	0	0	0
2023	0	0	0
2024	0	0	0
Total	**167**	**186.8**	**1.12**

Source: Florida Forest Service Reporting System: Fires by Causes

Two notable fires explain some of the variation in average acreage burned in the table above.

Thunderstruck Fire: In 2007, the Thunderstruck Fire burned 7 acres on Big Pine Key, affecting vacant property adjacent to residential and commercial structures. The Florida Division of Forestry brought in resources from Miami to assist in controlling the fire. The U.S. Fish and Wildlife Service provided helicopter water drops to help control the fire spread. During this event, firefighters from several stations worked in yards of homes and several businesses to prevent damage. Flame lengths exceeded thirty feet, and nearly all the vegetation was killed as a result of severity and intensity.

Big Pine Key Brush Fire: The Big Pine Key Brush Fire began around 2pm on April 22, 2018 in a wooded area on Big Pine Key. Due to strong winds and dry conditions, the fire spread quickly and burned a total of 72 acres. Due to a quick, unified response from 10 different agencies, including Monroe County Emergency Services, Florida Forest Service, the U.S. Fish and Wildlife Service and others from Key West to Georgia, only one home and an associated detached garage were destroyed, and 30 other homes were saved in the burn area. There were no reported injuries or loss of life. With help from 1.7 inches of rain recorded at the Big Pine Key Forestry site on April 27th, which reduced heat in the fire's interior, the fire was completely contained and put out by April 29th. Overall, 93 percent of the pine rock lands on Big Pine Key were left unburned.

The State of Florida uses this Active Wildfires Dashboard to communicate to others where the currently burning wildfires are located. At the time this data is collected, there are 3 active wildfires in the state of Florida

The region experienced prolonged periods of moderate to severe drought in 2000 to 2001, 2007 to 2008, 2009, 2011, 2015, and 2018. These periods of drought may explain some of the annual variation in fires and acreage burned.

PROBABILITY OF FUTURE OCCURRENCE

The Southern Wildfire Risk Assessment provides a Burn Probability analysis which signifies the likelihood of a wildfire burning a specific location within a set time frame - commonly represented as the chance of burning during one calendar year or wildfire season. According to the SWRA, Burn Probability can be expressed as a fraction (ex. 0.005) or odds (1-in-200) and is based on fire behavior modeling across thousands of simulations of possible fire seasons. In each simulation, factors contributing to the probability of a fire occurring, including weather and ignition likelihood are varied based on patterns derived from observations in recent decades. It is not predictive and does not reflect any currently forecasted weather or fire danger conditions. Burn Probability does not say anything about the intensity of a fire if it occurs. The Burn Probability for Monroe County is presented in Table 4.67 and illustrated in Figure 4.37. Note that approximately 30 percent of the land area in the County does not have a Burn

Probability class assigned to it. The following table details the Burn Probability for the remaining area in the county.

Table 4.67 – Burn Probability, Monroe County

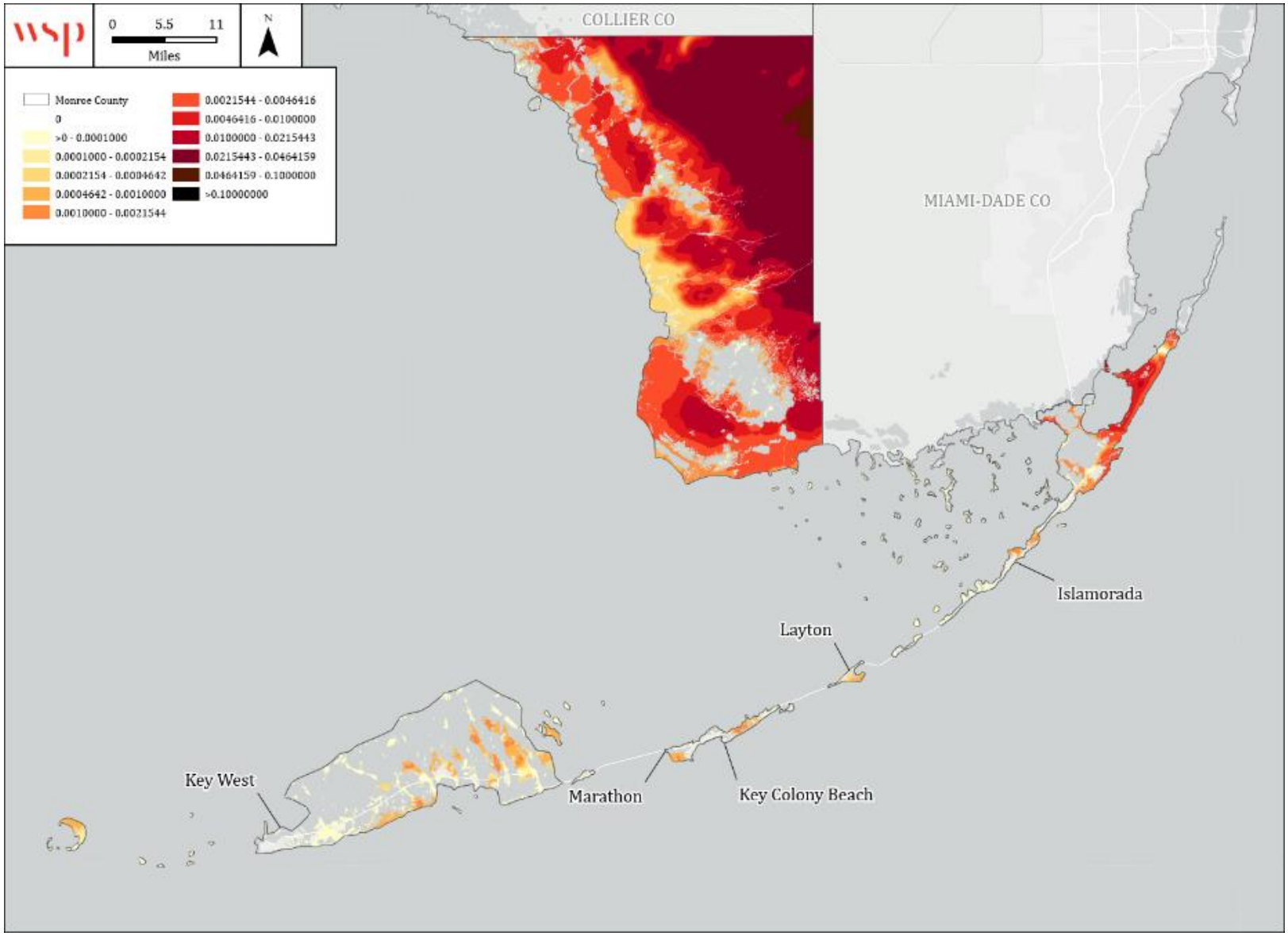
	Burn Probability Category	Acres	Percent
	0	264,099	30%
	>0 - 0.0001000	32,576	4%
	0.0001000 - 0.0002154	6,256	1%
	0.0002154 - 0.0004642	25,410	3%
	0.0004642 - 0.0010000	28,958	3%
	0.0010000 - 0.0021544	42,103	5%
	0.0021544 - 0.0046416	111,287	13%
	0.0046416 - 0.0100000	96,178	11%
	0.0100000 - 0.0215443	87,185	10%
	0.0215443 - 0.0464159	181,532	21%
	0.0464159 - 0.1000000	5,270	1%
	>0.10000000	0	0%
	Total	**880,853**	**100%**

Source: Southern Wildfire Risk Assessment

Over 50 percent of Monroe County has a relatively moderate to high burn probability. The areas of higher burn probability are located on the mainland of Monroe County in Everglades National Park. The Keys themselves have a relatively low burn probability. The probability of wildfire across the county is considered likely, defined as between a 10% and 100% annual chance of occurrence. The mainland (Everglades National Park), and Big Pine Key are areas that have historically seen wildfire and area likely to experience wildfire again due to their higher burn probability and potential fire intensity.

Probability: 3 – Likely

Figure 4.37 – Burn Probability, Monroe County



CLIMATE CHANGE

Climate change is expected to have far-reaching effects on various environmental processes, including the frequency an intensity of extreme heat and drought events, both of which could profoundly influence wildfire behavior. As global temperatures rise, the likelihood of more frequent and prolonged periods of extreme heat increase, which can dry out vegetation, soil, and organic matter, making them more susceptible to ignition. Additionally, the intensification of drought conditions means that water availability for plants and ecosystems could become increasingly scarce, leading to a reduction in the moisture content of vegetation, soils, and decomposing organic material, all of which play a critical tole in wildfire dynamics. Moreover, the unpredictability of climate change means that both seasons could become more extreme in their respective ways, amplifying the impacts on wildfire behavior.

VULNERABILITY ASSESSMENT

PEOPLE

Wildfire pose significant risks to human life and health, causing fatalities, injuries, and long-term health complications such as respiratory issues due to smoke inhalation. To mitigate these dangers, it is crucial to implement comprehensive procedures for rapid warning and evacuation. Developing reliable early warning systems that utilize satellite monitoring, drones, and weather forecasts can help alert communities to emerging threats. Local authorities should communicate through various channels, including SMS alerts, social media and community radio, to ensure that messages everyone effectively.

Effective communication and coordination among local fire departments, law enforcement, and emergency management agencies are vital for an orderly and safe evacuation process. After evacuations, providing support affected individuals and families is crucial, including access to medical care, mental health services, and resources for rebuilding. Establishing community networks can further assist residents during recovery.

PROPERTY

Wildfire can lead to sustainable direct property losses, impacting buildings, vehicles, landscaped areas, agricultural lands, and livestock. The destruction of homes and businesses not only results in financial losses but can also displace families and disrupt communities. One effective approach to increasing fire resistance is the use of fire-rated materials in construction such as non-combustible roofing, siding, and decks, as well as tempered glass windows that can withstand high temperatures. Additionally, building codes that require certain fire safety measures, such as proper ventilation and firebreaks, can further protect properties from encroaching flames.

Landscaping practices are another vital element in reducing vulnerability to wildfires. By incorporating fire-resistant plants and creating defensible space around properties—typically a buffer zone that extends at least 30 feet from structures—homeowners can limit the flammability of their surroundings. Techniques such as maintaining a green lawn, using gravel or stone mulch, and keeping trees trimmed can minimize the potential for fire to spread to buildings.

ENVIRONMENT

Wildfires have the potential to cause extensive damage to forest and forage resources, significantly affecting both natural habitats and agricultural land. When a wildfire sweeps through a forest, it can obliterate vast areas of vegetation, leading to loss of trees, shrubs, and underbrush that provide habitat for wildlife. This destruction disrupts ecosystems, displacing animal species and impacting their food sources.

Additionally, wildfires can severely damage agricultural crops on private land. The intense heat and smoke can harm plants, leading to reduced yields or complete crop failure. This not only affects farmers economically but can also have broader implications for local and regional food supplies. The destruction of crops can lead to higher food prices and food scarcity, impacting communities that depend on these resources.

The recovery process can vary based on factors such as the severity of the fire, the type of ecosystem affected, and climate conditions. In many cases, wildfires can lead to the growth of new, diverse plant communities that enhance soil quality and increase habitat complexity. Additionally, the ash left behind can provide essential nutrients that stimulate the growth of new vegetation.

CONSEQUENCE ANALYSIS

Table 4.68 summarizes the potential detrimental consequences of wildfire.

Table 4.68 – Consequence Analysis - Wildfire

Category	Consequences
Public	In addition to the potential for fatalities, wildfire and the resulting diminished air quality pose health risks. Exposure to wildfire smoke can cause serious health problems within a community, including asthma attacks and pneumonia, and can worsen chronic heart and lung diseases. Vulnerable populations include children, the elderly, people with respiratory problems or with heart disease. Even healthy citizens may experience minor symptoms, such as sore throats and itchy eyes.
Responders	Public and firefighter safety is the first priority in all wildland fire management activities. Wildfires are a real threat to the health and safety of the emergency services. Most fire-fighters in rural areas are 'retained'. This means that they are part-time and can be called away from their normal work to attend to fires.
Continuity of Operations (including Continued Delivery of Services)	Wildfire events can result in a loss of power which may impact operations. Downed trees, power lines and damaged road conditions may prevent access to critical facilities and/or emergency equipment.
Property, Facilities and Infrastructure	Wildfires frequently damage community infrastructure, including roadways, communication networks and facilities, power lines, and water distribution systems. Restoring basic services is critical and a top priority. Efforts to restore roadways include the costs of maintenance and damage assessment teams, field data collection, and replacement or repair costs. Direct impacts to municipal water supply may occur through contamination of ash and debris during the fire, destruction of aboveground distribution lines, and soil erosion or debris deposits into waterways after the fire. Utilities and communications repairs are also necessary for equipment damaged by a fire. This includes power lines, transformers, cell phone towers, and phone lines.
Environment	Wildfires cause damage to the natural environment, killing vegetation and animals. The risk of floods and debris flows increases after wildfires due to the exposure of bare ground and the loss of vegetation. In addition, the secondary effects of wildfires, including erosion, landslides, introduction of invasive species, and changes in water quality, are often more disastrous than the fire itself.

Category	Consequences
Economic Condition of the Jurisdiction	Wildfires can have significant short-term and long-term effects on the local economy. Wildfires, and extreme fire danger, may reduce recreation and tourism in and near the fires. If aesthetics are impaired, local property values can decline. Extensive fire damage to trees can significantly alter the timber supply, both through a short-term surplus from timber salvage and a longer-term decline while the trees regrow. Water supplies can be degraded by post-fire erosion and stream sedimentation.
Public Confidence in the Jurisdiction's Governance	Wildfire events may cause issues with public confidence because they have very visible impacts on the community. Public confidence in the jurisdiction's governance may be influenced by actions taken pre-disaster to mitigate and prepare for impacts, including the amount of public education provided; efforts to provide warning to residents; response actions; and speed and effectiveness of recovery.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes wildfire hazard risk by jurisdiction. Wildfire warning time and duration do not vary by jurisdiction. Spatial extent ratings were estimated based on the percentage of direct exposure within the WUI; jurisdictions with approximately 10% to 50% of direct exposure were assigned a spatial extent rating of 3. Impact ratings were based on fire intensity data from SWRA. Jurisdictions with significant clusters of moderate to high fire intensity were assigned a rating of 3; all other jurisdictions were assigned a rating of 2. Probability ratings were determined based on burn probability data from SWRA. Only the unincorporated areas of the county have any areas with moderate to high burn probability and was thus given a probability rating of 3. All other jurisdictions were assigned a probability of 2.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Key Colony Beach	2	2	3	4	3	2.5	M
Key West	2	2	3	4	3	2.5	M
Layton	2	2	3	4	3	2.5	M
Marathon	2	3	3	4	3	2.8	M
Islamorada	2	3	3	4	3	2.8	M
Unincorporated Monroe County	3	3	4	4	3	3.3	H

4.5.9 CYBER ATTACK

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Cyber Attack	Possible	Limited	Small	Less than 6 hrs	More than 1 week	2.4

HAZARD DESCRIPTION

The State of Florida Hazard Mitigation Plan defines a cyber incident as "an incident involving computers, networks, and information or services that affect daily operations of critical infrastructure," noting that a Cyber Incident can be either malicious or stem from a system glitch or human error. The SHMP defines a cyber attack, then, as a cyber incident with malicious intent.

Cyber-attacks use malicious code to alter computer operations or data. The vulnerability of computer systems to attacks is a growing concern as people and institutions become more dependent upon networked technologies. The Federal Bureau of Investigation (FBI) reports that "cyber intrusions are becoming more commonplace, more dangerous, and more sophisticated," with implications for private- and public-sector networks.

There are many types of cyber-attacks. Among the most common is a direct denial of service, or DDoS attack. This is when a server or website will be queried or pinged rapidly with information requests, overloading the system and causing it to crash.

Malware, or malicious software, can cause numerous problems once on a computer or network, from taking control of users' machines to discreetly sending out confidential information. Ransomware is a specific type of malware that blocks access to digital files and demands a payment to release them. Hospitals, school districts, state and local governments, law enforcement agencies, businesses, and even individuals can be targeted by ransomware.

Cyber spying or espionage is the act of illicitly obtaining intellectual property, government secrets, or other confidential digital information, and often is associated with attacks carried out by professional agents working on behalf of a foreign government or corporation. According to cybersecurity firm Symantec, in 2016 "…the world of cyber espionage experienced a notable shift towards more overt activity, designed to destabilize and disrupt targeted organizations and countries."

Major data breaches - when hackers gain access to large amounts of personal, sensitive, or confidential information - have become increasingly common. The Symantec report says more than seven billion identities have been exposed in data breaches over the last eight years. In addition to networked systems, data breaches can occur due to the mishandling of external drives, as has been the case with losses of some state employee data.

Cyber crime can refer to any of the above incidents when motivated primarily by financial gain or other criminal intent.

The most severe type of attack is cyber terrorism, which aims to disrupt or damage systems in order to cause fear, injury, and loss to advance a political agenda.

The State of Florida has several cyber security mechanisms. The Florida Computer Crime Center (FC3) conducts cyber investigations, training, research, and prevention, and developed the Florida Infrastructure Protection Center (FIPC). The FIPC was developed to anticipate, prevent, react to, and recover from acts of terrorism, sabotage, and cyber crim. One component of the FIPC is the Computer Incident Response Team (CIRT) which is on-call to respond to critical cyber incidents in Florida. The Agency for State Technology developed a Statewide Strategic Information Technology Security Plan to protect the

confidentiality, integrity, and availability of the state's IT resources. FDEM also has a Cyber Incident Plan.

Warning Time: 4 – Less than six hours

Duration: 4 – More than one week

LOCATION

Cyber disruption events can occur and/or impact virtually any location in the state where computing devices are used. Incidents may involve a single location or multiple geographic areas. A disruption can have far-reaching effects beyond the location of the targeted system; disruptions that occur far outside the County can still impact people, businesses, and institutions within the County.

Spatial Extent: 2 – Small

EXTENT

The extent or magnitude/severity of a cyber disruption event is variable depending on the nature of the event. A disruption affecting a small, isolated system could impact only a few functions/processes. Disruptions of large, integrated systems could impact many functions/processes, as well as many individuals that rely on those systems.

There is no universally accepted scale to quantify the severity of cyber-attacks. The strength of a DDoS attack is sometimes explained in terms of a data transmission rate. One of the largest DDoS disruptions ever, which brought down some of the internet's most popular sites on October 21, 2016, peaked at 1.2 terabytes per second.

Data breaches are often described in terms of the number of records or identities exposed.

The Florida State Hazard Mitigation Plan defines three levels of cyber-attacks:

Unstructured: attacks with little to no organization and no significant funding. Such attacks are usually carried out by amateurs using pre-made tools to attack well known system flaws. These attacks are most common, but are also easily spotted by network security

Structured: attacks with more organization and planning and decent financial backing. These attacks have specific targets and intend to disrupt operations to a specific organization or sector. The impacts might range from minimal to significant.

Highly Structured: attacks involve extensive organization, planning, and funding. Attackers conduct reconnaissance and use multiple attacks to achieve their goals.

Impact: 2 – Limited

HISTORICAL OCCURRENCES

The Privacy Rights Clearinghouse, a nonprofit organization based in San Diego, maintains an estimated timeline of 17,552 unique data breaches, of which at least 7,130 were acts of computer hacking, in the United States from 2005-2023. The database lists 700 total data breaches, including 330 hacking events in Florida, totaling over 19.6 million records breached since 2005. Similarly, some residents in the region were likely affected by national and international data breaches. Media reports indicate an uptick in cyber-attacks across the state.

SecuLore also provides its own database of Cyber Attacks across the country via local media outlets, broken down by state and infrastructure affected. Based on local media outlets, Monroe County has seen the following four attacks:

September 2018 (Education): The Monroe County School District was forced to shut down its computer system for almost a week due to a cyber attack. The incident was first noticed by an employee who contacted the IT department. The event was eventually escalated to the District's internet security provider who advised securing and shutting down the entire system. The culprit was a ransomware called "GandCrab." No data was threatened and no demands for ransom were actually made, as the district had appropriately backed up its data. In order to reopen the system, the District had to rebuild each server individually. The system was first up and running again after three days, but had to be shut down only an hour later. It was then slowly restarted, but was delayed due to a cable and internet outage.

May through November 2018 (Education): The Florida Keys Community College (FKCC) reported of suspicious activity, potentially phishing, on an employee's email account. An investigation into this suspicious activity revealed an unknown individual had access certain college employees' email accounts. The press release noted that some combination of name, address, date of birth, social security number, passport information, medical information, usernames, and passwords may have been accessible to the hackers. In response, the college notified potentially impacted employees and individuals, and offered those individuals 12 months of free identity protection services. FKCC also implemented increased security measures for account access such as multi-factor authentication.

March 2020 (Local Government): Beginning in March of 2020, a software attack crippled the City of Marathon's communication system, including email, internet, and broadcast capabilities. The system was ransomed, and the attack and subsequent recovery took over 4 months. The City had to update and de-encrypt most computers. Costs associated include insurance policies, specialist and IT assistance, and time costs of systems being down.

August through September 2020 (Local Government): For the two weeks between August 28th through September 16th, 2020, the computers in the Key West City Hall were inaccessible due to a suspected virus. These impacts also impacted the Key West Police Department. The networks at City Hall were shutdown voluntarily when the virus was initially discovered to allow IT workers to identify the problem and rebuild the servers. During this week, police officers were writing police reports on paper – with a backlog to be uploaded when the servers returned. Additionally, any requests for existing reports were difficult to fulfil because the reports would have to physically be located in the building. Community members could still pay parking tickets and apply for building permits, but this could not be done online and had to be done by mail or in person.

PROBABILITY OF FUTURE OCCURRENCE

Cyber attacks occur daily, but most have negligible impacts at the local or county level. The possibility of a larger disruption affecting systems within the county is a constant threat, but it is difficult to quantify the exact probability due to such highly variable factors as the type of attack and intent of the attacker. Minor attacks against business and government systems have become a commonplace occurrence but are usually stopped with minimal impact. Similarly, data breaches impacting the information of residents of Monroe County are almost certain to happen in coming years. Major attacks or breaches specifically targeting systems in the county are less likely but cannot be ruled out.

Probability: 2 – Possible

VULNERABILITY ASSESSMENT

As discussed above, the impacts from a cyber attack vary greatly depending on the nature, severity, and success of the attack.

METHODOLOGIES AND ASSUMPTIONS

Vulnerability to cyber attacks was assessed based on past occurrences nationally and internationally as well as publicly available information on these vulnerabilities, as well as attacks occurring in the region.

PEOPLE

Cyber-attacks can have a significant cumulative economic impact. According to the most recent Internet Crime Report run by the Federal Bureau of Investigation, the State of Florida experienced a loss of over $874 million during the year 2023. A major cyber-attack has the potential to undermine public confidence and build doubt in their government's ability to protect them from harm.

Injuries or fatalities from cyber-attacks would generally only be possible from a major cyber terrorist attack against critical infrastructure.

PROPERTY

Short of a major cyber terrorist attacks against critical infrastructure, property damage from cyber attacks is typically limited to computer systems.

ENVIRONMENT

A major cyber terrorism attack could potentially impact the environment by triggering a release of a hazardous materials, or by causing an accident involving hazardous materials by disrupting traffic-control devices.

CONSEQUENCE ANALYSIS

Table 4.69 summarizes the potential consequences of a cyber threat.

Table 4.69 – Consequence Analysis – Cyber Threat

Category	Consequences
Public	Cyber attacks can impact personal data and accounts. Injuries or fatalities could potentially result from a major cyber terrorist attacks against critical infrastructure.
Responders	Cyber attacks can impact personal data and accounts. Injuries or fatalities could potentially result from a major cyber terrorist attacks against critical infrastructure.
Continuity of Operations (including Continued Delivery of Services)	Agencies that rely on electronic backup of critical files are vulnerable. The delivery of services can be impacted since governments rely, to a great extent, upon electronic delivery of services.
Property, Facilities and Infrastructure	Rare. Most attacks affect only data and computer systems. Sabotage of utilities and infrastructure from a major cyber terrorist attacks could potentially result in system failures that damage property on a scale equal with natural disasters. Facilities and infrastructure may become unusable as a result of a cyber-attack.
Environment	Rare. A major attack could theoretically result in a hazardous materials release.

Category	Consequences
Economic Condition of the Jurisdiction	Could greatly affect the economy. In an electronic-based commerce society, any disruption to daily activities can have disastrous impacts to the economy. It is difficult to measure the true extent of the impact.
Public Confidence in the Jurisdiction's Governance	The government's inability to protect critical systems or confidential personal data could impact public confidence. An attack could raise questions regarding the security of using electronic systems for government services.

CHANGES IN DEVELOPMENT

Increased development will not necessarily lead to increased incidents of cyberattack. Cyberattacks generally impact critical systems rather than the built environment. However, as we become more reliant on technology and IoT (the internet of things) any connected infrastructure would be at risk. Additionally, increases in population puts more records at risk in the event of a cyberattack.

PROBLEM STATEMENT

Cyber attacks frequently result from phishing scams. Training on cyber security can serve as a prevention method.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes cyber attack disruption risk by jurisdiction. Risk is not expected to change substantially between jurisdictions.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
All Jurisdictions	2	2	2	4	4	2.4	M

4.5.10 RADIOLOGICAL INCIDENT

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Radiological Incident	Unlikely	Critical	Moderate	Less than 6 hrs	More than 1 week	2.6

HAZARD DESCRIPTION

A radiological incident is an occurrence resulting in the release of radiological material at a fixed facility (such as power plants, hospitals, laboratories, etc.) or in transit.

Radiological incidents related to transportation are described as an incident resulting in a release of radioactive material during transportation. Transportation of radioactive materials through Florida over the interstate highway system is considered a radiological hazard. The transportation of radioactive material by any means of transport is licensed and regulated by the federal government. As a rule, there are two categories of radioactive materials that are shipped over the interstate highways:

- Low level waste consists primarily of materials that have been contaminated by low level radioactive substances but pose no serious threat except through long-term exposure. These materials are shipped in sealed drums within placarded trailers. The danger to the public is no more than a wide array of other hazardous materials.
- High level waste, usually in the form of spent fuel from nuclear power plants, is transported in specially constructed casks that are built to withstand a direct hit from a locomotive.

Radiological emergencies at nuclear power plants are divided into classifications. Table 4.70 shows these classifications, as well as descriptions of each.

Table 4.70 – Radiological Emergency Classifications

Emergency Classification	Description
Notification of Unusual Event (NOUE)	Events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.
Alert	Events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life-threatening risk to site personnel or damage to site equipment because of hostile action. Any releases are expected to be limited to small fractions of the Environmental Protection Agency (EPA) Protective Action Guides (PAGs)
Site Area Emergency (SAE)	Events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or hostile action that results in intentional damage or malicious acts; 1) toward site personnel or equipment that could lead to the likely failure of or; 2) that prevent effective access to, equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA PAG exposure levels beyond the site boundary.

Emergency Classification	Description
General Emergency	Events are in progress or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity or hostile action that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA PAG exposure levels offsite for more than the immediate site area.

Warning Time: 4 – Less than 6 hours

Duration: 4 – More than one week

LOCATION

Turkey Point Nuclear Generating Station, located in the south of Miami-Dade County and northeast of the planning area, is a twin reactor nuclear power station. It has three currently operating units including two 802-megawatt units (units 3 and 4) and one 1,150-megawatt unit (unit 5). There are two retired 404-megawatt units (units 1 and 2) still on-site. Commercial operation began in 1967 and the most recent unit was completed in 2007. Units 3 and 4 are pressurized water reactors and unit 5 is a combined-cycle gas-fired unit. As the sixth largest power plant in the United States and third largest in Florida, it serves all of southern Florida. The plant is operated with a very high level of security. This is the location from which the most catastrophic nuclear accident might occur and will be the focal point of the nuclear analysis in this plan. In December of 2019, units 3 and 4 at Turkey Point Nuclear Generating Station was granted the world's first 80-year operating license.

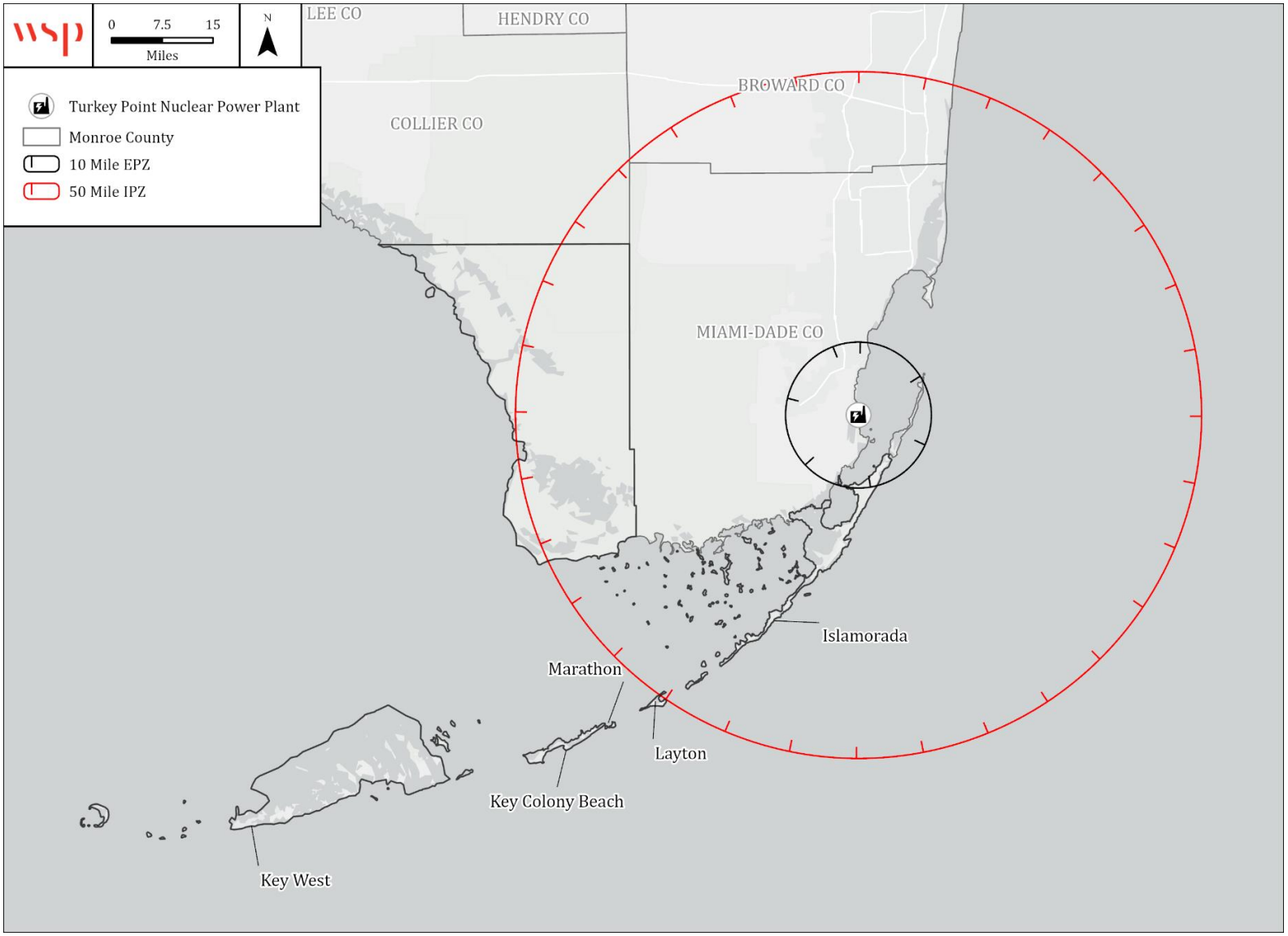
The Nuclear Regulatory Commission defines two emergency planning zones around nuclear plants:

- **Emergency Planning Zone (EPZ)** – The EPZ is a 10-mile radius around nuclear facilities. It is also known as the Plume Exposure Pathway. Areas located within this zone are at highest risk of exposure to or inhalation of radioactive materials. Within this zone, the primary concern is exposure to and inhalation of radioactive contamination. Predetermined action plans within the EPZ are designed to avoid or reduce dose from such exposure. This is the designated evacuation radius recommended by the Nuclear Regulatory Commission and residents within this zone would be expected to evacuate in the event of an emergency. Other actions such as sheltering and the use of potassium-iodide must be taken to avoid or reduce exposure in the event of a nuclear incident.
- **Ingestion Pathway Zone (IPZ)** – The IPZ is delineated by a 50-mile radius around nuclear facilities as defined by the federal government. Also known as the Ingestion Exposure Pathway, the IPZ has been designated to mitigate contamination in the human food chain resulting from a radiological accident at a nuclear power facility. Contamination to fresh produce, water supplies, and other food produce may occur when radionuclides are deposited on surfaces.

Figure 4.38 shows the location of Turkey Point Nuclear Generating Station and the approximate 10-mile Emergency Planning Zone (EPZ) buffer and 50-mile Ingestion Pathway Zone (IPZ) around the plant. The northeastern-most tip of the Florida Keys, just north of Key Largo, falls within the 10-mile EPZ. Much of mainland Monroe and the Keys north of Islamorada fall within the IPZ.

Spatial Extent: 3 – Moderate

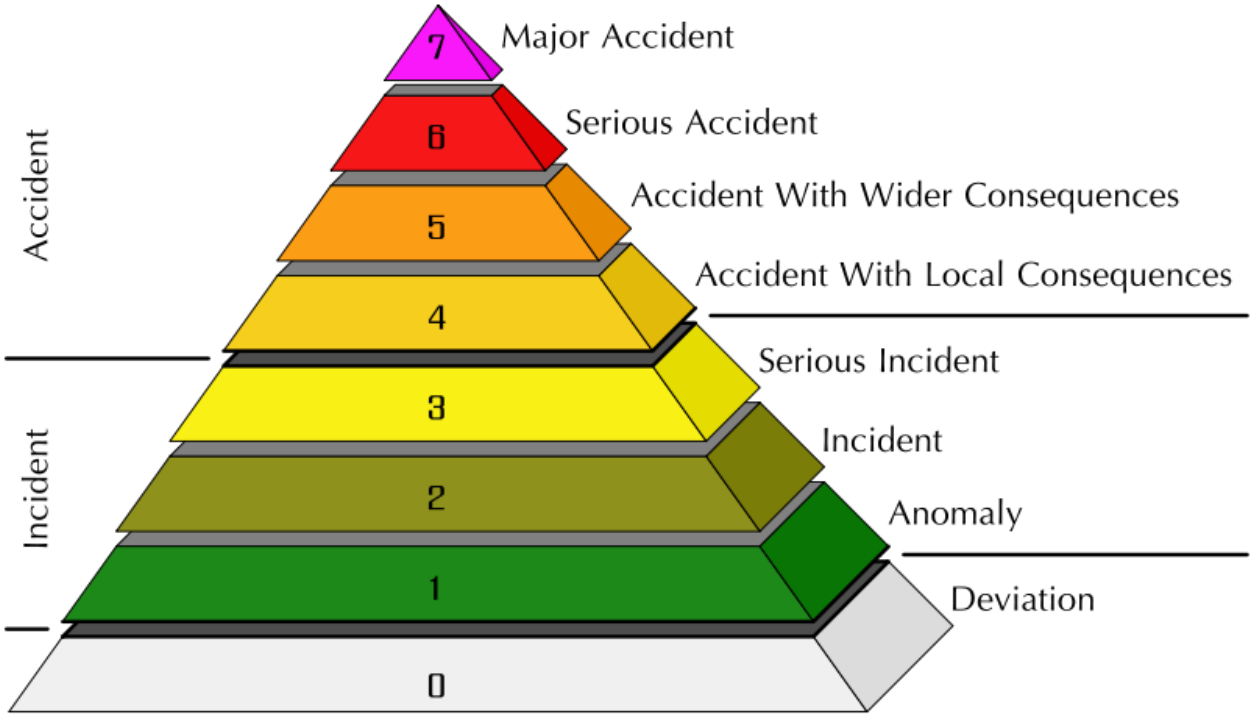
Figure 4.38 – Turkey Point Nuclear Generating Station Location in Relation to Planning Area



Source: U.S. Energy Information Administration

EXTENT

The International Atomic Energy Association (IAEA) developed the International Nuclear and Radiological Event Scale to quantify the magnitude of radiological events. This scale is logarithmic, meaning each increasing level represents a 10-fold increase in severity compared to the previous level.



Source: International Atomic Energy Association

Impact: 3 – Critical

HISTORICAL OCCURRENCES

May 8, 1974 – During a routine test, it was discovered that two of the three Emergency Feedwater pumps which served unit 3 failed due to overtightened packing. The third pump also failed but was caused by a malfunction in the turbine. These failures, had they not been found and corrected, could have led to a nuclear disaster if other failures had occurred simultaneously.

August 24, 1992 – Category 5 Hurricane Andrew hit Turkey Point causing damage to many systems. The fire protection systems were partly disabled, two raw water tanks were destroyed, a third was drained, and the smokestack on unit 1 cracked. Offsite power was lost so onsite generators had to be operated for numerous days.

February 26, 2008 – The loss of offsite power prompted both reactors to shut down which lead to a widespread power outage affecting 700,000 customers and a total of 2.5 million people. The originating event was an overheated voltage switch that caught fire in a substation 23 miles away from Turkey Point. Power was restored within 5 hours of the blackout. Large commercial locations such as Walt Disney World, Orlando International Airport, and Miami International Airport were affected.

March 18, 2017 – An electrical fault happened in unit 3 causing the loss of a safety system and a reactor trip. This fault caused an arc flash which minorly burned one plant worker. All other safety systems were operational so there was no threat to the community or environment.

August 17-20, 2020 – Turkey Point experienced three unplanned nuclear reactor shutdowns. On August 17th, plant operators manually shut down the reactor as a response to rising steam generator water levels. On August 19th, an instrument sensed higher-than-expected neutron activity in the reactor core, causing the plant's protection system to automatically shut down the reactor during startup. On August 20th, a reactor was once again manually shut down after the loss of a steam generator feed water pump. These three shutdowns in a short time frame prompted a Nuclear Regulatory Commission (NRC) inspection.

PROBABILITY OF FUTURE OCCURRENCE

Radiological hazards are highly unpredictable. Nuclear reactors present the possibility of catastrophic damages, yet the industry is highly regulated and historical precedence suggests an incident is unlikely.

Probability: 1 – Unlikely

CLIMATE CHANGE

While climate change is not projected to have any direct impact on a potential nuclear power plant incident, the low-lying coastal location of the Turkey Point Nuclear Generating Station in Miami-Dade County means this plant is particularly susceptible to the impacts of sea level rise and increased storm surge. The plant won federal approval to continue operating through at least 2053. By the end of the plant's current license, Miami-Dade is planning for just under 2 feet of SLR while Turkey Point is planning for 0.5 to just over 1 foot of Sea Level Rise. The threat of increasing incidences of flood and higher storm surges could increase the likelihood of an event at Turkey Point.

VULNERABILITY ASSESSMENT

PEOPLE

People within the 10-mile EPZ are at risk of direct exposure to radioactive material. People within the 50-mile EPZ are at risk of exposure through ingestion of contaminated food and water. Low levels of radiation are not considered harmful, but a high exposure to radiation can cause serious illness or death.

Beyond those in the EPZ and IPZ, the entirety of Monroe County is potentially at risk because of operations at the Turkey Point Nuclear Generating Station. Turkey Point relies on a one-of-its-kind 5,900-acre cooling canal system – rather than the more commonly used cooling towers. Millions of gallons of saltwater have seeped from these canals into the Biscayne aquifer beneath the canals; an underground saltwater plume has spread more than 10.6 miles inland. As the majority of Monroe County's drinking water is supplied by the Biscayne Aquifer, continued, unresolved saltwater intrusion threatens the health of all residents.

PROPERTY

A radiological incident could cause severe damage to the power station itself but would not cause direct property damage outside the station, especially with the distance between the reactor and the planning area. However, property values could drop substantially if a radiological incident resulted in contamination of nearby areas.

ENVIRONMENT

A radiological incident could result in the spread of radioactive material into the environment, which could contaminate water and food sources and harm animal and plant life. These impacts are lessened the further an area is to the plant site.

CONSEQUENCE ANALYSIS

Table 4.71 summarizes the potential detrimental consequences of radiological incident.

Table 4.71 – Consequence Analysis – Radiological Incident

Category	Consequences
Public	High levels of radiation could cause serious illness or death. Those living and working closest to the nuclear plant would face the greatest risk of exposure.
Responders	Responders face potential for heightened exposure to radiation, which could cause severe chronic illness and death.
Continuity of Operations (including Continued Delivery of Services)	An incident at the nuclear plant could interrupt power generation and cause power shortages. Regular operations would likely be affected by the response effort an event would require.
Property, Facilities and Infrastructure	The plant itself could be damaged by a radiological incident. Nearby property and facilities could be affected by contamination.
Environment	Water supplies, food crops, and livestock within 50 miles of the nuclear plant could be contaminated by radioactive material in the event of a major incident.
Economic Condition of the Jurisdiction	The local economy could be affected if a radiological incident caused contamination of nearby areas. Property values and economic activity could decline as a result.
Public Confidence in the Jurisdiction's Governance	A radiological incident would likely cause severe loss of public confidence given that the hazard is human-caused and highly regulated. Public confidence can also be affected by false alarms.

ASSOCIATED HAZARDS

Natural hazards are often interconnected. Any given hazard may lead to, or be spurred by, another hazard – sometimes referred to as cascading disasters. Radiological Incidents, although not natural, may be associated with certain natural hazards, including flood, tropical cyclone, tornado, and sea level rise.

PROBLEM STATEMENT

Northeastern Monroe County is most at risk to the impacts of a radiological incident at the Turkey Point Nuclear Facility. An effective education and outreach program about the impacts of radiation within the EPZ would help reduce vulnerability to those living within this zone.

The Village of Islamorada and areas north in Unincorporated Monroe County are within the Ingestion Pathway Zone, meaning food grown in this area or water will be impacted in the event of a nuclear emergency. Community members here are only at risk if they ingest impacted food/drinks and should be educated as such.

The continued utilization of cooling canals at Turkey Point threatens further saltwater intrusion into the Biscayne Aquifer and in turn threatens the predominant drinking water source for the entire county.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes radiological incident risk by jurisdiction. Risk is not expected to change substantially between jurisdictions, however jurisdictions overlapping with the Ingestion Pathway Zone were given an impact rating of critical.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Islamorada	1	3	3	4	4	2.6	M
Key Colony Beach	1	2	3	4	4	2.3	M
Key West	1	2	3	4	4	2.3	M
Layton	1	2	3	4	4	2.3	M
Marathon	1	2	3	4	4	2.3	M
Unincorporated Monroe County	1	3	3	4	4	2.6	M

4.6 CONCLUSIONS ON HAZARD RISK

PRIORITY RISK INDEX

As discussed in Section 4.2, the Priority Risk Index was used to rate each hazard on a set of risk criteria and determine an overall standardized score for each hazard. The conclusions drawn from this process are summarized below.

Table 4.72 summarizes the degree of risk assigned to each identified hazard using the PRI method.

Table 4.72 – Summary of PRI Results

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Natural Hazards						
Coastal Erosion	Likely	Limited	Moderate	More than 24 hrs	Less than 1 week	2.5
Drought	Likely	Minor	Large	More than 24 hrs	More than 1 week	2.5
Extreme Heat	Likely	Limited	Large	More than 24 hrs	Less than 1 week	2.7
Flood	Highly Likely	Critical	Large	6 to 12 hours	Less than 1 week	3.5
Sea Level Rise	Highly Likely	Critical	Large	More than 24 hrs	More than 1 week	3.1
Severe Storms and Tornadoes[1] (Thunderstorm Wind)	Highly Likely	Limited	Large	Less than 6 hrs	Less than 6 hrs	2.6
Severe Storms[1] (Lightning & Hail)	Highly Likely	Minor	Negligible	Less than 6 hrs	Less than 6 hrs	2.2
Severe Storms[1] (Tornadoes	Likely	Limited	Small	Less than 6 hrs	Less than 6 hrs	2.4
Tropical Cyclones	Highly Likely	Catastrophic	Large	More than 24 hrs	Less than 1 week	3.6
Wildfire	Likely	Limited	Small	Less than 6 hrs	Less than 1 week	2.6
Technological and Human-Caused Hazards & Threats						
Cyber Attack	Possible	Limited	Small	Less than 6 hrs	More than 1 week	2.4
Radiological Incident	Unlikely	Critical	Moderate	Less than 6 hours	More than 1 week	2.6

[1]Severe Storms hazards average to a score of 2.4 and are therefore considered together as a moderate-risk hazard.

The results from the PRI have been classified into three categories based on the assigned risk value which are summarized in Table 4.73:

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.

Moderate 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.

Low Risk – Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal. This is not a priority hazard.

Table 4.73 – Summary of Hazard Risk Classification

High Risk (≥ 3.0)	Flood Sea Level Rise Tropical Cyclones
Moderate Risk (2.0 – 2.9)	Coastal Erosion Drought Extreme Heat Severe Storms & Tornado (Thunderstorm, Lightning, Hail) Wildfire Cyber Attack Radiologic Incident
Low Risk (< 2.0)	*none*

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5 CAPABILITY ASSESSMENT

This section discusses the capability of Monroe County to implement hazard mitigation activities. It consists of the following four subsections:

5.1 Overview
5.2 Conducting the Capability Assessment
5.3 Capability Assessment Findings
5.4 Conclusions on Local Capability

5.1 OVERVIEW

The purpose of conducting a capability assessment is to determine the ability of a local jurisdiction to implement a comprehensive mitigation strategy, and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs, or projects. As in any planning process, it is important to try to establish which goals, objectives, and actions are feasible, based on an understanding of the organizational capacity of those agencies or departments tasked with their implementation. A capability assessment helps to determine which mitigation actions are practical and likely to be implemented over time given a local government's planning and regulatory framework, level of administrative and technical support, fiscal resources, and current political climate.

A capability assessment has two primary components: 1) an inventory of a local jurisdiction's relevant plans, ordinances, and programs already in place; and 2) an analysis of its capacity to carry them out. Careful examination of local capabilities will detect any existing gaps, shortfalls, or weaknesses with ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. The capability assessment also highlights the positive mitigation measures already in place or being implemented at the local government level, which should continue to be supported and enhanced through future mitigation efforts.

The capability assessment completed for Monroe County serves as a critical planning step toward developing an effective mitigation strategy. Coupled with the risk assessment, the capability assessment helps identify and target effective goals, objectives, and mitigation actions that are realistically achievable under given local conditions.

5.2 CONDUCTING THE CAPABILITY ASSESSMENT

To facilitate the inventory and analysis of local government capabilities within the planning area, individual meetings were held with LMSWG members from each jurisdiction to review a variety of "capability indicators" such as existing local plans, policies, programs, or ordinances that contribute to and/or hinder the jurisdiction's ability to implement hazard mitigation actions. Other indicators included information related to fiscal, administrative, and technical capabilities, such as access to local budgetary and personnel resources for mitigation purposes, and existing education and outreach programs that can be used to promote mitigation.

In addition to requesting LMSWG input, the planning team re-examined data from the 2020 plan and conducted a review of plans, policies, and ordinances in order to identify changes in capability over the past five years. The previous plan's capability assessment was developed using feedback from the LMSWG through a detailed Local Capability Self-Assessment worksheet.

At a minimum, the capability assessment findings provide an extensive and consolidated inventory of existing local plans, ordinances, programs, and resources in place or under development. With this information, inferences can be made about the overall effect on hazard loss reduction in each community.

5.3 CAPABILITY ASSESSMENT FINDINGS

The findings of the capability assessment are summarized in this plan to provide insight into the relevant capacity of Monroe County to implement hazard mitigation activities. All information is based upon the input provided by local government officials and subsequent updates by the planning team and the LMSWG.

5.3.1 PLANNING AND REGULATORY CAPABILITY

Planning and regulatory capability is based on the implementation of plans, ordinances, and programs that demonstrate a local jurisdiction's commitment to guiding and managing growth, development, and redevelopment in a responsible manner, while maintaining the general welfare of the community. It includes emergency response and mitigation planning, comprehensive land use planning, and transportation planning. Regulatory capability also includes the enforcement of zoning or subdivision ordinances and building codes that regulate how land is developed and structures are built, as well as protecting environmental, historic, and cultural resources in the community. Although some conflicts can arise, these planning initiatives generally present significant opportunities to integrate hazard mitigation principles and practices into the local decision-making process.

Table 5.1 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for Monroe County. A checkmark (✓) indicates that the given item is currently in place and being implemented. A plus sign (+) indicates that a jurisdiction is covered for that item under a county-implemented version. An asterisk (*) indicates that a jurisdiction is developing an item. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the Local Mitigation Strategy. This information will help identify opportunities to address gaps, weaknesses, or conflicts with other initiatives and integrate the implementation of this plan with existing planning mechanisms where appropriate.

Table 5.1 – Relevant Plans, Ordinances, and Programs

Jurisdiction	Hazard Mitigation Plan	Comprehensive Land Use Plan	Floodplain Management Plan	Open Space Management Plan	Stormwater Management Plan	Emergency Operations Plan	SARA Title III Plan	Radiological Emergency Plan	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Transportation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Site Plan Review Requirements	Unified Development Ordinance	Post-Disaster Redevelopment Ordinance	Building Code	Fire Code	Community Wildfire Protection Plan	National Flood Insurance Program	Community Rating System
Monroe County	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓			✓	✓		✓	✓
City of Key Colony Beach	✓	✓	✓		✓	+		+	+	+		✓				✓	✓	✓	✓			✓	✓		✓	✓
City of Key West	✓	✓	✓		✓	+		+	+	+	✓	✓			✓	✓	✓	✓	✓			✓	✓		✓	✓
City of Layton	✓	✓	✓		✓	+		+	+	+		✓				✓	✓	✓	✓			✓	✓		✓	✓
City of Marathon	✓	✓	✓	*	✓	+		+	+	+		✓	*	✓		✓	✓	✓	✓			✓	✓		✓	✓
Islamorada Village of Islands	✓	✓	✓		*	+		+	+	+		✓				✓	✓	✓	✓			✓	✓		✓	✓

A more detailed discussion on planning and regulatory capability follows, along with the incorporation of additional information based on the narrative comments provided by LMSWG members and local staff in response to the self-assessment and subsequent discussions.

5.3.1.1 EMERGENCY MANAGEMENT

Hazard mitigation is widely recognized as one of the four primary phases of emergency management, as is shown in Figure 5.1. In reality, mitigation is interconnected with all other phases and is an essential component of effective preparedness, response, and recovery. Opportunities to reduce potential losses through mitigation practices are most often implemented before a disaster event, such as through the elevation of flood-prone structures or by regular enforcement of policies that regulate development. However, mitigation opportunities can also be identified during immediate preparedness or response activities, such as installing storm shutters in advance of a hurricane. Furthermore, incorporating mitigation during the long-term recovery and redevelopment process following a disaster event is what enables a community to become more resilient over time.

Figure 5.1 – The Four Phases of Emergency Management

Planning for each phase is a critical part of a comprehensive emergency management program and a key to the successful implementation of hazard mitigation actions.

HAZARD MITIGATION PLAN

A hazard mitigation plan, or local mitigation strategy, is a community's blueprint for how it intends to reduce the impact of natural and human-caused hazards on people and the built environment. The essential elements of a hazard mitigation plan include a risk assessment, capability assessment, and mitigation strategy.

- All participating jurisdictions in this multi-jurisdictional planning effort participated in and adopted the 2020 Monroe County Local Mitigation Strategy.
- Key West and Layton/Key Colony Beach are currently (as of Spring 2025) developing vulnerability assessments and adaptation plans, which should be completed by the end of 2025. Key West's plan will culminate in a community-prioritized 10-year Adaptation Plan that identifies projects, budgets, and grants necessary to prepare the city and its residents for future climate hazards.
- Islamorada and Marathon developed vulnerability assessments in 2024.

- Monroe County and Islamorada, Layton, Key Colony Beach and Marathon are developing a combined vulnerability assessment beginning in 2025.

DISASTER RECOVERY PLAN

A disaster recovery plan serves to guide the physical, social, environmental, and economic recovery and reconstruction process following a disaster event. In many instances, hazard mitigation principles and practices are incorporated into local disaster recovery plans with the intent of capitalizing on opportunities to break the cycle of repetitive disaster losses. Disaster recovery plans can also lead to the preparation of disaster redevelopment policies and ordinances to be enacted following a hazard event.

Monroe County's 2009 Recovery Plan outlines the following policies and procedures for post-disaster mitigation:

1. Assign a Hazard Mitigation Coordinator to lead the effort and provide overall coordination of the post–disaster mitigation planning process and grant proposal development.
    a. Ensure this person has the authority to cross departmental lines and ensure interdepartmental participation.
2. Review the County's Pre–Disaster Mitigation Plan; Determine updates and changes needed.
3. Participate on an Interagency Hazard Mitigation Committee (IHMC), made up of federal, state and local representatives who will prepare a report that serves as the basis for the hazard mitigation plan.
    a. The IHMC identifies opportunities for reducing or eliminating the long–term hazard risk to people and property. The IHMC report normally includes an analysis of the disaster incident, a historical perspective regarding disasters in the impacted area, and recommendations to bring various governmental agencies together to reduce the potential for future losses.
4. Coordinate with RF # 13 (Redevelopment (Planning and Community Development)) to ensure the Post–Disaster Mitigation Plan and strategies are linked with land use plans, subdivision regulations, building codes, storm water management plans, the capital improvement plan, and other components of the County's Comprehensive Plan.
5. Identify and apply for federal and state post–disaster mitigation programs and funds.
6. Update the County's Hazard Mitigation Plan.

In January 2020, Monroe County released its Post-Disaster Recovery Strategy, which serves as an operational framework intended to help Monroe County navigate resources that are available for long-term recovery, after FEMA Individual Assistance and Public Assistance are exhausted. Stakeholders from each of Monroe County's jurisdictions were included in the creation of the plan. The plan outlines long-term recovery procedures for various county functions. Long-term community recovery planning procedures that support post-disaster mitigation are listed below:

Landfall to 3 months:

- Work closely with Monroe County Emergency Management to understand data related to the FEMA Individual Assistance Program. Specifically, document the number of applicants, the amount of assistance provided to-date and the number of individuals denied assistance. It is also important to understand the number of households who are provided temporary sheltering assistance support through FEMA trailers, hotel lodging or other resources.
- Review existing plans and ordinances to determine if adjustments need to be made to streamline recovery or address a specific need resulting from the disaster.

3 to 6 months:

- Coordinate with the Housing Recovery Team to conduct a survey of long-term housing repair needs that considers the appetite of homeowners for mitigation programs as well as voluntary buyout programs.

6 months to 1 year:

- Coordinate the Housing Recovery Team to understand impacts on homeowners and renters and the need for new workforce housing to support long-term recovery.
- Coordinate with the Economic Recovery Team to conduct a survey of local long-term business recovery needs (the survey conducted following Hurricane Irma is a great example).
- Coordinate with the Infrastructure Recovery Team to understand infrastructure impacts and specific projects that will not be covered by the FEMA Public Assistance or the FEMA Hazard Mitigation Grant Program.
- Coordinate with the Finance and Administration Teams to understand the long-term fiscal impacts the County and any additional support that may be needed to ensure a successful recovery. This can include financial assistance to support local tax revenue shortfalls or new positions that are needed to support long-term recovery and redevelopment.
- Coordinate with the Finance and Administration to understand impacts to cultural and historic resources and any gaps in funding that may exist to ensure that these resources are restored.
- Coordinate with the Environmental Restoration Team to understand impacts on the environment, including marine debris, fisheries, and other environmental concerns/impacts.
- Coordinate with municipalities to understand how the disaster impacted their community and specific projects not covered by current resources, needed to support this recovery.
- Conduct forums or listening sessions to get public feedback on important elements to preserve in the community and potential strategies to build-back in a way that may move the community in a more resilient direction in the future.

1 to 2 years:

- Ensure that the collection of unmet needs and action plan development processes are transparent by posting relevant information to a central website for recovery and offering opportunities in-person and online for community members to ask questions and offer feedback on projects.
- Work closely with the Public Information Officer to ensure that all opportunities to provide feedback are broadly disseminated through all advertising venues including social media, press releases, etc.
- Work with schools and non-profit agencies to develop creative ways to involve students and the art community in soliciting feedback on redevelopment.
- Develop a long-term recovery plan that builds on the information collected to date and outlines clear actions that are needed, with funding sources aligned to guide recovery and long-term redevelopment.
- As resources are available to support long-term recovery, coordinate closely with municipalities and other eligible stakeholders to ensure that the opportunities are seized.

2+ years:

- Continue close coordination with all stakeholders as funding continues to roll out and provide webinars, meetings, newsletters and other media to get the word out about grant opportunities and facilitate a forum for communication.

Key West has its own post-disaster redevelopment plan.

EMERGENCY OPERATIONS PLAN

An emergency operations plan outlines responsibilities and how resources will be deployed during and following an emergency or disaster.

- All participating jurisdictions are covered under the Monroe County Emergency Management Comprehensive Plan, which was passed in 2022.

CONTINUITY OF OPERATIONS PLAN

A continuity of operations plan establishes a chain of command, line of succession, and plans for backup or alternate emergency facilities in case of an extreme emergency or disaster event.

- All participating jurisdictions are covered under the Monroe County Continuity of Operations Plan.

5.3.1.2 GENERAL PLANNING

The implementation of hazard mitigation activities involves agencies and individuals beyond the emergency management profession. Stakeholders may include local planners, public works officials, economic development specialists, and others. In many instances, concurrent local planning efforts will help to achieve or complement hazard mitigation goals.

COMPREHENSIVE/LAND USE PLAN

A comprehensive or land use plan establishes the overall vision for what a community wants to be and serves as a guide for future governmental decision making. Typically, a comprehensive plan contains sections on demographic conditions, land use, transportation elements, and community facilities. Given the broad nature of the plan and its regulatory standing in many communities, the integration of hazard mitigation measures into the comprehensive plan can enhance the likelihood of achieving risk reduction goals, objectives, and actions.

- All participating jurisdictions have a comprehensive plan.
- Key Colony Beach and Islamorada are currently updating their comprehensive plans.

CAPITAL IMPROVEMENTS PLAN

A capital improvements plan guides the scheduling of spending on public improvements. A capital improvements plan can serve as an important mechanism for guiding future development away from identified hazard areas. Limiting public spending in hazardous areas is one of the most effective long-term mitigation actions available to local governments.

- All participating jurisdictions have a capital improvements plan in place.

HISTORIC PRESERVATION PLAN

A historic preservation plan is intended to preserve historic structures or districts within a community. An often-overlooked aspect of the historic preservation plan is the assessment of buildings and sites located in areas subject to natural hazards, and the identification of ways to reduce future damages. This may involve retrofitting or relocation techniques that account for the need to protect buildings that do not meet current building standards or are within a historic district that cannot easily be relocated out of harm's way.

- 1 of the 6 participating jurisdictions have a historic preservation plan in place or under development.

ZONING ORDINANCE

Zoning represents the primary means by which land use is controlled by local governments. As part of a community's police power, zoning is used to protect the public health, safety, and welfare of those in a

given jurisdiction that maintains zoning authority. A zoning ordinance is the mechanism through which zoning is typically implemented. Since zoning regulations enable municipal governments to limit the type and density of development, a zoning ordinance can serve as a powerful tool when applied in identified hazard areas.

– All participating jurisdictions have a zoning ordinance in place and enforce zoning regulations.

SUBDIVISION ORDINANCE

A subdivision ordinance is intended to regulate the development of residential, commercial, industrial, or other uses, including associated public infrastructure, as land is subdivided into buildable lots for sale or future development. Subdivision design that accounts for natural hazards can dramatically reduce the exposure of future development.

– All participating jurisdictions have a subdivision ordinance in place and enforce subdivision regulations.

BUILDING CODES, PERMITTING, AND INSPECTIONS

Building codes regulate construction standards. In many communities, permits and inspections are required for new construction. Decisions regarding the adoption of building codes (that account for hazard risk), the type of permitting process required both before and after a disaster, and the enforcement of inspection protocols all affect the level of hazard risk faced by a community.

– All participating jurisdictions have building codes in place and enforce building code requirements.

The adoption and enforcement of building codes by local jurisdictions is routinely assessed through the Building Code Effectiveness Grading Schedule (BCEGS) program, developed by the Insurance Services Office, Inc. (ISO). The results of BCEGS assessments are routinely provided to ISO's member private insurance companies, which in turn may offer ratings credits for new buildings constructed in communities with strong BCEGS classifications. The expectation is that communities with well-enforced, up-to-date codes should experience fewer disaster-related losses, and as a result should have lower insurance rates.

In conducting the assessment, ISO collects information related to personnel qualification and continuing education, as well as number of inspections performed per day. This type of information combined with local building codes is used to determine a grade for that jurisdiction. The grades range from 1 to 10, with a BCEGS grade of 1 representing exemplary commitment to building code enforcement, and a grade of 10 indicating less than minimum recognized protection.

5.3.1.3 FLOODPLAIN MANAGEMENT

Flooding represents the greatest natural hazard facing the nation, yet the tools available to reduce the impacts associated with flooding are among the most developed when compared to other hazard-specific mitigation techniques. In addition to approaches that cut across hazards such as education, outreach, and the training of local officials, the National Flood Insurance Program (NFIP) contains specific regulatory measures that enable government officials to determine where and how growth occurs relative to flood hazards. Participation in the NFIP is voluntary for local governments; however, program participation is strongly encouraged by FEMA as a first step for implementing and sustaining an effective hazard mitigation program. It is therefore used as part of this capability assessment as a key indicator for measuring local capability.

To participate in the NFIP, a county or municipality must adopt a local flood damage prevention ordinance that requires established minimum building standards in the floodplain. These standards require that all new buildings and substantial improvements to existing buildings be protected from damage by a 1%-annual-chance flood event and that new development in the floodplain not exacerbate existing flood

problems or increase damage to other properties. Within the last five years, Monroe County and its incorporated communities adopted flood damage prevention ordinance updates establishing minimum elevation requirements communitywide, protecting development not only in the SFHA but also in areas currently mapped as moderate and low risk zones.

A key service provided by the NFIP is the mapping of identified flood hazard areas. Flood Insurance Rate Maps (FIRMs) are used to assess flood hazard risk, regulate construction practices, and set flood insurance rates. FIRMs are an important source of information to educate residents, government officials, and the private sector about the likelihood of flooding in their community.

All jurisdictions in Monroe County participate in the NFIP. NFIP policy and claim information for each participating jurisdiction are provided in the jurisdictional annexes along within an overview of NFIP participation activities and higher standards of floodplain management enforced in each community.

All jurisdictions will continue to comply with all required provisions of the NFIP. Floodplain management is managed through zoning ordinances, building code restrictions, and the county building inspection program. The jurisdictions will coordinate with FDEM and FEMA to develop maps and regulations related to Special Flood Hazard Areas within their jurisdictional boundaries and, through a consistent monitoring process, will design and improve their floodplain management program in a way that reduces the risk of flooding to people and property. Additional details on Community Rating System (CRS) participation and substantial damage management procedures are provided below.

COMMUNITY RATING SYSTEM

An additional indicator of floodplain management capability is active participation in the CRS. The CRS is an incentive-based program that encourages communities to undertake defined flood mitigation activities that go beyond the minimum requirements of the NFIP. Each of the CRS mitigation activities is assigned a point value. As a community earns points and reaches identified thresholds, they can apply for an improved CRS class. Class ratings, which range from 10 to 1 and increase on 500-point increments, are tied to flood insurance premium reductions. Every class improvement earns an additional 5 percent discount for NFIP policyholders, with a starting discount of 5 percent for Class 9 communities and a maximum possible discount of 45 percent for Class 1 communities.

Community participation in the CRS is voluntary. Any community that is in full compliance with the rules and regulations of the NFIP may apply to FEMA for a CRS classification better than class 10. The CRS application process has been greatly simplified over the past several years, based on community comments intended to make the CRS more user friendly, and extensive technical assistance is available for communities who request it.

All communities in Monroe County participate in the Community Rating System. Each community's CRS Class is shown in Table 5.2. Key West is working toward a CRS improvement to a Class 4.

Table 5.2 – NFIP Policy and Claim Information

Jurisdiction	Date of Initial FIRM/FHBM	NFIP Entry Date	Current CRS Class	Current Effective Map Date
Monroe County	06/20/70	06/15/1973	3	04/01/2022
City of Key Colony Beach	06/20/70	07/16/71	6	04/01/2025
City of Key West	09/03/71	09/03/1971	5	10/01/2020
City of Layton	07/01/70	07/23/1971	5	04/01/2022
City of Marathon	06/20/70	10/16/2000	6	05/01/2018
Village of Islamorada	06/20/70	10/01/1998	5	04/01/2022

Source: FEMA Community Status Book, 2022

FLOODPLAIN MANAGEMENT PLAN

A floodplain management plan (or a flood mitigation plan) provides a framework for action regarding corrective and preventative measures to reduce flood-related impacts.

- This hazard mitigation plan follows the 10 steps of the CRS Activity 510 Floodplain Management Plan process and provides a similar framework for flood mitigation; therefore, all jurisdictions have planned for floodplain management through this process.
- Key West is currently updating its Duval Street Master Plan which addresses stormwater issues and wind-proofing of commercial structures. The City is also updating the Mallory Square Master Plan which will address sea wall updates and elevation.
- Monroe County, Key West, Layton, Key Colony Beach and Marathon are all currently developing CRS Activity 452.b Watershed Management Plans. Islamorada's was completed and approved in 2024. Monroe County is updating their previous WMP that was adopted in 2019.

SUBSTANTIAL DAMAGE PROCEDURES

The NFIP requires that participating communities regulate and enforce substantial damage and substantial improvement procedures such that, at a minimum, buildings that are damaged to 50 percent or more of their market value or improved by 50 percent or more of their market value are required to be brought into compliance with flood damage prevention regulations for new development, such as being elevated to the freeboard requirement. Procedures followed by the participating jurisdictions in Monroe County are outlined below.

MONROE COUNTY

Monroe County's Building Official is designated as the Floodplain Administrator. For applications for building permits to improve buildings and structures, including alterations, movement, enlargement, replacement, repair, change of occupancy, additions, rehabilitations, renovations, substantial improvements, repairs of substantial damage, and any other improvement of or work on such buildings and structures, the Building Official of Monroe County shall follow the procedures outlined below:

- Estimate the market value, or require the applicant to obtain an appraisal of the market value prepared by a qualified independent appraiser, of the building or structure before the start of construction of the proposed work; in the case of repair, the market value of the building or structure shall be the market value before the damage occurred and before any repairs are made;
- Compare the cost to perform the improvement, the cost to repair a damaged building to its pre-damaged condition, or the combined costs of improvements and repairs, if applicable, to the market value of the building or structure;
- Determine and document whether the proposed work constitutes substantial improvement or repair of substantial damage; and
- Notify the applicant if it is determined that the work constitutes substantial improvement or repair of substantial damage and that compliance with the flood resistant construction requirements of the FL Building Code and the flood damage prevention ordinance is required.

CITY OF KEY COLONY BEACH

The City of Key Colony Beach's Building Official is designated as the Floodplain Administrator. For applications for building permits to improve buildings and structures, including alterations, movement, enlargement, replacement, repair, change of occupancy, additions, rehabilitations, renovations, substantial

improvements, repairs of substantial damage, and any other improvement of or work on such buildings and structures, the Building Official of Key Colony Beach shall follow the procedures outlined below:

- Estimate the market value, or require the applicant to obtain an appraisal of the market value prepared by a qualified independent appraiser, of the building or structure before the start of construction of the proposed work; in the case of repair, the market value of the building or structure shall be the market value before the damage occurred and before any repairs are made;
- Compare the cost to perform the improvement, the cost to repair a damaged building to its pre-damaged condition, or the combined costs of improvements and repairs, if applicable, to the market value of the building or structure;
- Determine and document whether the proposed work constitutes substantial improvement or repair of substantial damage; and
- Notify the applicant if it is determined that the work constitutes substantial improvement or repair of substantial damage and that compliance with the flood resistant construction requirements of the FL Building Code and the flood damage prevention ordinance is required.

CITY OF KEY WEST

The City of Key West's FEMA Coordinator is the designated Floodplain Administrator. For applications for building permits to improve buildings and structures, including alterations, movement, enlargement, replacement, repair, change of occupancy, additions, rehabilitations, renovations, substantial improvements, repairs of substantial damage, and any other improvement of or work on such buildings and structures, the floodplain administrator, shall:

- Estimate the market value, or require the applicant to submit appraisals - not older than one year - of the market value prepared by a qualified independent appraiser, of the building or structure before the start of construction of the proposed work; in the case of repair, the market value of the building or structure shall be the market value before the damage occurred and before any repairs are made;
- Compare the cost to perform the improvement, the cost to repair a damaged building to its pre-damaged condition, or the combined costs of improvements and repairs, if applicable, to the market value of the building or structure;
- Determine and document whether the proposed work constitutes substantial improvement or repair of substantial damage; the determination requires evaluation of previous permits issued for improvements and repairs as specified in the definition of "substantial improvement"; for proposed work to repair damage caused by flooding, the determination requires evaluation as specified in the definition of "substantial damage"; and
- Notify the applicant if it is determined that the work constitutes substantial improvement or repair of substantial damage and that compliance with the flood-resistant construction requirements of the Florida Building Code and this ordinance is required.

CITY OF LAYTON

The City of Layton's Building Code Administrator is designated as the Floodplain Administrator. For applications for building permits to improve buildings and structures, including alterations, movement, enlargement, replacement, repair, change of occupancy, additions, rehabilitations, renovations, substantial improvements, repairs of substantial damage, and any other improvement of or work on such buildings and structures, the floodplain administrator, in coordination with the building official, shall:

- Estimate the market value or require the applicant to obtain an appraisal of the market value prepared by a qualified independent appraiser, of the building or structure before the start of construction of the

proposed work; in the case of repair, the market value of the building or structure shall be the market value before the damage occurred and before any repairs are made.

- Compare the cost to perform the improvement, the cost to repair a damaged building to its pre-damaged condition, or the combined costs of improvements and repairs, if applicable, to the market value of the building or structure.
- Determine and document whether the proposed work constitutes substantial improvement or repair of substantial damage.
- Notify the applicant if it is determined that the work constitutes substantial improvement or repair of substantial damage and that compliance with the flood resistant construction requirements of the Florida Building Code and this chapter is required.

CITY OF MARATHON

The City Manager of Marathon is designated as the Floodplain Administrator. For applications for building permits to improve buildings and structures, including alterations, movement, enlargement, replacement, repair, change of occupancy, additions, rehabilitations, renovations, substantial improvements, repairs of substantial damage, and any other improvement of or work on such buildings and structures, the Floodplain Administrator, in coordination with the Building Official shall follow the procedures outlined below:

- Estimate the market value, or require the applicant to obtain an appraisal of the market value prepared by a qualified independent appraiser, of the building or structure before the start of construction of the proposed work; in the case of repair, the market value of the building or structure shall be the market value before the damage occurred and before any repairs are made;
- Compare the cost to perform the improvement, the cost to repair a damaged building to its pre-damaged condition, or the combined costs of improvements and repairs, if applicable, to the market value of the building or structure;
- Determine and document whether the proposed work constitutes substantial improvement or repair of substantial damage; and
- Notify the applicant if it is determined that the work constitutes substantial improvement or repair of substantial damage and that compliance with the flood resistant construction requirements of the FL Building Code and the flood damage prevention ordinance is required.

ISLAMORADA VILLAGE OF ISLANDS

The Village Manager is designated as the Floodplain Administrator; however the Village Floodplain/CRS Coordinator oversees development in the floodplain including substantial damage and substantial improvement determinations. Islamorada has developed a Substantial Damage Administrative Procedures Plan following FEMA's template and guidance. The Village uses Forerunner software and CityView software to maintain a property database of structures in the floodplain and to facilitate making substantial damage determinations following a flooding event. Staff from the Building Department and Fire Department coordinate post-event to identify areas of damage and make substantial damage determinations. Property owners are notified via a letter through Forerunner.

For applications for building permits to improve buildings and structures, including alterations, movement, enlargement, replacement, repair, change of occupancy, additions, rehabilitations, renovations, substantial improvements, repairs of substantial damage, and any other improvement of or work on such buildings and structures, the Floodplain Administrator, in coordination with the Building Official, shall:

- Estimate the market value, or require the applicant to obtain an appraisal of the market value prepared by a qualified independent appraiser, of the building or structure before the start of construction of the proposed work; in the case of repair, the market value of the building or structure shall be the market value before the damage occurred and before any repairs are made;
- Compare the cost to perform the improvement, the cost to repair a damaged building to its pre-damaged condition, or the combined costs of improvements and repairs, if applicable, to the market value of the building or structure;
- Determine and document whether the proposed work constitutes substantial improvement or repair of substantial damage; for proposed work to repair damage caused by flooding, the determination requires evaluation of previous permits issued to repair flood-related damage as specified in the definition of "substantial damage"; and
- Notify the applicant if it is determined that the work constitutes substantial improvement or repair of substantial damage and that compliance with the flood resistant construction requirements of the Florida Building Code and this article is required.

OPEN SPACE MANAGEMENT PLAN

An open space management plan is designed to preserve, protect, and restore largely undeveloped lands in their natural state, and to expand or connect areas in the public domain such as parks, greenways, and other outdoor recreation areas. In many instances open space management practices are consistent with the goals of reducing hazard losses, such as the preservation of wetlands or other flood-prone areas in their natural state in perpetuity.

- The City of Marathon is in the process of developing a Parks, Recreation, and Open Space Master Plan.
- All other jurisdictions do not have an open space management plan.

STORMWATER MANAGEMENT PLAN

A stormwater management plan is designed to address flooding associated with stormwater runoff. The stormwater management plan is typically focused on design and construction measures that are intended to reduce the impact of more frequently occurring minor urban flooding.

- 4 of 6 participating jurisdictions have a stormwater management plan.
- The City of Islamorada is currently developing an updated stormwater management plan, which is expected to be completed in 2026.
- Monroe County, Key West, Layton, Key Colony Beach and Marathon are all currently developing CRS Activity 452.b Watershed Management Plans. Islamorada's was completed and approved in 2024.

5.3.2 ADMINISTRATIVE AND TECHNICAL CAPABILITY

The ability of a local government to develop and implement mitigation projects, policies, and programs is directly tied to its ability to direct staff time and resources for that purpose. Administrative capability can be evaluated by determining how mitigation-related activities are assigned to local departments and if there are adequate personnel resources to complete these activities. The degree of intergovernmental coordination among departments will also affect administrative capability for the implementation and success of proposed mitigation activities.

Technical capability can generally be evaluated by assessing the level of knowledge and technical expertise of local government employees, such as personnel skilled in using GIS to analyze and assess

community hazard vulnerability. Community meetings were used to capture information on administrative and technical capability through the identification of available staff and personnel resources.

Table 5.3 provides a summary of the results for each jurisdiction with regard to relevant staff and personnel resources. A checkmark indicates the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill.

In the past five years, Islamorada has added a new sustainability/resiliency position and a planning review engineer. Three to four Key West staff members became Certified Floodplain Managers and they have a resilience manager. Since the City's updated strategic plan, Key West has been able to expand their training budget to support adaptation planning opportunities across departments.

Both Key West and Islamorada are working on a LiDAR mapping project. Islamorada will utilize this data for a road elevation assessment in tandem with the stormwater management plan that is currently being updated. All jurisdictions have detailed mobile LiDAR data for future planning efforts.

Table 5.3 – Relevant Staff/Personnel Resources

Jurisdiction	Planners with knowledge of land development and land management practices	Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Planners or engineers with an understanding of natural and/or human-caused hazards	Building Official	Emergency Manager	Floodplain Manager	Land surveyors	Staff with education or expertise to assess the community vulnerability to hazards	Personnel skilled in Geographic Information Systems (GIS) and/or HAZUS	Resource development staff or grant writers	Warning systems/services
Monroe County	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
City of Key Colony Beach		✓	✓	✓	✓	✓				✓	✓
City of Key West	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
City of Layton	✓	✓	✓	*	✓	✓		✓	✓		
City of Marathon	✓	✓	✓	✓	✓			✓	✓		
Village of Islamorada	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓

*Layton's Building Official has retired, and the City is under contract with a private provider.

5.3.3 FISCAL CAPABILITY

The ability of a local government to implement mitigation actions is often dependent on the amount of money available. This may take the form of outside grant funding awards or locally based revenue and

financing. The costs associated with mitigation policy and project implementation vary widely. In some cases, policies are tied primarily to staff time or administrative costs associated with the creation and monitoring of a given program. In other cases, direct expenses are linked to an actual project such as the acquisition of flood-prone houses, which can require a substantial commitment from local, state, and federal funding sources.

The Local Capability Self-Assessment was used to capture information on each jurisdiction's fiscal capability through the identification of locally available financial resources.

Table 5.4 provides a summary of the results for each jurisdiction with regard to relevant fiscal resources. A checkmark indicates that the given fiscal resource is locally available for hazard mitigation purposes (including match funds for state and federal mitigation grant funds).

Table 5.4 – Relevant Fiscal Resources

Jurisdiction	Capital Improvement Programming	Community Development Block Grants (CDBG)	Special Purpose Taxes	Gas/Electric/Water/OR Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation Bonds	Revenue Bonds	Special Tax Bonds	Other
Monroe County	✓	✓	✓			✓	✓	✓	✓	✓
City of Key Colony Beach	✓	✓	✓	✓	✓	✓	✓		✓	
City of Key West	✓	✓	✓	✓	✓	✓	✓		✓	✓
City of Layton	✓	✓	✓							✓
City of Marathon	✓	✓	✓	✓	✓	✓	✓			
Village of Islamorada	✓	✓	✓	✓	✓	✓	✓		✓	✓

Monroe County has a Municipal Service Benefit Unit to fund road elevation and tidal flooding mitigation.

Since the last plan update, several communities have added fiscal resources:

- Key West passed four general obligation bonds for resilience, parks and rec, streets (including stormwater), and safety (fire station and police station upgrades).
- Key West received $1.4 million in FDEO and FDEP funds for a vulnerability assessment and adaptation plan.
- Key West received a Florida Defense DIG to help establish the Bahama Village Resilience Hub.
- Layton and Key Colony Beach received funding for a vulnerability assessment through the Resilient Florida program.
- Monroe County has received funding and updated their vulnerability assessment.

- All jurisdictions received FDEM funds to develop new or updated watershed management plans.
- Monroe County has received funding for several road elevation projects.
- Islamorada has received USACE and FDOT funding for a revetment project.
- Monroe County Tourist Development Council can help support mitigation efforts that protect and complement tourism in the region.

5.3.4 EDUCATION AND OUTREACH CAPABILITY

This type of local capability refers to education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Examples include natural disaster or safety related school programs; participation in community programs such as Firewise or StormReady; and activities conducted as part of hazard awareness campaigns such as a Tornado Awareness Month.

Table 5.5 provides a summary of relevant education and outreach resources. A checkmark indicates that the given resource is locally available for hazard mitigation purposes.

Table 5.5 – Education and Outreach Resources

Jurisdiction	Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Natural disaster or safety related school programs	StormReady certification	Firewise USA Site certification	Public-private partnership initiatives addressing disaster-related issues	Other
Monroe County		✓		✓			
City of Key Colony Beach		✓					
City of Key West	✓	✓	✓				
City of Layton		✓					
City of Marathon		✓					
Village of Islamorada		✓	✓				

Each community's specific public education and outreach initiatives related to hazard mitigation are summarized below:

- Monroe County: Hosts the County's multi-jurisdictional CRS Program for Public Information and the associated Committee (all jurisdictions except for Layton participate in this PPI); StormReady certified; Emergency management preparedness website.
- City of Key Colony Beach: Distributes flyers to the community with topics related to water preservation, hurricane preparedness and flood preparedness.

- City of Key West: Outreach and education through booths, work/school visits, PSAs, and online videos on topics including, but not limited to, fire and hurricane safety, lightning, water conservation, energy conservation, and climate change; annual mailing to repetitive loss properties; Know before you buy brochures; Annual flood information mailing to lenders, insurance agents, and realtors.
- Layton: Community mailouts on hazard related topics.
- Marathon: Emergency Management website with preparedness guides.
- Islamorada: Public education trailer for community and school outreach, especially around home fires; Outreach with FKAA around water conservation; Maintains a Community Emergency Response Team (CERT); Assist with MERC programs which incorporate storm readiness, home readiness, mitigation, and response.

5.3.5 MITIGATION CAPABILITY

This type of local capability refers to the mitigation strategies and actions that are developed by the communities in this plan. All communities in Monroe County pursue mitigation grant funding to implement property protection activities, including building elevations and acquisitions, as well as structural projects. The LMSWG coordinates regularly to review mitigation grant funding opportunities and prioritize projects for grant applications.

In the past five years, Key West received an $11 million BRIC grant, funding a fire station and EOC, received funds from FDEP to develop a vulnerability assessment, and worked with the Florida Division of Historic Resources to complete an assessment and flood mitigation of historic properties.

Islamorada has been working with USACE on the Florida Keys Costal Storm Risk Management Project which will address US-1 revetment on the Fill Keys, home elevations, and critical infrastructure floodproofing.

LiDAR mapping is occurring throughout the county will support evaluation of potential elevation projects.

5.3.6 POLITICAL CAPABILITY

One of the most difficult capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to reduce the impact of future hazard events. Hazard mitigation may not be a local priority, or it may conflict with or be seen as an impediment to other goals of the community, such as growth and economic development. Therefore, the local political climate must be considered in designing mitigation strategies, as it could be the most difficult hurdle to overcome in accomplishing their adoption and implementation.

In completing the Local Capability Self-Assessment, HMPC representatives from each community were asked to rate political support as they perceive it and identify general examples of local political capability, such as guiding development away from identified hazard areas, restricting public investments or capital improvements within hazard areas, or enforcing local development standards that go beyond minimum state or federal requirements (e.g., building codes, floodplain management, etc.). Table 5.6 below summarizes the different government structures in the jurisdictions as well as whether or not the governing bodies are supportive of mitigation efforts.

Table 5.6 – Jurisdictional Government Structure and Political Climate

Jurisdiction	Government Structure	Political Climate Supportive of Mitigation Efforts?
Monroe County	5-member Board of County Commissioners	Yes, supportive via resolution
City of Key Colony Beach	5-member City Commission led by Mayor	Yes.
City of Key West	City Commission of 7 (6 district representatives, 1 Mayor)	Local political climate is very supportive of mitigation efforts.
City of Layton	5 member elected City Council and 1 elected Mayor	Mitigation is supported by Mayor, Council, and staff.
City of Marathon	5-member City Council (3 council members, 1 vice mayor, 1 mayor)	Yes.
Islamorada Village of Islands	Islamorada operates under a council-manager form of government; 5-member Village Council (including Mayor)	Mayor and Village Council are very supportive of mitigation efforts in Islamorada.

5.4 CONCLUSIONS ON LOCAL CAPABILITY

As previously discussed, one of the reasons for conducting a capability assessment is to examine local capabilities to detect any existing gaps or weaknesses within ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. These gaps, which indicate opportunities for improvement, have been identified for each jurisdiction in the tables found throughout this section. The participating jurisdictions used the capability assessment as part of the basis for the mitigation actions that are identified in Section 7; therefore, each jurisdiction addresses their ability to expand on and improve their existing capabilities through the identification of their mitigation actions. Each jurisdiction is unique in its planning, regulatory, fiscal, political, and outreach capabilities; additional details on jurisdictional capability, including existing mitigation in comprehensive planning efforts, and other details of local planning can be found in the Planning Area Profile.

6 MITIGATION STRATEGY

Requirement §201.6(c)(3): [The plan shall include] a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

This section describes the process for developing the mitigation strategy for the Monroe County Local Mitigation Strategy. It describes how the Region met the requirements for Planning Step 6 (Set Goals), Planning Step 7 (Review Possible Activities), and Planning Step 8 (Draft an Action Plan). This section includes the following sub-sections:

- 6.1 Goals and Objectives
- 6.2 Identification & Analysis of Mitigation Activities

6.1 GOALS AND OBJECTIVES

Requirement §201.6(c)(3)(i): [The mitigation strategy section shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

Goal setting builds upon the findings of Section 4, which documents the hazards and associated risks that threaten Monroe County, including the vulnerability of structures, infrastructure, and critical facilities. Section 5 evaluates each jurisdiction's capacity to reduce the impact of hazards. The intent of Goal Setting is to identify areas where improvements to existing capabilities and reductions in existing vulnerabilities can be made so that overall risk is reduced. Goals also guide the review of possible mitigation measures. This plan needs to make sure that recommended actions are consistent with what is appropriate for the County and the incorporated municipalities. Mitigation goals need to reflect community priorities and should be consistent with other local plans.

- **Goals** are general guidelines that explain what is to be achieved. They are usually broad-based policy type statements, long term and represent global visions. Goals help define the benefits that the plan is trying to achieve.
- **Objectives** are short term aims that, when combined, form a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

6.1.1 COORDINATION WITH OTHER PLANNING EFFORTS

The goals of this plan need to be consistent with and complement the goals of other local planning efforts. The primary planning documents that the goals of this plan should complement and be consistent with are the County and participating jurisdictions' comprehensive plans. Comprehensive plans are important because they are developed and designed to guide future growth within their communities so they encompass long-term strategies and can be critical to reducing long term vulnerabilities. Keeping the Local Mitigation Strategy and Comprehensive Plans consistent ensures that land development is done with awareness and understanding of hazard risk and that mitigation projects complement rather than contradict community development objectives. Another local resource that was reviewed for coordination was the Southeast Florida Regional Climate Change Compact *Regional Climate Action Plan 3.0*; Monroe County and all incorporated jurisdictions are part of the compact and the associated climate action plan.

The Action Plan recommendations are broad and applicable across the region and throughout Monroe County.

6.1.2 GOAL SETTING

At the third planning meeting, held on June 5, 2025, the LMSWG reviewed and discussed the goals and objectives from the 2020 Monroe County LMS. The planning team provided recommendations for minor revisions to the goals and objectives, which the LMSWG discussed and approved. Revisions included minor changes to wording, reorganization of several objectives within the goals, The revised goals and objectives of this plan update are detailed below in Section 6.1.3.

6.1.3 RESULTING GOALS AND OBJECTIVES

Goal 1 – Protect and maintain the life, health, safety, and welfare of the community.

Objective 1.1: Provide public education and outreach to inform residents and visitors how to protect themselves and their property.

Objective 1.2: Improve preparedness, response, and recovery capabilities to minimize hazard impacts.

Objective 1.3: Reduce losses from business interruption and support long term business viability.

Goal 2 – Protect and preserve property and assets, including the built environment and natural resources.

Objective 2.1: Retrofit or otherwise protect community infrastructure systems, including critical facilities, utilities, water, sewer, communications, and transportation.

Objective 2.2: Use planning and regulatory tools to protect future development and prevent hazard risks from worsening.

Objective 2.3: Preserve and protect natural areas and resources that provide hazard risk reduction and other beneficial functions.

Objective 2.4: Pursue property protection and structural projects to reduce vulnerability of existing development.

Goal 3 – Build local capacity to enhance resiliency and enable communities to quickly recover from hazard impacts.

Objective 3.1: Explore, develop, and implement new pre-disaster opportunities that build community resilience.

Objective 3.2: Ensure continuity and redundancy of critical local government operations and systems.

Objective 3.3: Strengthen regional connections and continue to foster inter-jurisdictional coordination for risk reduction efforts.

6.2 IDENTIFICATION AND ANALYSIS OF MITIGATION ACTIVITIES

Requirement §201.6(c)(3)(ii): [The mitigation strategy section shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.

To identify and select mitigation projects that support the mitigation goals and objectives, the risks and vulnerabilities associated with all hazards identified and evaluated in Section 4 Hazard Identification and Risk Assessment were evaluated for mitigation opportunities. The LMSWG analyzed viable mitigation options that supported the identified goals and objectives, addressed key problems, risks, or vulnerabilities, and aligned with other local plans and efforts. The LMSWG was provided with the following list of mitigation categories which are utilized as part of the CRS planning process but are also applicable to multi-hazard mitigation:

- Prevention
- Property Protection
- Natural Resource Protection
- Emergency Services
- Structural Projects
- Public Education

The LMSWG was also provided with examples of potential mitigation actions for each of the above categories. The LMSWG was instructed to consider both future and existing buildings in evaluating possible mitigation actions. Facilitated discussions took place to examine and analyze the options. The LMSWG also considered which actions from the previous plan and subsequent annual updates that were not already completed should be continued in this action plan. A more detailed review of possible actions within each mitigation category that were reviewed by the LMSWG is provided in Appendix C. Actions that were completed or deleted are detailed in Section 2.9.

6.2.1 PRIORITIZATION PROCESS

Monroe County employs a three-step mitigation action prioritization process. Step One, defined in this section, is to identify a full range of possible mitigation activities and create a preliminary list of actions to pursue. Steps Two and Three are detailed in Appendix D. In the process of identifying continuing and new mitigation actions, the LMSWG was provided with a set of prioritization criteria to assist in deciding why one recommended action might be more important, more effective, or more likely to be implemented than another. LMSWG members were asked to rate each action with an approach modified from the FEMA STAPLEE criteria and then evaluate the general efficacy of each action.

The LMSWG was first asked to give each action a positive (1 point), neutral (0 points), or negative (-1 point) rating for each of the STAPLEE elements:

- **Socially Acceptable:** Is the action acceptable to the community? Does it have a greater impact on a certain segment of the population? Are the benefits fair?
- **Technically Feasible:** Is the action technically feasibly? Is it a long-term solution to the problem? Does it capitalize on existing planning mechanisms for implementation?
- **Administrative Resources:** Are there adequate staffing, funding and other capabilities to implement the project? Is there adequate additional capability to ensure ongoing maintenance?

- **Politically Supported:** Will there be adequate political and public support for the project? Does the project have a local champion to support implementation?
- **Legally Allowable:** Does the community have the legal authority to implement the action?
- **Economically Sound:** Can the action be funded locally? Will the action need to be funded by an outside entity, and has that funding been secured? How much will the project cost? Can the benefits be quantified, and do they outweigh the costs?
- **Environmentally Sound:** Does the action comply with environmental regulations? Does the action meet the community's environmental goals? Does the action impact land, water, endangered species, or other natural assets?

Each action could receive a STAPLEE score between 7 and -7; however, no action was considered further if it scored less than 0 points.

Next, the LMSWG was asked to consider each action's potential efficacy by answering the following questions with unlikely (0 points), maybe (1 point), probably (2 points), or definitely (3 points):

- Will the action result in lives saved?
- Will the action reduce property damages?
- Will the action reduce the need for response actions?
- Will the benefits exceed the cost?

Each action could receive an additional effectiveness score of 0 to 12.

Using these prioritization criteria, the LMSWG was able to score each action on a scale of 0 to 19. The prioritization ranking, simplified as High, Medium, or Low, for each mitigation action considered by the LMSWG is provided in the Mitigation Action Plan below. These priority rankings are defined as follows:

- **High:** 14 to 19 points
- **Medium:** 7 to 13 points
- **Low:** 0 to 6 points

In accordance with the DMA requirements, an emphasis was placed on the importance of a benefit-cost analysis in determining action priority, as reflected in the prioritization criteria above. For each action, the LMSWG considered the benefit-cost analysis in terms of:

- Ability of the action to address the problem
- Contribution of the action to save life or property
- Available technical and administrative resources for implementation
- Availability of funding and perceived cost-effectiveness

The consideration of these criteria helped to prioritize and refine mitigation actions but did not constitute a full benefit-cost analysis. The cost-effectiveness of any mitigation alternative will be considered in greater detail through performing benefit-cost project analyses when seeking FEMA mitigation grant funding for eligible actions associated with this plan.

6.3 PLAN UPDATE REQUIREMENT

In keeping with FEMA requirements for plan updates, the LMSWG evaluated mitigation actions identified in the previous plan to determine their current implementation status, including if an action was completed or, if not, whether it should be carried forward for future implementation or deleted from the

mitigation action plan. The results of this evaluation are reflected in the updated mitigation action plan and in the summary of completed and deleted actions from the 2020 plan update in Table 6.1. Note that the mitigation action plan in Section 7 presents only those actions currently being pursued for implementation, including new actions and actions carried forward from the 2020 plan update.

Table 6.1 – Completed and Deleted Actions from the 2020 Plan

Action #	Action Description	Jurisdiction	2025 Status	2025 Implementation Comments
1	Saferoom enhancements for County EOC in conjunction with design and construction of new facility. The current facility is shared with the County Commission which presents issues when a Commission meeting is scheduled during a time when an emergency event may be threatening the County.	Monroe County and Municipalities	Completed	Saferoom was completed in 2024
2	Emergency Management Training Programs: The County will conduct regular training for EOC personnel and all emergency response personnel. Provide orientation and training for all designated EOC personnel, including procedures, technology, communications, facility layout, etc. Plan and improve hurricane drills with more realistic scenarios.	Monroe County and Municipalities	Completed	
3	Florida Keys Imperiled Water Supply Protection	Monroe County and Municipalities (FKAA)	Completed	The New Kermit H. Lewin Stock Island Reverse Osmosis Facility that produces four (4) million gallons per day, was completed in May 2025.
4	Production of a Mitigation Program Technical Assistance and Resource Manual: During the Working Groups activities and discussions, it was determined that there was a need for an assistance manual to identify mitigation assistance programs and provide direction on how to apply for funds and grants such as the federal HMGP. This manual would be especially useful to small agencies and private non-profits that are invited to apply for state and federal grants but may not have the technical knowledge to complete the application process. The manual would also include a listing and description of various government and/or private programs that could apply to mitigation efforts	Monroe County and Municipalities	Deleted	Information flows from FDEM (Mitigate Florida) To Local Mitigation workgroup
5	As a group, the LMS should coordinate with agencies and utility providers responsible for critical infrastructure to express the need to incorporate flood, wind, sea level rise, and coastal erosion	Monroe County and Municipalities	Completed	LMSWG has been expanded to include utility partners.

Action #	Action Description	Jurisdiction	2025 Status	2025 Implementation Comments
	protection into infrastructure maintenance, upgrades, and new construction. When infrastructure maintenance and upgrade projects are planned by agencies and utility providers such as Florida DOT or the Florida Keys Aqueduct Authority (e.g., repaving or elevating a road), the Working Group should express an opinion, as appropriate, that mitigation should be considered with the proposed project. These infrastructure investments represent an opportunity to add in a mitigation component like a drainage upgrade during a road project for an incremental cost.			
6	Evaluate Hazard Identification and Risk Assessment Tools. The Working Group will evaluate the Hazard Identification and Risk Assessments that were prepared for at least two other counties and determine whether using different tools (e.g. FEMA's Hazards US) would significantly improve the outcomes reflected in the 2010 update. The anticipated update of the Sea, Lake, and Overland Surge from Hurricanes (SLOSH) projections may also influence future updates of the HIRA)	Monroe County and Municipalities	Completed	Hazard Identification and Risk Assessment tools have been updated with new software to capture Surge data
9	County-Wide Emergency Back-Up Power Enhancement for Critical Facilities	Monroe County and Municipalities	Completed	All critical county facilities have back-up power and UPS
10	Acquisition-Demolition of Residential Structures	Monroe County and Municipalities	Deleted	
12	Residential Mitigation Reconstruction Project	Monroe County and Municipalities	Deleted	Projects moved to Elevate Florida
13	Trailer Park Acquisition and Reconstruction Sites A, B, C, D, & F	Monroe County and Municipalities	Deleted	No longer pursuing
15	Residential Wind Retrofitting Project	Monroe County and Municipalities	Deleted	Projects moved to Elevate Florida
16	Comprehensive hazard mitigation (prevention) education and outreach program targeted to government employees, the construction industry, and trades, and the general public. During the development of the LMS the working group identified the	Monroe County and Municipalities	Completed	Public outreach material has been created, published and distributed throughout county.

Action #	Action Description	Jurisdiction	2025 Status	2025 Implementation Comments
	need to provide information about the mitigation concept and how to use it. To address education government employees about the benefits of mitigation awareness, training programs, and materials will be developed. Through this training, agencies' staff will understand the concept of reduction of loss and risk and be able to apply it at their jobs and homes. The project would involve the construction industry by developing educational materials and arranging for seminars through the private sector. Businesses such as private contractors and building supply companies would help arrange for and participate in the programs. Groups such as building officials and public works and construction staff could participate. Local governments will be encouraged to allow their personnel to attend. In addition, the programs would be submitted to the appropriate authorities to determine eligibility for CEU credits. Finally, a mitigation brochure will be produced and distributed to the public. It will include information about government mitigation programs (such as elevating utilities and techniques to strengthen homes from hazards). Public information campaigns will be targeted at such groups as condo and homeowners associations			
17	Promote hurricane and flood awareness to residents and businesses. Once residents and businesses become more aware of their risk, they are more likely to mitigate their property and support community efforts to mitigate. Risk awareness can be challenging in most parts of Florida with long intervals between events and with new residents moving in. The LMS working group should actively seek effective risk communication information and opportunities to promote steps businesses and residents can take to reduce their flood and hurricane risk.	Monroe County and Municipalities	Completed	Public outreach material has been created, published and distributed throughout county.
18	Replacement of Storm Damaged wastewater treatment facility: locations could include package treatment plants that serve small communities and businesses within the County.	Monroe County and Municipalities	Deleted	Remove per direction of FKAA. Specific facility

Action #	Action Description	Jurisdiction	2025 Status	2025 Implementation Comments
				projects have been submitted.
20	Purchase New Wellfield for water supply to address threat of saltwater intrusion and hypersaline water from FPL cooling canals.	Monroe County and Municipalities (FKAA)	Deleted	No activity has occurred under this project in the past five years and project is no longer needed.
24	Emergency Communications and Warning Upgrade	Monroe County	Completed	New facility with communications upgrades
25	Phone System/Communications Upgrades	Monroe County	Deleted	Phone system / comms have been updated per IT dept
26	Department of Health Emergency Operations Center (EOC) in the Tavernier area close to their special needs shelter	Monroe County	Deleted	State agency
27	Integrated Flood Risk Reduction Approach. Monroe County will examine the various department responsibilities and activities that address flooding and seek ways to develop a more integrated approach. The departments involved include Emergency Management, Growth Management, Planning, etc. Some integration options include coordination with recovery plan preparations, review and commenting on comprehensive plan updates, and evaluating capital improvement budgeting programs	Monroe County	Completed	
29	Emergency Generator for Critical Facility @ Guidance Care Center	Monroe County	Completed	100% complete and waiting on FDEM close out
30	Retrofit St. James Missionary Baptist Church (historic church) and update structure to be a safe place to house and feed members of community during and after a disaster	Monroe County	Deleted	
31	Mel Fisher Maritime Museum Capital Improvement Project: The window and doors project is a subset of an overall capital improvement project designed to protect and preserve a historically significant building, located in a historical district and housing priceless and unique historical collection	Monroe County	Deleted	

Action #	Action Description	Jurisdiction	2025 Status	2025 Implementation Comments
32	Evaluate existing and proposed infrastructure and facilities to identify recommendations to increase resilience and account for dynamic hazards including flood, wind, sea level rise, coastal erosion, and strong storms. Infrastructure and facilities provide services the whole community depends on for basic functioning. Monroe County will review new projects for recommendations to increase resiliency prior to inclusion in the Capital Improvements Element of the Comprehensive Plan and evaluate options for protecting infrastructure in vulnerable areas. Infrastructure includes new, renovated and replacement public facilities such as streets and bridges, water and wastewater treatment plants, police stations and fire stations, and any other public buildings and facilities. Options may include hardening, elevating, relocating, or not building new infrastructure in the areas with highest risk associated with flooding, sea level rise, and erosion.	Monroe County	Completed	
33	Murray Nelson Cultural Center Emergency Backup Generator for SpNS Population: Purchase and installation of generator to provide emergency backup power for SpNS sheltering population during all hazard events	Monroe County	Completed	Backup power installed
34	Old City Hall Flood Retrofit: install flood panel system for double doors on Ann Street and single door on Greene Street.	Monroe County	Deleted	No longer Monroe County owned building
37	West Martello Seawall Improvements	Monroe County	Deleted	
38	Become certified under Emergency Management Accreditation Program	Monroe County	Deleted	No longer looking into accreditation
39	Monroe County Handheld Radionuclide Identification Device	Monroe County	Completed	Paid for by REP
40	Portable Radiological Portal Monitors	Monroe County	Completed	Paid for by REP
41	Monroe County Emergency Management Inflatable Decontamination Tent for Emergency Worker Decontamination	Monroe County	Completed	Paid for by REP
42	Monroe County complete requirements to achieve Storm Ready recognition from NOAA National Weather Service	Monroe County	Completed	

Action #	Action Description	Jurisdiction	2025 Status	2025 Implementation Comments
43	Marathon Generation	Monroe County, Marathon, Islamorada, Key Colony Beach, Layton	Deleted	
44	Distribution water crossing overhead to underground	Monroe County, Marathon, Islamorada, Key Colony Beach, Layton	Deleted	
45	Main Feeder Pole Replacement	Monroe County, Marathon, Islamorada, Key Colony Beach, Layton	Completed	Awaiting close out
46	Sea Oats Beach Transmission Line Relocation	Monroe County, Marathon, Islamorada, Key Colony Beach, Layton	Completed	Awaiting close out
48	Transmission Water Structure	Monroe County, Marathon, Islamorada, Key Colony Beach, Layton	Completed	Awaiting close out
49	Improve Satellite Communication	Monroe County and Key West (Keys Energy Services)	Completed	Implemented Starlink; satellite phones for senior management
50	Storm Hardening of Electrical Service to Critical Government Facilities	Monroe County and Key West (Keys Energy Services)	Completed	Completed upgrade of all wood poles between substations and critical facilities. Final inspection completed and awaiting final payment for closeout. Submitted BRIC application for additional storm hardening of 500 poles.
52	Harden Material Distribution Center	Monroe County and Key West (Keys Energy Services)	Completed	
53	Transmission Pole Water Crossing	Monroe County and Key West (Keys Energy Services)	Completed	Final inspection completed

Action #	Action Description	Jurisdiction	2025 Status	2025 Implementation Comments
55	Emergency Communications System, including communication and notification system comprised of video and cable components to augment the local cable system, local municipal radio communications system, and satellite communications	Islamorada	Completed	New Communications poles were put up. SOS Kitchen serves as kitchen.
61	EOC Upgrades	Key West	Completed	
69	Generators for Critical Facilities (5)	Key West	Completed	
73	Garrison Bright/Wahoo Pier Hardening	Key West	Completed	
86	Outfall system for Dennis & Venetian (Drainage)	Key West	Completed	Adopted through Ordinance 23-15.
110	Water Supply Plan: Require high efficiency water fixtures	Key West	Completed	
112	Assess vulnerability to Severe Wind	Key West	Completed	
123	Seawall Repair at KW Historic Seaport	Key West	Completed	
124	Structural Repairs at 201 William St Building	Key West	Completed	Educational information created by MCEM distributed throughout county
130	Educational material to share across websites	Key West	Completed	
137	Third Effluent Pump	Key West	Completed	
147	Lift Station Renovation - Phases 1 and 2	Key West	Completed	New Communications poles were put up. SOS Kitchen serves as kitchen.
149	Update Stormwater Master Plan	Key West	Completed	
152	Obtain LiDAR data to identify actual elevation of existing city roads and elevate as needed.	Layton	Completed	
155	Hurricane Shelter: increase shelter spaces available during hurricane emergencies	Marathon	Completed	2025 Annual assessment included both cafeteria, gym, and locker room areas.
-	9th street stormwater drainage improvements, and installation of injections wells at outfalls	Key Colony Beach	Completed	

Action #	Action Description	Jurisdiction	2025 Status	2025 Implementation Comments
-	10th street stormwater drainage improvements, and installation of injections wells at outfalls	Key Colony Beach	Completed	
-	Wastewater Flood Proofing Adaptation Project	Monroe County and Municipalities (FKAA)	Completed	Waiting on close-out
-	Magnolia Street, Key Largo Roof Replacement	Monroe County and Municipalities (FKAA)	Completed	Completed 7/15/2024
-	J.R. Dean Roof Replacement	Monroe County and Municipalities (FKAA)	Completed	Completed 7/1/2023
-	J. Robert Dean WTP Emergency Standby System	Monroe County and Municipalities (FKAA)	Completed	Completed 1/5/2023
-	Duck Key WW Floodproofing Adaption Project	Monroe County and Municipalities (FKAA)	Completed	Waiting on close-out
-	Stock Island Facility, Generator	Monroe County and Municipalities (FKAA)	Completed	98% complete
-	Islamorada Transmission Main Adaptation Project	Monroe County and Municipalities (FKAA)	Completed	92% complete
-	Marathon (Crawl Key) Reverse Osmosis Facility	Monroe County and Municipalities (FKAA)	Completed	92% complete
-	Stock Island Reverse Osmosis Facility	Monroe County and Municipalities (FKAA)	Completed	84% complete
-	KW Terminus, Ocean Reef, Knights Key	Monroe County and Municipalities (FKAA)	Completed	70% complete

7 MITIGATION ACTION PLAN

Requirement §201.6(c)(3)(iii): [The mitigation strategy section shall include an] action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

This section provides the updated mitigation action plan, which was developed to reduce the risk and vulnerability of people, property, infrastructure, and natural and cultural resources to future disaster losses. Emphasis was placed on both future and existing development.

Each mitigation action recommended for implementation is listed in these tables along with detail on the applicable jurisdictions, hazards addressed, the goal and objective addressed, the priority rating, the lead agency responsible for implementation, potential funding sources for the action, a projected implementation timeline (noted as the projected timeframe for completion), and the 2025 status and comments on this status for actions that were carried forward from the 2020 plan.

Table 7.1 – Mitigation Action Plan

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
1	Monroe County and Municipalities	Support efforts in Monroe County to address the potential negative impacts related to climate change, including sea level rise. Monroe County is the most vulnerable partner that participates in the SE FL Compact with respect to climate change induced sea level increases. Critical resources like the primary source of drinking water as well as homes, businesses, and infrastructure are directly at risk. The LMS should actively support its own Climate Change action plans (Monroe County and Key West) and support the implementation of a Regional Collaborative Climate Action Plan with the neighboring counties through the Southeast Florida Regional Climate Compact to address the impacts of sea level rise and other related climate change impacts	Sea Level Rise	3	H	Prevention	County/Jurisdictional Planning and Engineering Departments	Less than $10,000	Staff Time	2025 - 2030	Carry Forward	This is an ongoing collaboration. This county and municipalities continue to participate in the SE FL Compact and Climate Change Planning by attending summits and supporting initiatives. This includes incorporating Sea Level Rise projections into this plan.

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
2	Monroe County and Municipalities	Verify Repetitive Loss Property Data - Monroe County and municipalities that participate in the CRS will verify the repetitive loss property data obtained from FEMA. The NFIP maintains records of past flood insurance claims and tracks properties that have received multiple claims. These properties and similarly situated buildings present likely opportunities for mitigation. Verifying the data serves two purposes: it helps the NFIP improve its records, and it helps identify Repetitive Loss Areas. Prepare Repetitive Loss Area Maps - Monroe County and municipalities that prepare Repetitive Loss Area Analyses will identify repetitive loss areas within their jurisdiction using the methods described in FEMA/CRS guidance. Identification of Repetitive Loss Areas helps identify property owners who may be interested in reducing their exposure and working with the communities to seek mitigation funds.	Flood	1, 2	H	Prevention, Public Education	County/Jurisdictional Floodplain Management	$10,000 to $50,000	Staff Time	2020-2025	Carry Forward	This action is ongoing in the communities with identified repetitive loss properties. Data verification occurs annually and repetitive loss area maps are updated upon request.
3	Monroe County and Municipalities	Elevate Buildings Located within Floodprone Areas	Tropical Cyclones, Flood, Sea Level Rise	2	M	Property Protection	County Emergency Management Department with Jurisdictional Representatives	$5,225,000	HMGP, BRIC, FMA, CDBG-DR	5 years	Carry Forward	Residential elevation projects are now covered under the Elevate Florida Program. Continue to pursue other elevation projects.

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
4	Monroe County and Municipalities	Wind Retrofit of County Facilities	Severe Storms and Tornadoes, Tropical Cyclones	2	M	Property Protection	Monroe County Public Works	$8,837,280	HMGP, BRIC, HLMP	1 - 5 years	Carry Forward	On going upgrades to apartments. Final project will be to build new apartment buildings by 2028
5	Monroe County and Municipalities	County-wide Road Elevation and Drainage Improvements (Phase 1 of 2)	Tropical Cyclones, Flood, Sea Level Rise	2	M	Structural Projects	Monroe County Roads and Bridges ; Monroe County Public Works	$367,200,000	HMGP, BRIC, FMA, CDBG-MIT	5 years	Carry Forward	Road Elevation projects in progress
6	Monroe County and Municipalities	Natural Resources Adaptation Plan	Flood, Sea Level Rise, Tropical Cyclones	2, 3	H	Prevention, Natural Resource Protection	Monroe County Planning and Environmental Resources	$142,000	BRIC, HMPG	3 Years	Carry Forward	80% complete
7	Monroe County and Municipalities	Engine generators at Water Treatment Plant	All	2	M	Structural Projects	FKAA	$1,500,000	HMGP, BRIC, HLMP, CDBG	1 - 3 years	Carry Forward	This project is currently in the bidding phase.
8	Monroe County and Municipalities	Hospital Hardening: Evaluate/identify necessary improvements needed to retrofit hospital facilities and perform needed retrofits to mitigate storm damages. Facilities include: Lower Keys Health Systems, De Poo Hospital, Fisherman's Hospital, Mariners' Hospital, Nursing Homes (including Bayshore Manor)	All	2	M	Property Protection	LKMC/Baptist Health/Monroe County	Over $1,000,000	HMGP, BRIC, CDBG-MIT, HLMP	5 - 10 years	Carry Forward	No progress
9	Monroe County and Municipalities	Marathon Potable Water Pump Station Mitigation	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$3,000,000.00	DEP - Resilient Florida	2 years	New	
10	Monroe County and Municipalities	Decentralized Wastewater Treatment Project	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$450,000.00	DEP - Water Quality Improvements	2 years	New	
11	Monroe County and Municipalities	Plantation Key Transmission Main	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$1,750,000.00	DEP - Rep Gimenez Request	2 years	New	
12	Monroe County	Peacock Apartments Rehabilitation Project: rehabilitation and retrofit of 24 unit special needs housing property. Serves very low income mentally ill adults.	Tropical Cyclones, Flood, Sea Level Rise, Severe Storms and Tornadoes	1, 2	M	Property Protection	US Fellowship of Florida	$150,000	BRIC, HMGP	1 - 5 years	Carry Forward	On going upgrades to apartments. Final project will be to build new apartment buildings by 2028

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
13	Monroe County	Higgs Beach (KW) Seawall Replacement Project for flood water protection of the Historic West Martello Towers Fort	Tropical Cyclones, Flood, Sea Level Rise	2	M	Structural Projects	Monroe County Public Works	$1,050,000	HMA, FMA, BRIC, HMGP	1 - 5 years	Carry Forward	No progress has been made on this action to date.
14	Monroe County	Sands Subdivision Drainage Improvement and Roadway Elevation Project	Tropical Cyclones, Flood, Sea Level Rise	2	M	Structural Projects	Monroe County Roads and Bridges/ Engineering	$9,500,000	Rep Gimenez Request (Federal Approp), DEP - Resilient Florida	1 - 5 years	Carry Forward	Project currently with BOCC. Updated budget. Awarded initial funding in 2022
15	Monroe County	Twin Lakes Drainage Improvement and Roadway Elevation Project	Tropical Cyclones, Flood, Sea Level Rise	2	M	Structural Projects	Monroe County Roads and Bridges/ Engineering	$20,500,000	CDBG-MIT, DEP - Resilient Florida	1 - 5 years	Carry Forward	Updated budget. Awarded initial funding in 2021 and 2025
16	Monroe County	Stillwright Point Road Elevation Project	Flood, Sea Level Rise, Tropical Cyclones	2, 3	H	Structural Projects	Monroe County Roads and Bridges	$21,700,000.00	HMGP, DEP - Resilient Florida	5 years	New	
17	Monroe County	Winston Waterways Road Elevation	Flood, Sea Level Rise, Tropical Cyclones	2, 3	H	Structural Projects	Monroe County Roads and Bridges	$53,000,000.00	HMGP, DEP - Resilient Florida	5 years	New	
18	Monroe County	Big Coppitt Road Elevation Project	Flood, Sea Level Rise, Tropical Cyclones	2, 3	H	Structural Projects	Monroe County Roads and Bridges	$88,000,000.00	HMGP, DEP - Resilient Florida	5 years	New	
19	Monroe County	Flagler Avenue Road Resiliency Project	Flood, Sea Level Rise, Tropical Cyclones	2, 3	H	Structural Projects	Monroe County Roads and Bridges	$57,000,000.00	HMGP	5 years	New	
20	Monroe County	Conch Key Road Elevation	Flood, Sea Level Rise, Tropical Cyclones	2, 3	H	Structural Projects	Monroe County Roads and Bridges	$4,000,000.00	DEP - Resilient Florida	5 years	New	
21	Monroe County, Marathon, Islamorada, Key Colony Beach, Layton	Self-Supporting Transmission Poles	All	2	M	Structural Projects	FKEC	$6,000,000	HMGP, BRIC, FMA	1 - 5 years	Carry Forward	Awaiting FDEM approval
22	Monroe County and Key West	Backup Generators for Critical Facilities	All	2	M	Property Protection	KEYS Energy Services	$200,000	HMGP, BRIC, CDBG-DR, CDBG-MIT	1 - 5 years	Carry Forward	Some work completed. May pursue funding for substation generators

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
23	Monroe County and Key West	Harden Critical Facilities	All	2, 3	H	Structural Projects	KEYS Energy Services	$650,000	HMGP, BRIC, CDBG	1 - 2 years	New	Submitted HMGP application and budgeted for match to harden employee building that houses generation control center and vehicle mechanic shop
24	Monroe County and Key West	Improve System Redundancy	All	2, 3	H	Structural Projects	KEYS Energy Services	$5,000,000	HMGP, BRIC, CDBG	1 - 4 years	New	
25	Monroe County and Key West	Storm Hardening of Electrical Service - Undergrounding of electric service	All	2, 3	H	Structural Projects	KEYS Energy Services	$20,000,000	HMGP, BRIC, CDBG	1 - 10 years	New	
26	Monroe County and Key West	Storm Hardening of Electrical Service - Pole Strengthening	All	2, 3	H	Structural Projects	KEYS Energy Services	$10,000,000	HMGP, BRIC, CDBG	1 - 10 years	New	
27	Key Colony Beach	Raise wastewater 13 lift station electrical control boxes to assure functionality after storms. Estimated cost to raise each control box is $4,000 per box, total $52,000. Raise all remaining lower lift stations to current specifications	All	2, 3	H	Property Protection	KCB Wastewater Utility; KCB Public Works	$12,000	HMGP	3 - 5 years	Carry Forward	Action description updated. Update grant request for potential new wastewater grant application in Fall 2025
28	Key Colony Beach	City Maintenance Building Dry-Flood proofing project with flood log protections on all entry doors, providing protection to an elevation of 11 feet. Protecting critical city vehicles (police/public works) , generators, city lawn and maintenance equipment, storage of documents, etc.	Tropical Cyclones, Flood, Sea Level Rise, Severe Storms and Tornadoes	2	H	Property Protection	KCB Public Works; KCB Police Department	$15,000	HMGP	2 - 4 years	Carry Forward	Action description updated. Phase I design work is complete. Completing grant work for closure of Phase I. Updating budgeting and grant application for Phase II implementation step.

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29	Key Colony Beach	7th street stormwater improvements to reduce flooding from excessive rain events of 4-8 inches of rain within a 24 hour period	Tropical Cyclones, Flood, Sea Level Rise, Severe Storms and Tornadoes	2	H	Structural Projects	KCB Public Works	$7,000	HMGP	1 year	Carry Forward	Design completed for improvements. Approval for Phase I work May 2025, Contractor agreed upon for Phase I May 2025. Work to be completed by the end of 2025.
30	Key Colony Beach	City Hall Hardening for improved flood and wind protection. Implementation of a local EOC center.	All	2, 3	M	Structural Projects, Emergency Services	KCB Public Works	$100,000	HMGP	2 - 3 years	Carry Forward	Action description updated. Initial design in process, with completion by 15Au25. Then request for quote will be advertised for cost estimates
31	Key Colony Beach	Sunset Park beach and park erosion protection	Flood, Coastal Erosion	2, 3	M	Natural Resource Protection	KCB City Staff	$150,000	Florida DEP Grant	3 years	New	
32	Key Colony Beach	Road elevation in limited areas based on Sea Level Rise Lidar report and localized flooding feedback	Flood, Sea Level Rise	2	M	Structural Projects	KCB City Staff	$3,000,000	HMGP	3 years	New	
33	Key Colony Beach	11th and 12th street stormwater drainage improvements and installation of remaining injection wells	Flood	2	M	Structural Projects	KCB Stormwater Utility Board	$3,000,000	HMGP	5 years	New	Initial Design completed. Will need to review and update designs when funding is available
34	Islamorada, Key Colony Beach, Key West, Layton, Marathon	Evaluate protective measures for critical infrastructure and facilities to protect against dynamic hazards including flood, wind, sea level rise, and strong storms. Critical facilities provide services that the whole community depends on for basic functioning. The communities will evaluate the need for protecting critical facilities and infrastructure and address as needed.	All	2	M	Property Protection, Prevention	Jurisdiction Engineering/Public Works	$10,000 to $50,000	Staff Time	1 - 5 years	Carry Forward	Completed flood protection project - elevated breakwater, protected marina office. Continue to pursue additional projects. Adaptation action Plan is underway and will identify new opportunities.

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35	Key West	Planning/Development of Sister City EOC: Develop a plan and implement a Sister City Emergency Operations Center for large scale pre & post disaster situations	All	1, 3	M	Emergency Services; Prevention	Department of Emergency Management	$40,000	EMPG, HMGP, BRIC, FMA	1 - 5 years	Carry Forward	No progress
36	Key West	Emergency warning signal: install a siren or message device to be heard all across the city.	All	1	M	Emergency Services	Key West Information Technology Dept; General Services Department	$200,000	HMGP, BRIC, FMA, CDBG-MIT	1 - 3 years	Carry Forward	No progress
37	Key West	Hazard Mitigation Strategies Planning Support	All	1, 2	H	Prevention	Key West Floodplain Management	$75,000	BRIC, HMGP	1 - 2 years	Carry Forward	Vulnerability Assessment is complete. Adaptation Plan will be complete by August 2025
38	Key West	Post-Disaster (Flood) Recovery Plan	Flood	3	H	Prevention	Key West Engineering	$40,000	BRIC;FMA	1 - 5 years	Carry Forward	Attempting to fulfil a couple of recommended actions each year.
39	Key West	Repetitive Loss Property Mitigation Planning Support	Tropical Cyclones, Flood, Sea Level Rise	1, 3	H	Prevention	Key West Floodplain Management	$45,000	HMGP, BRIC, FMA, CDBG-DR	1 - 2 years	Carry Forward	Vulnerability Assessment is complete. Adaptation Plan is in progress and will identify potential opportunities.
40	Key West	Reconstruction of Key Plaza Site B: Demolition and Reconstruction of 50 affordable apartment units.	Tropical Cyclones, Flood, Severe Storms and Tornadoes, Sea Level Rise	1, 2	M	Property Protection	Housing Authority of Key West	$6,775,000	BRIC, HMGP	5 - 10 years	Carry Forward	No progress
41	Key West	Rehabilitation and Retrofit of George Allen Apartments: Rehabilitation, Window replacement, & retrofit shutters to Dade County approved wind resistance for 117 public housing project units	Tropical Cyclones, Severe Storms and Tornadoes	2	H	Property Protection	Housing Authority of Key West	$550,000	BRIC, HMGP, HLMP	1 - 5 years	Carry Forward	No progress; Key West is following up with the Housing Authority
42	Key West	Wind-Retrofit(s) of First Responder Facilities	All	2, 3	H	Property Protection	Key West Engineering	$1,092,194	HMGP, BRIC	1 - 5 years	Carry Forward	Project scope has been expanded.

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43	Key West	Fire Station 3	All	1, 2	H	Property Protection, Emergency Services	Key West Engineering	$10,000,000	HMGP, BRIC, FMA	1 - 5 years	Carry Forward	Awarded design funding through FEMA BRIC. Continuing to apply for implementation grants.
44	Key West	Residential Floodproofing Program	Tropical Cyclones, Flood, Sea Level Rise	1, 2	H	Property Protection, Public Education	Key West Engineering	$236,000	HMGP, BRIC, FMA, CDBG-DR,	1 - 5 years	Carry Forward	No progress
45	Key West	Elevation of Floodprone Residential Properties	Tropical Cyclones, Flood, Sea Level Rise	1, 2	H	Property Protection	Key West Engineering	$1,800,000	HMGP, BRIC, FMA, CDBG-DR, HLMP	1 -5 years	Carry Forward	Partnered with County on Education Outreach and FMA applications.
46	Key West	Shutter Bayview Park Scorebox	Tropical Cyclones, Severe Storms and Tornadoes	2	H	Property Protection	Key West General Services/City Engineer	$4,000	HMGP, BRIC, HLMP	1 -5 years	Carry Forward	No progress
47	Key West	Shutter Fire Station Museum: Install Dade county approved shutter system on structure.	Tropical Cyclones, Severe Storms and Tornadoes	1, 2	H	Property Protection	Key West General Services/City Engineer	$30,000	HMGP, BRIC, HLMP	1 -5 years	Carry Forward	No progress
48	Key West	Shutter Park-n-Ride: Shutter the parking garage for storage of City Emergency vehicles and equipment.	Tropical Cyclones, Flood, Severe Storms and Tornadoes	1, 2	H	Property Protection	Key West General Services/City Engineer	$250,000	HMGP, BRIC, HLMP	1 -5 years	Carry Forward	No progress
49	Key West	Wind Retrofit of Homes: The City will manage a project to examine homes and provide recommendations to homeowners for wind retrofit and fund the structural retrofit.	Tropical Cyclones, Severe Storms and Tornadoes	1, 2	H	Property Protection, Public Education	Key West Information Technology Dept; General Services Department	$100,000	HMGP, BRIC, HLMP	1 -5 years	Carry Forward	MySafeFLHome - concept is in the early stages and will be included in the City's developing Adaptation Plan for further consideration.
50	Key West	1010 Windsor Lane: Structural retrofitting of existing auditorium building	Tropical Cyclones, Severe Storms and Tornadoes	2	H	Property Protection	St. Mary's Start of the Sea Parish	$100,000 to $500,000	HMGP, BRIC, HLMP, CDBG-DR	1 -5 years	Carry Forward	No progress
51	Key West	Wind-Retrofit(s) of Historically and Culturally Significant Facilities	Tropical Cyclones, Severe Storms and Tornadoes	2	H	Property Protection	Key West Engineering	$4,500,000	HMGP, PDM, HLMP, CDBG-DR, CDBG-MIT	1 -5 years	Carry Forward	Pursuing funding opportunities for building mitigation
52	Key West	Wind-Retrofits of Public Service Facilities	Tropical Cyclones, Severe Storms and Tornadoes	2	H	Property Protection	Key West Engineering	3,500,000	HMGP; BRIC; HLMP	1 - 5 years	Carry Forward	Project scope has been expanded.

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53	Key West	Affordable Rentals, Phase III; New construction of affordable housing units. This is a continuation of project funded under prior Unmet Needs Funding. New construction of 14 affordable rental unit elderly persons.	All	1, 2	H	Property Protection	Monroe County Housing Authority	$2,000,000	BRIC, CDBG-DR, CDBG-MIT	1 - 5 years	Carry Forward	Grand View complete. 3.2 acres is still being built.
54	Key West	Elevation of Public Works Facility: Raise the Public Works Office, equipment storage, and repair facilities. Tow Structures.	Tropical Cyclones, Flood, Sea Level Rise	2, 3	M	Property Protection	Key West General Services/City Engineer	$373,000	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward	No progress
55	Key West	United St./Jose Marti drainage improvements	Tropical Cyclones, Flood, Sea Level Rise	2	M	Structural Projects	Key West General Services/City Engineer	$2,300,000	HGMP, BRIC, FMA, CDBG	1 - 3 years	Carry Forward	In design phase with FDOT
56	Key West	Force Main Relocation Project (Infrastructure Hardening)	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$2,330,000	HMGP, BRIC, FMA	FY26	Carry Forward	In progress. Will complete in FY26.
57	Key West	Staples Avenue exfiltration trench	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$638,471	HMGP, BRIC, FMA	1 - 5 years	Carry Forward	No progress
58	Key West	Tide Valves and Outfall Improvements (Drainage)	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$4,658,082	HMGP, BRIC, FMA	1 -3 years	Carry Forward	Design completed. Construction begins soon.
59	Key West	Fogarty and 3rd Street Pump Station	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$6,800,000	HMGP, BRIC, FMA, CDBG-DR, CDBG-MIT	1 -3 years	Carry Forward	Design completed. Construction begins soon.
60	Key West	Harris and 10th street expanded project: installation of new outfall at Harris & 10th street with a pollution control box near the outfall to improve drainage in the low elevation area	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$5,625,000	HMGP, BRIC, FMA, CDBG-DR, CDBG-MIT	1 - 5 years	Carry Forward	Design phase completed. Looking for implementation funding.
61	Key West	White and Petronia Street Gravity Well	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$450,000	HMGP, BRIC, FMA, CDBG-DR, CDBG-MIT	1 - 5 years	Carry Forward	Project put on hold due to lack of funding
62	Key West	3rd street Well or Exfiltration Trench	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$396,316	HMGP, BRIC, FMA, CDBG-MIT	1 - 3 years	Carry Forward	Part of Fogarty & 3rd pump station construction begins soon
63	Key West	4th street Well or Exfiltration Trench	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$396,316	HMGP, BRIC, FMA, CDBG-MIT	1 - 3 years	Carry Forward	Part of Fogarty & 3rd pump station construction begins soon

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64	Key West	Cindy & 19th Street Outfall	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$2,825,692	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward	Project put on hold due to lack of funding
65	Key West	Additional Well for Patricia/Ashby Pump Station	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$150,000	HMGP; BRIC;FMA	1 - 5 years	Carry Forward	Project put on hold due to lack of funding
66	Key West	Duck Avenue & 19th Street Gravity Well	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$530,577	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward	Project put on hold due to lack of funding
67	Key West	Eagle and 20th outfall	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$1,705,914	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward	Project put on hold due to lack of funding
68	Key West	Eagle Avenue Between 16th and 17th street trench	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$406,550	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward	Project put on hold due to lack of funding
69	Key West	Eisenhower Drive Twin 24" Pipeline	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$548,554	BRIC, FMA, HMGP	1 - 5 years	Carry Forward	Project put on hold due to lack of funding
70	Key West	Flood Control Flagler Avenue: Install nine wells to intercept water from Flagler Avenue and put tide valves to stop storm surge.	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West General Services/City Engineer	$560,000	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward	County has put out and RFP for project design
71	Key West	Florida & Olivia Street Gravity Well	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$396,316	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward	Project put on hold due to lack of funding
72	Key West	Olivia Street at Phalski & at Francis Gravity Well	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	530577	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward	Project put on hold due to lack of funding
73	Key West	Packer Street at Olivia - trench and well	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$396,316	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward	Project put on hold due to lack of funding
74	Key West	Hazard Mitigation Community Revolving Loan Fund	All	1	H	Prevention	Key West Sustainability; Engineering Department	$100,000 to $500,000	HLMP, BRIC, HMGP	1 - 5 years	Carry Forward	No progress
75	Key West	Hazard Mitigation Policies Upgrade	All	1, 2	H	Prevention	Key West Planning	Less than $10,000	Staff Time	1 - 2 years	Carry Forward	Updates within PDRRP and upcoming Adaptation Plan

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76	Key West	Comprehensive Pervious Program to decrease runoff. Tie to vertical (cistern) Stormwater Management options.	Flood	2	H	Natural Resource Protection	Key West Engineering	$10,000 to $50,000	FMA, BRIC, HMGP	2027	Carry Forward	Have a task order, but not funded yet.
77	Key West	Erosion Program, to track, disclose & utilize living shorelines when possible.	Coastal Erosion	2, 3	H	Natural Resource Protection	Key West Engineering	$50,000 to $100,000	BRIC, HMGP	1 - 5 years	Carry Forward	Will be addressed in ongoing Key West Adaptation Plan.
78	Key West	Living Shoreline Plan to protect our island from erosion.	Flood, Coastal Erosion	2, 3	H	Natural Resource Protection, Prevention	Key West Engineering	$50,000 to $100,000	HMGP, BRIC	1 - 5 years	Carry Forward	Will be addressed in ongoing Key West Adaptation Plan.
79	Key West	Neighborhood Flood Protection Plan	Flood	1, 2	H	Prevention, Public Education	Key West Engineering	$50,000 to $100,000	BRIC, HMPG	1 - 5 years	Carry Forward	Will be addressed in ongoing Key West Adaptation Plan.
80	Key West	Turf Replacement with Synthetic options	Drought	2	M	Prevention	Key West Public Works	$100,000 to $500,000	HMGP, BRIC, FMA	1 - 5 years	Carry Forward	City has replaced many fields with fake turf and will pursue other locations
81	Key West	CRS Group to work together on Beyond Minimum requirements	Tropical Cyclones, Severe Storms and Tornadoes, Flood, Sea Level Rise	1, 2	H	Prevention	County/Jurisdictional Floodplain Management	Less than $10,000	Staff Time	1 - 3 years	Carry Forward	No progress. Hope to achieve via Adaptation Plan
82	Key West	Research using New Town alleyways to protect powerlines or for stormwater	Tropical Cyclones, Flood, Severe Storms and Tornadoes	2	M	Prevention	Key West Engineering	Less than $10,000	Staff Time	1 - 5 years	Carry Forward	Will be addressed in ongoing Key West Adaptation Plan.
83	Key West	Survey all City owned buildings for Wind/Flood resiliency needs	Tropical Cyclones, Flood, Severe Storms and Tornadoes	2	H	Prevention	Key West Engineering	$10,000 to $50,000	Staff Time	1 - 3 years	Carry Forward	Will be addressed in ongoing Key West Adaptation Plan.
84	Key West	Enforce existing irrigation regulations (sensors, timing)	Drought	2	M	Prevention	Key West Engineering	$10,000 to $50,000	Staff Time	1 - 3 years	Carry Forward	No progress. Needs code officers
85	Key West	Feasibility study for greywater systems	Drought	2	M	Prevention	Key West Engineering	$10,000 to $50,000	BRIC, HMGP	1 - 3 years	Carry Forward	No progress
86	Key West	Feasibility Study for WWTP Potable Water Treatment	Drought	2	M	Prevention	Key West Utility	$10,000 to $50,000	BRIC, HMGP	1 - 3 years	Carry Forward	Received DOD Grant to study feasibility

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87	Key West	Heat Island Program, to increase tree canopy, green/cool roofs & a community cooling center	Extreme Heat	1, 3	H	Prevention	Key West Engineering	$10,000 to $50,000	BRIC, HMGP	1 - 5 years	Carry Forward	Will be addressed in ongoing Key West Adaptation Plan.
88	Key West	Map first floor elevation for all buildings	Flood	2	M	Prevention	Key West Floodplain Management	$50,000 to $100,000	Staff Time	1 - 3 years	Carry Forward	Creating Asset Management Program.
89	Key West	Map subsidence areas	Coastal Erosion	2, 3	H	Prevention	Key West Floodplain Management	$50,000 to $100,000	Staff Time	1 - 3 years	Carry Forward	Completed LiDAR project in 2025 which will help move forward with mapping.
90	Key West	Piling Replacement at KW Historic Seaport	Tropical Cyclones, Severe Storms	3	H	Property Protection	Key West Ports	$100,000 to $500,000	BRIC, FMA	1 year	Carry Forward	Will complete end of 2025
91	Key West	Tarpon Finger Pier Extensions	Tropical Cyclones, Severe Storms	2	H	Property Protection	Key West Ports	$100,000 to $500,000	HGMP, BRIC, CDBG-MIT	1 - 5 years	Carry Forward	No progress
92	Key West	Greene Street Redevelopment	Tropical Cyclones, Severe Storms and Tornadoes, Flood	2, 3	H	Property Protection	Key West Ports	$100,000 to $500,000	HMGP, BRIC, HLMP	1 - 3 years	Carry Forward	Project has been included in CIP for FY 26 and 27
93	Key West	Expand Public Outreach: Mapping, outreach, floodproofing, windproofing, individual mitigation actions, disclosures, financing, etc.	All	2	H	Public Education	Key West Sustainability; Engineering Department	$10,000 to $50,000	Staff Time	1 - 5 years	Carry Forward	The City has quadrupled it's hurricane preparedness outreach this year.
94	Key West	Cohost Public Workshops with FIRM (NFIP, mitigation, etc)	Tropical Cyclones, Severe Storms and Tornadoes	1, 2	H	Public Education	Key West Floodplain Management	Less than $10,000	Staff Time	1 - 5 years	Carry Forward	City participated in an Elevation Workshop with FIRM and has had them speak at Commission meetings
95	Key West	Track High Water Marks	Flood	2	M	Prevention	Key West Floodplain Management	Less than $10,000	Staff Time	1 - 5 years	Carry Forward	No progress
96	Key West	King Tide Educational Map	Flood	1	H	Public Education, Prevention	Key West Engineering	Less than $10,000	Staff Time	1 - 3 years	Carry Forward	Will be addressed in ongoing Key West Adaptation Plan.
97	Key West	Minimum Recommended Residential Mitigations	Tropical Cyclones, Flood, Sea Level Rise	1	H	Public Education	Key West Engineering	Less than $10,000	Staff Time	1 - 2 years	Carry Forward	Will be addressed in ongoing Key West Adaptation Plan.
98	Key West	Potable Water Treatment option for WWTP (Design and Build)	Drought	2	H	Structural Projects	Key West Utility	Over $1,000,000	BRIC, HMGP, CDBG-MIT	1 - 5 years	Carry Forward	Received DOD Grant to study feasibility

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99	Key West	Poincianna Housing: affordable housing for Police Dept	All	1, 2	H	Structural Projects	Key West Engineering	$500,000 to $1,000,000	BRIC, HMGP, EMPG	1 - 5 years	Carry Forward	Pursuing funding opportunities
100	Key West	Cisterns for additional water supply during hurricanes	Drought, Tropical Cyclones, Severe Storms	2	H	Structural Projects	Key West Engineering	$100,000 to $500,000	HMGP, BRIC	1 - 5 years	Carry Forward	Will be addressed in ongoing Key West Adaptation Plan.
101	Key West	Replace Sludge Conveyor	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$50,000 to $100,000	BRIC, HMGP	1 year	Carry Forward	Implementation planned for 2026
102	Key West	Community Services Building: Remodel to raise equipment and staff above flood.	Tropical Cyclones, Flood, Sea Level Rise	2	H	Property Protection	Key West Engineering	$100,000 to $500,000	HMGP, BRIC, FMA, CDBG-DR	1 - 5 years	Carry Forward	No progress. Maybe considered in upcoming CIP.
103	Key West	Atlantic Ave Rebuild: Raise and Protect	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Engineering	$100,000 to $500,000	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward	Waiting for funding to be approved.
104	Key West	Diesel Plant: Design & Construction to stabilize building of historical and cultural significance	Tropical Cyclones, Severe Storms and Tornadoes	2	H	Structural Projects	Key West Engineering	$100,000 to $500,000	BRIC, CDBG-MIT, HMGP	5 years	Carry Forward	Applied for funding and will be notified soon.
105	Key West	Douglass Gym Expansion: Community Center	All	1, 2, 3	H	Structural Projects	Key West Engineering	$100,000 to $500,000	BRIC, CDBG, HMGP	2 years	Carry Forward	Building is currently under construction
106	Key West	Duval Street Stormwater Revitalization: Raise road to reduce stormwater/SLR	Flood, Sea Level Rise	2, 3	H	Structural Projects	Key West Engineering	$100,000 to $500,000	HMGP, BRIC, FMA, CDBG-MIT	2 years	Carry Forward	Plan is almost completed. Creating phasing and applying for funds.
107	Key West	Elevate or floodproof essential public buildings	Flood	2, 3	H	Property Protection	Key West Engineering	Over $1,000,000	HMGP, BRIC, FMA, CDBG-MIT	5 - 7 years	Carry Forward	Will be addressed in ongoing Key West Adaptation Plan.
108	Key West	Elevate or floodproof historically or culturally significant buildings	Flood	1, 2	H	Property Protection	Key West Engineering	Over $1,000,000	HMGP, BRIC, FMA, CDBG-MIT	5 years	Carry Forward	Will be addressed in ongoing Key West Adaptation Plan. Have submitted project for grant funding
109	Key West	Govt Road Culverts	Tropical Cyclones, Flood, Sea Level Rise	2, 3	H	Structural Projects	Key West Utility	$100,000 to $500,000	HMGP, BRIC, FMA, CDBG-MIT	FY25	Carry Forward	Due for completion FY25
110	Key West	KOTS: Construct/Develop new Keys Overnight Temporary Shelter for homeless	All	1, 3	H	Structural Projects, Emergency Services	Key West Engineering	Over $1,000,000	HMGP, BRIC	2 - 3 years	Carry Forward	Building is currently under construction

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111	Key West	Parking lot stormwater storage pilot	Flood	2, 3	H	Structural Projects	Key West Engineering	$50,000 to $100,000	FMA, BRIC	2 - 5 years	Carry Forward	No progress
112	Key West	701 Palm Seawall: Seawall replacement	Flood, Sea Level Rise, Tropical Cyclones	2	M	Structural Projects	City of Key West	$2,000,000	City Funds	FY24-FY26	New	
113	Key West	Southernmost Point Seawall Repairs: Seawall replacement	Flood, Sea Level Rise, Tropical Cyclones	2	M	Structural Projects	City of Key West	$2,000,000	City Funds & FEMA PA	FY24-FY26	New	
114	Key West	Mallory T-Pier Extension and Improvements: Modification to better accommodate large ships	Flood, Sea Level Rise, Tropical Cyclones	2	L	Structural Projects	City of Key West	$2,000,000	City Funds & FL Stewardship Funds	FY24-FY27	New	
115	Key West	Mallory Square Hardening: Seawall and Pier hardening, includes stormwater work and shading	Flood, Sea Level Rise, Tropical Cyclones	2	M	Structural Projects	City of Key West	$30,000,000	City funds and all possible grants	FY23-FY30	New	
116	Key West	Mallory Square Historic Buildings: Wind hardening and floodproofing for all city owned Mallory Square historic buildings.	Flood, Sea Level Rise, Tropical Cyclones, Severe Storms and Tornadoes	2	M	Structural Projects	City of Key West	$10,000,000	City Funds & FL Dept of Historic Resources grants	FY23-FY30	New	
117	Key West	Martin Luther King Pool Replacement: Replacement of free, historic pool for community cooling and meeting spaces.	Extreme Heat	1, 3	M	Structural Projects	City of Key West	$10,000,000	City Funds & FL Recreation grants	FY25-FY28	New	
118	Key West	Berg & Kitso Boardwalks: Hardening for hurricanes with concrete foundation, replace wood structures, wood deck, and pillars.	Flood, Sea Level Rise, Tropical Cyclones	2	M	Structural Projects	City of Key West	$250,000	City Funds	FY25	New	
119	Key West	Indigenous Park Improvements: Create new, wind and flood resisted pavilions	Flood, Tropical Cyclones, Severe Storms and Tornadoes	2, 3	M	Property Protection	City of Key West	$1,600,000	City Funds	FY27	New	
120	Key West	Lagerhead's Roof Replacement: Code Plus Hardening	Tropical Cyclone, Severe Storms and Tornadoes	2	M	Property Protection	City of Key West	$50,000	City Funds	FY25	New	
121	Key West	Spotswood Park: Seawall replacement	Flood, Sea Level Rise, Tropical Cyclones	2	M	Structural Projects	City of Key West	$2,000,000	City Funds	FY6-FY27	New	

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
122	Key West	402 Wall Street Hardening: Renovate building to preserve structural integrity and bring up to current code for leasehold occupancy. Work includes mold remediation, new roof, fire suppression, HVAC, storefront and spalling repair.	All	2	H	Property Protection	City of Key West	$800,000	City Funds & FL Dept of Historic Resources grants	FY24-FY26	New	
123	Key West	Waterfront Playhouse Preservation and Hardening	All	2	L	Property Protection	City of Key West	$2,000,000	City Funds & FL Dept of Historic Resources grants	FY25-FY27	New	
124	Key West	White Street Pier Hardening: Redo rip rap retaining wall around pier.	Flood, Sea Level Rise, Tropical Cyclones	2	M	Structural Projects	City of Key West	$5,000,000	City Funds	FY26-27	New	
125	Key West	Wickers Park Stormwater Project: Elevation of prime bike trail through City	Flood, Sea Level Rise	2	M	Structural Projects	City of Key West	$1,100,000	City Funds & FDOT LAP grant	FY24-28	New	
126	Key West	Sewer Pump Station hardening: Pumps G, R, A, and F	Flood	2	M	Structural Projects	City of Key West	$10,000,000	City Funds	FY24-28	New	
127	Key West	Sewer Sludge Pumps and Valve Hardening: Upgrades to the Return Activated Sludge and Waste Activated Sludge pumps and valves.	Flood	2	M	Structural Projects	City of Key West	$4,000,000	City Funds	FY25-27	New	
128	Key West	Wastewater Treatment Plant Effluent Pump Hardening: New effluent pump.	Flood	2	M	Structural Projects	City of Key West	$2,500,000	City Funds	FY25-27	New	
129	Key West	Dennis Street Stormwater, Phase 2: Upgrade pumps with a low flow pump for added capacity. Replace storm drains and inlets that currently allow inflow and infiltration into the overall drainage system.	Flood	2	M	Structural Projects	City of Key West	$1,200,000	City Funds & Mayfield Grant	FY24-30	New	
130	Key West	Canal System Mitigative Clearing: Dredging, clearing of overgrown foliage and debris of open channel drainage conveyances (canals) throughout the city.	Flood	2	M	Prevention	City of Key West	$800,000	City Funds	Every 2 years	New	

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
131	Key West	Historic Bight: Conch Republic Seafood Company Wind Hardening: Code plus mitigation in V Zone	Tropical Cyclones, Severe Storms and Tornadoes	2	M	Property Protection	City of Key West	$5,000,000	City Funds	FY24-27	New	
132	Key West	Historic Bight: Turtle Kraals historic preservation	Flood	2	M	Property Protection	City of Key West	$550,000	City Funds	FY24-26	New	
133	Key West	Historic Bight: Electrical pedestal elevation	Flood	2	M	Property Protection	City of Key West	$500,000	City Funds	FY25-28	New	
134	Key West	Duval Street Commercial Properties flood and wind proofing	Flood	1, 2	M	Property Protection	City of Key West	$60,000,000	City Funds	FY24-35	New	
135	Key West	Historic Bight: Generator with Fuel Tank elevation & expansion.	Flood, Tropical Cyclones, Severe Storms and Tornadoes	2	M	Property Protection	City of Key West	$1,000,000	City Funds	FY25-27	New	
136	Key West	Historic Bight: Common Area Wave Attenuators	Flood, Tropical Cyclones	2	M	Structural Projects	City of Key West	$5,000,000	City Funds	FY25-28	New	
137	Key West	Historic Bight: Trumbo Shoreline Stabilization, Seawall & Pier Upgrades	Flood, Tropical Cyclones, Sea Level Rise, Coastal Erosion	2	M	Structural Projects	City of Key West	$6,000,000	City Funds	FY23-27	New	
138	Key West	Garrison Bight: Charter Boat Row Seawall Upgrades	Flood, Sea Level Rise, Tropical Cyclones	2	M	Structural Projects	City of Key West	$5,000,000	City Funds	FY24-27	New	
139	Key West	Garrison Bight: Angelfish & LAB Seawall Upgrades	Flood, Sea Level Rise, Tropical Cyclones	2	M	Structural Projects	City of Key West	$10,000,000	City Funds	FY24-27	New	
140	Key West	Garrison Bight: Upgrade Docks for SLR	Flood, Sea Level Rise, Tropical Cyclones	2	M	Structural Projects	City of Key West	$1,000,000	City Funds	FY25-28	New	
141	Key West	Parking Decks for Flood Protection	Flood, Sea Level Rise, Tropical Cyclones	1, 2	M	Structural Projects	City of Key West	$10,000,000	City Funds	FY24-30	New	
142	Key West	Voluntary Residential Buy Outs for SRL properties	Flood, Sea Level Rise, Tropical Cyclones	1, 2, 3	H	Property Protection	City of Key West	$15,000,000	City Funds & FEMA Grants	FY26-30	New	
143	Key West	Wind Harden and floodproof community critical facilities	Flood, Tropical Cyclones, Severe Storms and Tornadoes	2	H	Structural Projects	City of Key West	$5,000,000	City Funds & FEMA Grants	FY20-27	New	
144	Key West	Training program for contractors to elevate homes. Base off of New Orleans curriculum.	Flood, Sea Level Rise, Tropical Cyclones	1, 2	H	Property Protection, Public Education	City of Key West	$1,000,000	City Funds	FY23-30	New	
145	Key West	Increase safety and resiliency features in residential marinas and mooring fields	All	1, 3	M	Structural Projects	City of Key West	$8,000,000	City Funds	FY27-30	New	
146	Key West	Create more Resiliency Hubs to assist post storm	All	1, 3	H	Emergency Services	City of Key West	$25,000,000	City Funds	FY23-30	New	

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
147	Key West	Create Code Plus Tiny Home / Accessory Unit Models to help increase safe, affordable housing.	All	2	H	Prevention	City of Key West	$6,000,000	City Funds	FY27-30	New	
148	Key West	Create island wide Wi-Fi to increase affordable communications during storms or other disaster situations	All	1, 3	H	Emergency Services	City of Key West	$8,000,000	City Funds	FY27-30	New	
149	Key West	Install Living Shoreline and other Nature Based / Green Infrastructure systems to attenuate waves and lessen erosion	Flood, Sea Level Rise, Tropical Cyclones	2	H	Natural Resource Protection	City of Key West	$5,000,000	City Funds	FY27-30	New	
150	Key West	3D scan and develop interpretive materials for historic buildings with high cultural value.	All	2	L	Property Protection	City of Key West	$2,000,000	City Funds	FY27-30	New	
151	Key West	Create Cemetery Mitigation Plan to reduce displacement	Flood, Sea Level Rise	2	L	Prevention	City of Key West	$600,000	City Funds	FY27-30	New	
152	Key West	Create and enact below tide restoration plan of seagrass and corals to attenuate waves and lessen erosion	Coastal Erosion	2, 3	H	Prevention; Natural Resource Protection	City of Key West	$5,000,000	City Funds	FY27-30	New	
153	Key West	Create and enact plan to elevate Key West Tropical Forest and Botanical Garden via soil augmentation to lengthen lifespan of habitat.	Flood, Sea Level Rise	2, 3	M	Natural Resource Protection, Prevention	City of Key West	$10,000,000	City Funds	FY27-30	New	
154	Key West	Pilot floodable open space in public area to increase community acceptance and replication	Flood, Sea Level Rise, Tropical Cyclones	2, 3	H	Natural Resource Protection	City of Key West	$4,000,000	City Funds	FY27-30	New	
155	Key West	Retrofit North and South Roosevelt with additional wave attenuating nature based systems.	Flood, Tropical Cyclones	2, 3	M	Structural Projects; Natural Resource Protection	City of Key West	$25,000,000	City Funds	FY27-30	New	
156	Key West	Purchase Conservation Easements to increase open space in SFHAs	Flood	2, 3	H	Natural Resource Protection; Prevention	City of Key West	$10,000,000	City Funds	FY27-30	New	

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
157	Key West	Establish artificial buffer reefs to attenuate waves and reduce erosion.	Coastal Erosion, Tropical Cyclones	3	M	Natural Resource Protection, Structural Projects	City of Key West	$9,000,000	City Funds	FY27-30	New	
158	Key West	Sewer Facilities & System: Flood proofing and wind hardening	Flood, Tropical Cyclones, Severe Storms and Tornadoes	2	M	Structural Projects	City of Key West	$45,000,000	City Funds	FY27-30	New	
159	Key West	Stormwater Facilities & System: Flood proofing and wind hardening	Flood, Tropical Cyclones, Severe Storms and Tornadoes	2	M	Structural Projects	City of Key West	$30,000,000	City Funds	FY27-30	New	
160	Key West	Potable Water Facilities & System: Flood proofing and wind hardening	Flood, Tropical Cyclones, Severe Storms and Tornadoes	2	M	Structural Projects	FKAA	$60,000,000	FKAA Funds	FY27-30	New	
161	Key West	Diversify fuel sources for redundancy options post storm; prioritize critical facilities	All	3	M	Emergency Services	City of Key West	$3,000,000	City Funds	FY27-30	New	
162	Key West	Diversify potable water sources for redundancy options post storm; prioritize critical facilities	All	3	M	Emergency Services	City of Key West	$5,000,000	City Funds	FY27-30	New	
163	Key West	Diversify energy sources for redundancy options post storm; prioritize critical facilities	All	3	M	Emergency Services	City of Key West	$8,000,000	City Funds	FY27-30	New	
164	Key West	Stormwater: 6th Street and Patterson Avenue Neighborhood Drainage	Flood	2	M	Structural Projects	City of Key West	$6,000,000	City Funds	FY27-30	New	
165	Key West	Stormwater: Tropical Street to George Street Neighborhood Drainage	Flood	2	M	Structural Projects	City of Key West	$35,000,000	City Funds	FY27-30	New	
166	Key West	Stormwater: West Riviera Drive Improvements	Flood	2	M	Structural Projects	City of Key West	$27,000,000	City Funds	FY27-30	New	
167	Key West	Stormwater: East End Resiliency Planning Zone	Flood	2	M	Structural Projects	City of Key West	$125,000,000	City Funds	FY27-30	New	
168	Key West	Stormwater: White Street to Grinnell Street Neighborhood Drainage	Flood	2	M	Structural Projects	City of Key West	$28,000,000	City Funds	FY27-30	New	
169	Key West	Stormwater: Harmonize neighborhood roads with Monroe County Flagler Project	Flood	2, 3	M	Structural Projects	City of Key West	$18,000,000	City Funds	FY27-30	New	

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170	Key West	Stormwater: Harmonize neighborhood roads with FDOT Jose Marti / Eaton Street Project	Flood	2, 3	M	Structural Projects	City of Key West	$7,000,000	City Funds	FY27-30	New	
171	Key West	Stormwater: Partner with Navy and Monroe County on Palm Avenue solutions	Flood	2, 3	M	Structural Projects	City of Key West	$26,000,000	City Funds	FY27-30	New	
172	Key West	Energy: Plan and enact how to use electric vehicle fleet as batteries post storm.	All	2, 3	M	Prevention, Emergency Services	City of Key West	$12,000,000	City Funds	FY27-30	New	
173	Key West	Planning: Canopy Master Plan and Storm scaping.	Tropical Cyclones	2	M	Prevention	City of Key West	$600,000	City Funds	FY27-30	New	
174	Key West	Affordable housing: Wind Harden, Flood proof, Weatherize and Solarize Housing Authority properties	Flood, Tropical Cyclone, Extreme Heat	1, 2, 3	M	Property Protection	City of Key West	$12,000,000	City Funds	FY27-30	New	
175	Key West	Planning: Create post storm building permit manual, specifically addressing nonconformities, build back standards and disclosure notices	Flood Tropical Cyclones	1, 2, 3	H	Prevention	City of Key West	$800,000	City Funds	FY27-30	New	
176	Key West	Planning: Develop a Coastal Defense Strategy and Design Guide based on the best practices of living shorelines and built infrastructure such as seawalls and levies to be used by local contractors.	Flood, Sea Level Rise, Coastal Erosion	2, 3	H	Prevention; Natural Resource Protection	City of Key West	$800,000	City Funds	FY27-30	New	
177	Key West	Decrease saltwater intrusion into the wastewater system by lining collection lines	Sea Level Rise, Flood	2	M	Structural Projects	City of Key West	$16,000,000	City Funds	FY27-30	New	
178	Key West	Planning: Create & disseminate continuity of operations program and mitigation guidebook for local businesses.	All	1, 2	M	Public Education	City of Key West	$600,000	City Funds	FY27-30	New	
179	Layton	Become Storm Ready Community	All	1, 3	H	Emergency Services, Public Information & Outreach	Layton Building Department	Less than $10,000	Staff Time	1 - 2 years	Carry Forward	Not completed and would like to pursue

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
180	Layton	Add culverts to canals on the East side of the city to improve water flow and water quality	Flood, Tropical Cyclones, Drought, Sea Level Rise	2	M	Structural, Natural Resource Protection	Layton City Council & Building Department	$100,000 to $500,000	HMGP, BRIC, FMA, CDBG-MIT	5 years	Carry Forward	Watershed Management Plan underway which will inform design of culverts
181	Layton	Partner with Monroe County Fire Rescue to rebuild fire house and administrative offices elevated or flood proofed above BFE plus minimum 3' freeboard.	Tropical Cyclones, Severe Storms and Tornadoes, Flood, Sea Level Rise	2, 3	M	Property protection	Monroe County Fire Rescue; City of Layton	$500,000 to $1,000,000	HMGP, BRIC,FMA	5-7 years	Carry Forward	Renderings completed, still a priority
182	Layton	Develop an Adaptation Action Plan based on the results of the Vulnerability Assessment and the Watershed Management Plan	Flood, Sea Level Rise, Tropical Cyclones, Coastal Erosion	1, 2, 3	M	Prevention	City of Layton	$100,000	FDEP	3 years	New	
183	Layton	Become a CRS Class 4 or better	Flood, Sea Level Rise, Tropical Cyclones	1, 2	M	Prevention	City of Layton	$45,000	Staff Time	3 years	New	
184	Layton	Develop and implement a Stormwater & Roads Plan to provide stormwater infrastructure for the City of Layton based on the results of the Vulnerability Assessment and Watershed Management Plan	Flood, Sea Level Rise, Tropical Cyclones	2, 3	M	Prevention	City of Layton	$100,000	FDEP, HMGP	5-7 years	New	
185	Marathon	City-wide communications network	All	3	M	Emergency Services	Marathon Fire Rescue; Marathon Administration	$150,000	BRIC, HMGP	2025	Carried Forward	No progress has been made on this action to date.
186	Marathon	Critical Facility Hardening	All	2	H	Structural Projects	Marathon Public Works	$290,000	HGMP, BRIC, CDBG-DR, CDBG-MIT	2024	Carried Forward	Partial Progress; Further hardening work remains
187	Marathon	Emergency Generators and Fuel Trailers for Critical Facilities	All	2, 3	H	Property Protection	Marathon Public Works	$175,000	HMGP, BRIC	2023	Carried Forward	Generators project installation have been completed for both the City Marina and Fire Station 14. Will pursue upgrades for other facilities

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188	Marathon	Marathon Coastal Hardening and Resiliency	Tropical Cyclones, Flood, Sea Level Rise, Coastal Erosion	2, 3	H	Structural Projects	Marathon Public Works; Marathon Planning	$1,200,000	HMGP, BRIC, FMA	2024	Carried Forward	92nd Street Road elevation. Grant has been awarded for design, and are in the process of negotiations with selected consultant. Projected to begin in 2026. Completion of Coco Plum Beach Area Adaptation Action Plan completed in 4-15-21
189	Marathon	Wastewater Treatment Facilities and Area 6 Flood Wall	All	2	H	Structural Projects	Marathon Utilities	$3,155,528	HMGP, BRIC, FMA, CDBG-MIT	2023	Carried Forward	Engineering completed and submitted for external agency permitting. Still awaiting permit approval from FDEP. Marathon Area 3 WWTP expansion has been delayed due to FDEP permitting.
190	Islamorada	Emergency Back-up Power for Critical Facilities	All	2	H	Property Protection	Islamorada Public Works	$500,000	HMGP, BRIC	1 - 5 years	Carry Forward	Still in progress. One station has received a generator, the other is pending.
191	Islamorada	Flood-proofing for Fire Stations (3)	Tropical Cyclones, Flood, Sea Level Rise	2	M	Property Protection	Islamorada Fire Rescue; Islamorada Public Works	$300,000	HMGP, BRIC, FMA	1 - 5 years	Carry Forward	Still in progress. Project is in design phase.
192	Islamorada	Wastewater System Mitigation	All	2	M	Property Protection	Islamorada Wastewater Utility; Islamorada Public Works	$600,000	HMGP, BRIC, FMA	1 - 5 years	Carry Forward	Still in progress. 4 out of 6 station have been completed.

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
193	Islamorada	Fire Station 20 FEMA 361 Saferoom for First Responders	All	1, 2, 3	M	Emergency Services	Islamorada Public Works	$6,000,000	HMGP, BRIC, FMA	1 - 5 years	Carry Forward	In process. Combined with floodproofing for one station. In design phase.
194	Islamorada	Overseas Highway/ Sea Oats Beach Flood and Erosion Protection	Tropical Cyclones, Flood, Sea Level Rise, Coastal Erosion	2	H	Structural Projects, Natural Resource Protection	Islamorada Public Works	$10,000,000	HMGP, BRIC, FMA	1 - 5 years	Carry Forward	FDOT completed this project, but ongoing work is likely
195	Islamorada	Become Storm Ready Community	All	1	H	Emergency Services, Public Education	Islamorada Development Services	$10,000	Staff Time	2 - 3 years	New	

8 PLAN MAINTENANCE

Requirement §201.6(c)(4): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. This section discusses how the Mitigation Action Plan will be implemented by participating jurisdictions and outlines the method and schedule for monitoring, updating, and evaluating the plan. This section also discusses incorporating the plan into existing planning mechanisms and how the public will continue to be involved in the planning process. It consists of the following three subsections:

8.1 Distribution
8.2 Implementation
8.3 Monitoring, Evaluation, and Enhancement
8.4 Continued Public Involvement

8.1 DISTRIBUTION

Upon adoption of the 2025 Monroe County Local Mitigation Strategy Update, the plan in its entirety will be posted on the Monroe County Emergency Management Department's website. Notice of its availability will be distributed to relevant Federal and State agencies, as well as local elected officials. The plan will be maintained on the Monroe County Emergency Management Department's website for public access throughout its duration.

8.2 IMPLEMENTATION

Each jurisdiction participating in this plan update is responsible for implementing specific mitigation actions as prescribed in the Mitigation Action Plan (found in Section 7). In the Mitigation Action Plan, every proposed action is assigned to a specific local department or agency to ensure responsibility and accountability and increase the likelihood of subsequent implementation. Jurisdiction may update the actions applicable to their jurisdiction as needed without altering the broader focus of the LMS.

In addition to the assignment of a local lead department or agency, an implementation timeline or a specific implementation date or window has been assigned to each mitigation action to help assess whether reasonable progress is being made toward implementation. The participating jurisdictions will seek outside funding sources to implement mitigation projects in both the pre-disaster and post-disaster environments. When applicable, potential funding sources have been identified for proposed actions listed in the Mitigation Action Plan.

An important implementation mechanism that is highly effective and low-cost is integration of the Local Mitigation Strategy recommendations and their underlying principles into other plans and mechanisms. Where possible, plan participants will use existing plans and/or programs to implement the Mitigation Action Plan. LMSWG group members may consider integrating the findings, recommendations, and actions presented in the LMS into the following plans and ordinances, among others:

- Comprehensive Plans;
- Zoning Ordinances & Land Use Plans;
- Subdivision Ordinances;
- Building Codes;

- Emergency Operations Plans;
- Capital Improvements Plans;
- Repetitive Loss Plans;
- Climate Change/Sea Level Rise Plans;
- Small Area Plans; and
- Transportation Plans.

Monroe County and its jurisdictions acknowledge the risk and the associated effects of hazards such as high winds, tropical cyclones and storm surge, flooding, and sea level rise. As such, data regarding risk assessments and options to mitigate such risk are incorporated into existing community planning mechanisms, which are detailed in each community's individual annexes.

Moving forward, it will be the responsibility of the LMSWG representatives from each participating jurisdiction to continue to determine and pursue opportunities for integrating the findings, requirements, and strategies of this plan with other local planning documents. The LMSWG is also responsible for ensuring that the goals and strategies of new and updated local planning documents for their jurisdictions or agencies are consistent with the goals and actions of the Local Mitigation Strategy and will not contribute to increased hazard vulnerability in the planning area. Methods for integration may include:

- Monitoring other planning/program agendas;
- Attending other planning/program meetings;
- Participating in other planning processes; and
- Monitoring community budget meetings for other community program opportunities.

Many identified mitigation initiatives are capital projects, the implementation of which is usually dependent upon the availability of funding. When such initiatives are prioritized, and funding is sought, each jurisdiction will comply with its existing rules regarding inclusion of projects in its Capital Improvement Plan or other budget and planning processes and documents.

Opportunities to integrate the requirements of this plan into other local planning mechanisms shall continue to be identified through future meetings of the LMSWG and through the five-year review process described herein. Although it is recognized that there are many possible benefits to integrating components of this plan into other local planning mechanisms, the development and maintenance of this stand-alone Local Mitigation Strategy is deemed by the LMSWG to be the most effective and appropriate method to implement local hazard mitigation actions at this time.

8.3 MONITORING, EVALUATION, AND ENHANCEMENT

8.3.1 ROLE OF LMSWG IN IMPLEMENTATION, MONITORING AND MAINTENANCE

With adoption of this plan, each jurisdiction will be responsible for the implementation and maintenance of their mitigation actions. The LMS Coordinator from Monroe County Emergency Management will take the lead in all plan monitoring and update procedures. As such, each jurisdiction agrees to continue their relationship with the LMSWG and:

- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high-priority, low/no-cost recommended actions;
- Ensure hazard mitigation remains a consideration for community decision makers;

- Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the community implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and update of this plan;
- Report on plan progress and recommended revisions to the local governing boards; and
- Inform and solicit input from the public.

The LMSWG's primary duty moving forward is to see the plan successfully carried out and report to the local governing boards, FDEM, FEMA, and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about mitigation, passing concerns on to appropriate entities, and providing relevant information for posting on community websites (and others as appropriate).

Simultaneous to these efforts, it will be important to maintain a constant monitoring of funding opportunities that can be leveraged to implement some of the costlier recommended actions. This will include creating and maintaining a bank of ideas on how to meet local match or participation requirements. When funding does become available, the County will be positioned to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, state and federal earmarked funds, benefit assessments, and other grant programs, including those that can serve or support multi-objective applications.

8.3.2 MONITORING AND MAINTENANCE SCHEDULE

Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation and to update the plan as progress, roadblocks, or changing circumstances are recognized. The LMS Coordinator will be responsible for convening the LMSWG and initiating regular reviews. Regular maintenance will take place through quarterly conference calls and an annual meeting of the LMSWG. The LMSWG will also convene to review the plan after significant hazard events. The criteria recommended in 44 CFR 201 and 206 will be utilized in reviewing and updating the plan.

8.3.3 MAINTENANCE EVALUATION PROCESS

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

- Decreased vulnerability as a result of implementing recommended actions;
- Increased vulnerability as a result of failed or ineffective mitigation actions; and/or
- Increased vulnerability as a result of new development (and/or annexation).

Updates to this plan will:

- Consider changes in vulnerability due to project implementation;
- Document success stories where mitigation efforts have proven effective;
- Document areas where mitigation actions were not effective;
- Document any new hazards that may arise or were previously overlooked;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate growth and development-related changes to asset inventories; and
- Incorporate new project recommendations or changes in project prioritization.

8.3.3.1 *QUARTERLY LMSWG MEETINGS*

To ensure effectiveness in meeting the goals set forth in this plan, the LMS working group will convene quarterly via conference call. More specifically, quarterly reviews will monitor changes to the following information:

- Community growth or change in the past quarter along with updates to community plans.
- The implementation status of the mitigation strategy and individual mitigation action items, including noting completed items or progress made toward completion, amended items, and deleted items due to changed priorities or otherwise.
- The number of substantially damaged or substantially improved structures by flood zone.
- The renovations and mitigation activities to public infrastructure including water, sewer, drainage, roads, bridges, gas lines, and buildings.
- The number of building and assets protected or mitigation.
- Natural hazard occurrences that required activation of any Emergency Operations Center (EOC) in the County and whether the event resulted in a presidential disaster declaration.
- Natural hazard occurrences that were not of a magnitude to warrant activation of the EOC or a federal disaster declaration but were severe enough to cause damage in the community or closure of businesses, schools, or public services.
- The dates of hazard events descriptions.
- Documented damages due to the event; include details on closure of places of employment or schools and the number of days closed, road or bridge closures due to the hazard event and length of time closed, and an assessment of the number of private and public buildings damaged and whether the damage was minor, substantial, major, or if buildings were destroyed. The assessment will include residences, mobile homes, commercial structures, industrial structures, and public buildings, such as schools and public safety buildings.

8.3.3.2 *ANNUAL EVALUATION AND UPDATES*

Per Florida Administrative Code Chapter 27P-22, and to ensure the LMS is current and continues to serve the interest of residents and visitors, the LMSWG will perform annual evaluations. By the end of September of each year, the LMS Coordinator will notify LMSWG members of the need to identify and compile revisions brought up through quarterly reviews. Working group members will submit any proposed revisions to Emergency Management to be discussed at the annual LMSWG meeting. Minor revisions may be handled by addenda while significant revisions will be submitted to FDEM. The LMS Coordinator will compile the proposed revisions and submit them to the Department of Community Affairs and FDEM by the last working day of January. Revisions may be warranted due to:

- Hazard events that have occurred prompting a change in the characterization of risk and vulnerability or warrant the consideration of additional initiatives;
- Significant changes, such as addition or deletion, to the critical facilities lists;
- Changes to the NFIP's list of Repetitive Loss Properties;
- Changes in develop that result in changes to the characterization of people and property that are at risk;
- Changes to the list of mitigation initiatives including the addition of new initiatives, or the deletion or completion of existing initiatives;
- Changes in department organization, regulations, comprehensive plans, and the like; and
- Changes necessary to comply with State and Federal program requirements.

In the event of a major hazard event such as a hurricane or tropical storm, the LMSWG will convene after the event to discuss its impacts and initiate a discussion on how the LMSWG can influence mitigation in the recovery process. Whether shortly after an event or in response to receiving notice from FDEM that mitigation funds are available, the LMSWG will consider which project and initiatives will be prioritized.

8.3.3.3 *FIVE-YEAR UPDATE*

The LMS Coordinator will be responsible for reconvening the LMSWG for the Five-Year plan update. In part, this revision will be to incorporate the material collected for the annual updates in the four years prior. The five-year update will be submitted to FDEM and FEMA Region 4. With this plan update anticipated to be completed by January 2026, the next plan update for Monroe County will be completed by January 2031.

8.4 CONTINUED PUBLIC INVOLVEMENT

Continued public involvement is imperative to the overall success of the plan's implementation. The quarterly review process will provide an opportunity to solicit participation from new and existing stakeholders and to publicize success stories from the plan implementation and seek additional public comment. Efforts to involve the public in the maintenance, evaluation and revision process may include:

- Advertising LMSWG meetings in the local newspaper, public bulletin boards and/or local government office buildings;
- Designating willing citizens and private sector representatives as official members of the LMSWG;
- Utilizing local media to update the public of any maintenance and/or review activities;
- Utilizing local government websites to advertise any maintenance and/or review activities;
- Maintaining copies of the plan in public libraries or other appropriate venues;
- Posting annual progress reports on the Plan to local government websites;
- Heavy publicity of the plan and potential ways for the public to be involved after significant hazard events, tailored to the event that has just happened;
- Keeping websites, social media outlets, etc. updated;
- Drafting articles for the local community newspapers/newsletters;
- Utilizing social media accounts (e.g. Twitter, Facebook).

8.4.1 PUBLIC INVOLVEMENT FOR FIVE-YEAR UPDATE

When the LMSWG reconvenes for the five-year update, they will coordinate with all stakeholders participating in the planning process—including those that joined the committee since the planning process began—to update and revise the plan. In reconvening, the LMSWG will be responsible for coordinating the activities necessary to involve the greater public, including disseminating information through a variety of media channels detailing the plan update process. As part of this effort, public meetings will be held and public comments will be solicited on the plan update draft.

9 PLAN ADOPTION

Requirement §201.6(c)(5): [The plan shall include] documentation that the plan has been formally approved by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).

The purpose of formally adopting this plan is to secure buy-in, raise awareness of the plan, and formalize the plan's implementation. The adoption of this plan completes Planning Step 9 (Adopt the Plan) of the 10-step planning process, in accordance with the requirements of DMA 2000. FDEM Approval Letters and community adoption resolutions are provided on the following pages.

Placeholder for resolutions

A UNINCORPORATED MONROE COUNTY

A.1 ASSET INVENTORY

Unincorporated Monroe County and the LMS Working Group provided a local inventory of critical facilities and community lifelines, which are a priority for mitigation planning and emergency management. Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function. Table A.1 provides a count of critical facilities by FEMA lifeline category in unincorporated Monroe County. Figure A-1 through Figure A-7 show the locations of all critical facilities in unincorporated Monroe County.

Table A.2 provides a detailed inventory of the critical facilities in unincorporated Monroe County, indicating each facility's FEMA lifeline category, flood zone, 1% annual chance flood depth, sea level rise, storm surge, and wildfire. More information on hazard vulnerability is provided in the hazard profiles.

Table A.1 – Critical Facilities, Unincorporated Monroe County

Facility Type	Count of Facility Type	Structure Value
Communications	28	$13,095,053
Energy	17	$24,548,908
Food, Hydration, Shelter	14	$92,084,662
Hazardous Materials	2	$238,623
Health and Medical	10	$31,432,297
Safety and Security	35	$26,926,484
Transportation	2	$83,627
Water Systems	190	$73,861,022
Total	**298**	**$262,265,194**

Source: LMS Working Group, GIS Analysis

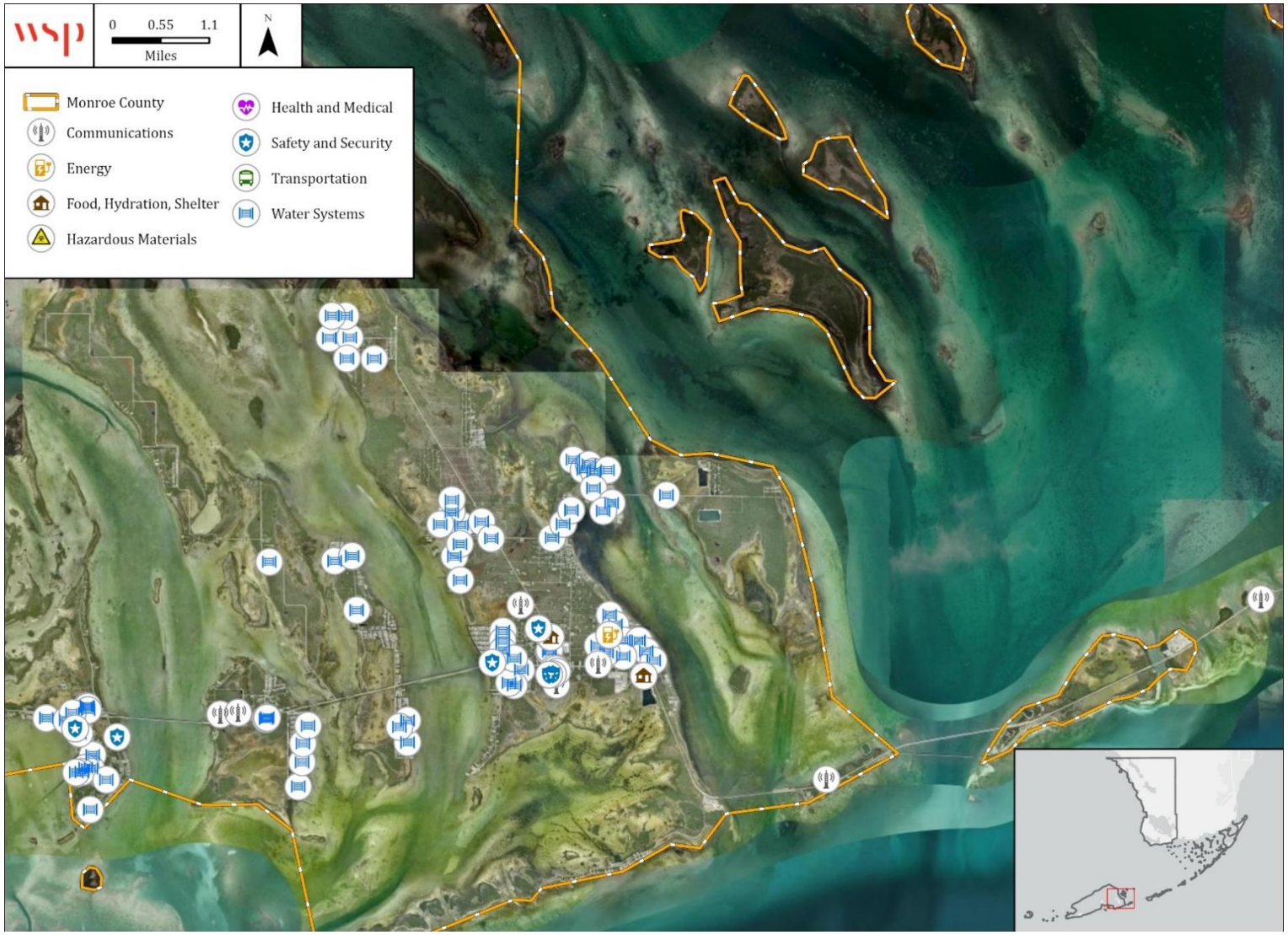
Figure A-1 – Critical Facilities, Unincorporated Monroe County (Inset 1)

Source: LMS Working Group, GIS Analysis

Figure A-2 – Critical Facilities, Unincorporated Monroe County (Inset 2)

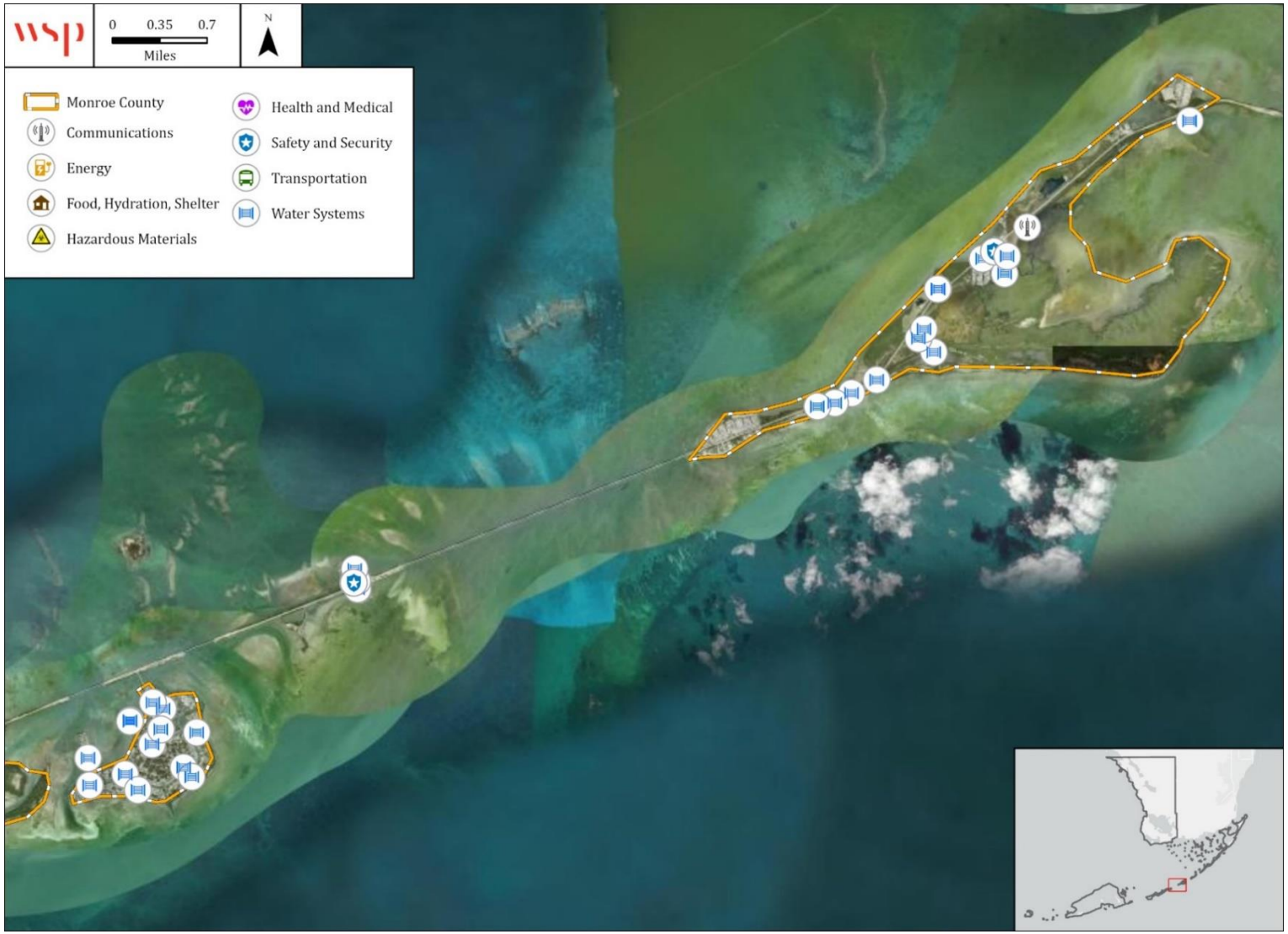
Source: LMS Working Group, GIS Analysis

Figure A-3 – Critical Facilities, Unincorporated Monroe County (Inset 3)



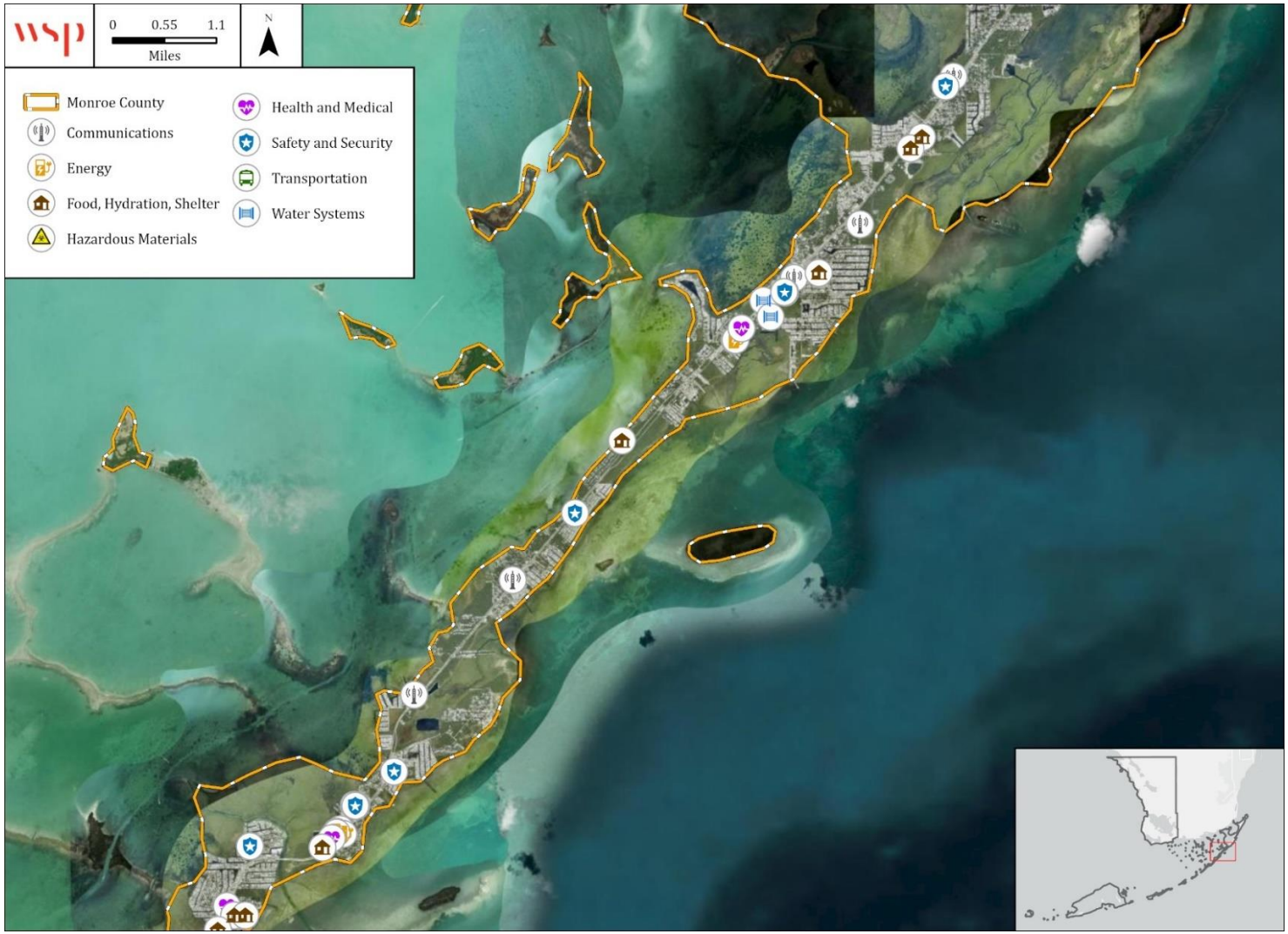
Source: LMS Working Group, GIS Analysis

Figure A-4 – Critical Facilities, Unincorporated Monroe County (Inset 4)



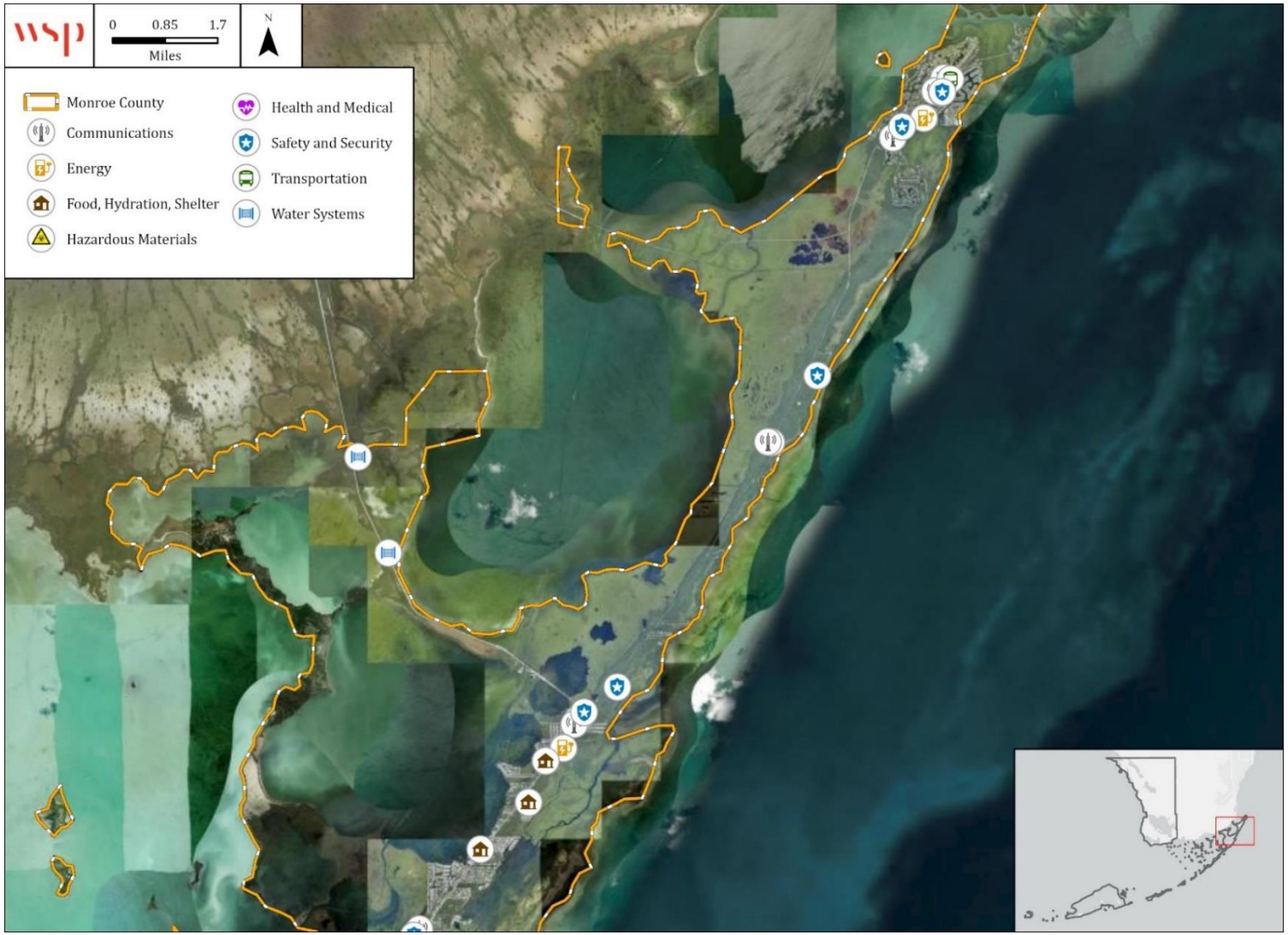
Source: LMS Working Group, GIS Analysis

Figure A-5 – Critical Facilities, Unincorporated Monroe County (Inset 5)



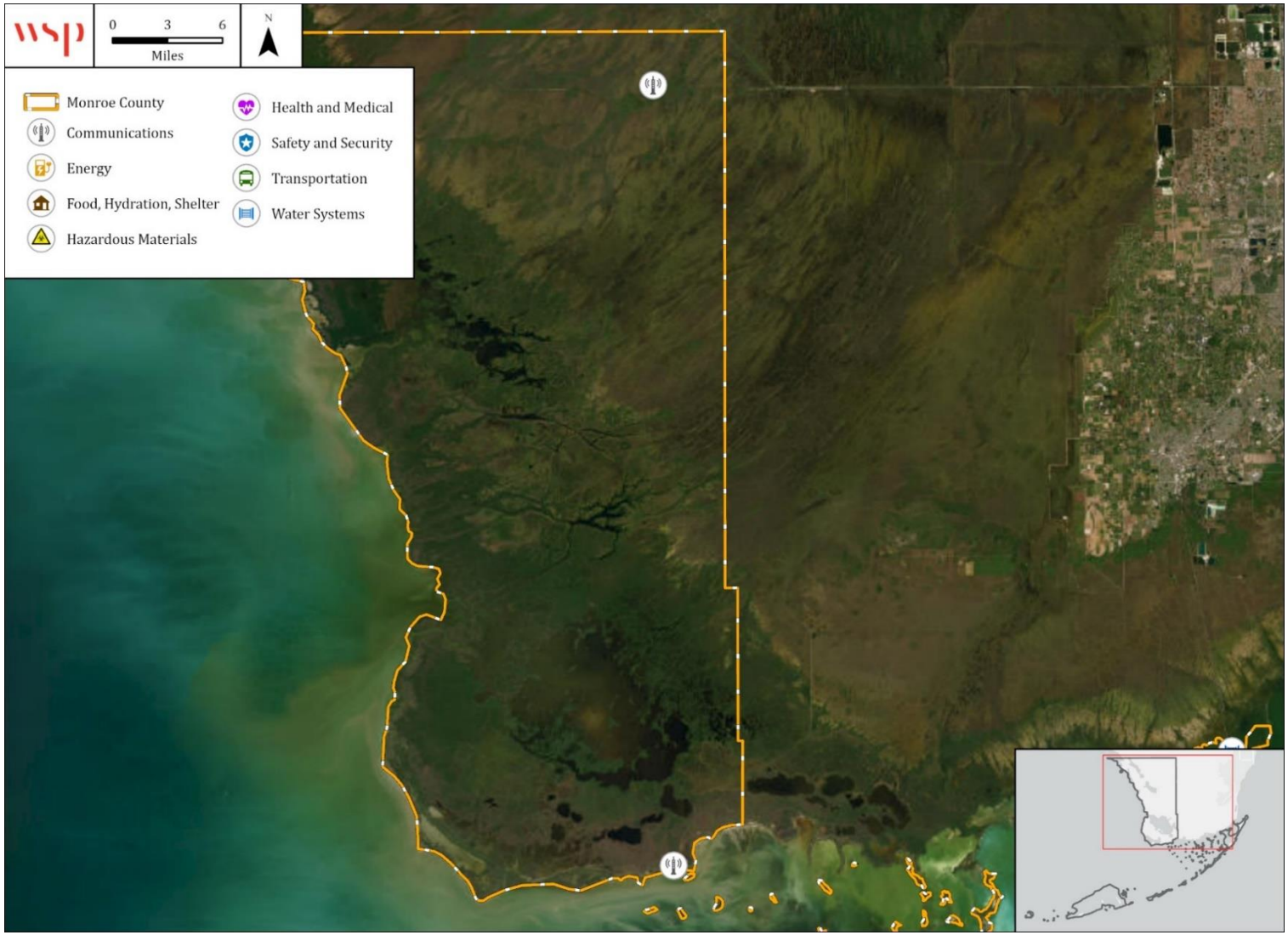
Source: LMS Working Group, GIS Analysis

Figure A-6 – Critical Facilities, Unincorporated Monroe County (Inset 6)



Source: LMS Working Group, GIS Analysis

Figure A-7 – Critical Facilities, Unincorporated Monroe County (Inset 7)



Source: LMS Working Group, GIS Analysis

Table A.2 – Critical Facilities Inventory, Unincorporated Monroe County

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Safety and Security	Emergency Ops	6180 2nd Street	$1,556,482.00	6.0	AE	NOAA 3ft	SS 100yr	-	0
Hazardous Materials	Landfill	740 Blimp Road	$238,623.00	0.0	AE	-	-	Direct Exposure	3
Energy	Energy	9160 Overseas Highway - Bayside	$11,197,550.00	1.3	AE	-	SS 100yr	-	0
Hazardous Materials	Landfill	11180 County Road 905	-	-	X (Shaded)	-	SS 100yr	Direct Exposure	1
Safety and Security	Government	1800 Blimp Road	-	6.9	AE	NIL	SS 100yr	-	0
Safety and Security	Emergency Ops	Blimp Road	-	8.6	AE	NIL	SS 100yr	-	4.5
Safety and Security	Emergency Ops	-	-	5.9	AE	NIH	SS 100yr	-	0
Energy	Energy	105901 Overseas Highway	-	-	X (Unshaded)	-	SS 500yr	Indirect Exposure	0
Energy	Energy	755 Blimp Road	-	3.0	AE	-	SS 100yr	-	2
Energy	Energy	910 Overseas Highway	$62,813.00	2.2	AE	-	SS 100yr	Indirect Exposure	0
Health and Medical	Emergency Ops	28 Emerald Drive	$1,133,885.00	1.8	AE	-	SS 100yr	Indirect Exposure	0
Food, Hydration, Shelter	Emergency Ops	21460 Overseas Highway	$1,276,394.00	7.1	VE	-	SS 100yr	Indirect Exposure	0
Energy	Energy	98401 Overseas Highway	-	-	X (Shaded)	-	SS 500yr	-	0
Health and Medical	Emergency Ops	151 Marine Avenue	$702,274.00	0.5	AE	-	SS 500yr	-	0
Food, Hydration, Shelter	Emergency Ops	104801 Overseas Highway	$8,643,572.69	0.0	AE	-	-	Indirect Exposure	0
Safety and Security	Emergency Ops	220 Reef Drive	$694,511.00	-	X (Unshaded)	-	SS 500yr	Indirect Exposure	0
Health and Medical	Emergency Ops	390 Key Deer Boulevard	$1,291,095.30	4.5	AE	-	SS 100yr	Indirect Exposure	0
Food, Hydration, Shelter	Emergency Ops	390 Key Deer Boulevard	$1,291,095.30	3.8	AE	-	SS 100yr	Indirect Exposure	0
Energy	Energy	5901 Overseas Highway	-	5.0	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	97000 Overseas Highway	$33,376,013.47	0.7	AE	-	SS 100yr	-	0
Safety and Security	Government	102050 Overseas Highway	$7,783,953.00	-	X (Shaded)	-	SS 500yr	-	0
Safety and Security	Emergency Ops	-	-	8.3	AE	NOAA 3ft	SS 100yr	Indirect Exposure	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	Emergency Ops	255 Crane Boulevard	$16,051,667.29	4.1	AE	-	SS 100yr	Indirect Exposure	0
Safety and Security	Emergency Ops	County Road 905	-	0.2	AE	-	SS 100yr	-	2.5
Communications	Communications	Mm 20 Overseas Highway	$439,792.00	6.5	AE	-	SS 100yr	Direct Exposure	2
Safety and Security	Emergency Ops	-	$50,246.10	5.3	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	30320 Overseas Highway	$763,830.00	4.7	AE	NIH	SS 100yr	Indirect Exposure	0
Safety and Security	Emergency Ops	30250 Overseas Highway	$31,792.00	4.6	AE	NIH	SS 100yr	Indirect Exposure	0
Safety and Security	Emergency Ops	17001 Overseas Highway	-	9.1	AE	NIL	SS 100yr	-	0
Safety and Security	Emergency Ops	-	$403,420.00	5.7	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Water	Mm 27 Overseas Highway	$593,399.00	2.6	AE	-	SS 100yr	Indirect Exposure	0
Safety and Security	Emergency Ops	30220 Overseas Highway	$1,576,701.00	4.5	AE	-	SS 100yr	Indirect Exposure	0
Food, Hydration, Shelter	Emergency Ops	105500 Overseas Highway	$2,920,419.97	-	X (Unshaded)	-	-	Indirect Exposure	0
Transportation	Transportation	764 Barracuda Lane	$83,627.00	4.5	AE	NIH	SS 100yr	Indirect Exposure	0
Food, Hydration, Shelter	Emergency Ops	3Rd Street	$130,349.00	3.8	AE	-	SS 100yr	-	0
Energy	Energy	6900 Front Street Extended	-	3.1	AE	-	SS 100yr	-	0
Water Systems	Water	7200 Front Street	$3,325,049.00	4.8	VE	-	SS 100yr	-	0
Safety and Security	Emergency Ops	Gatehouse Road	-	5.0	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	101463 Overseas Highway	$14,280,583.00	-	X (Shaded)	-	-	-	0
Communications	Communications	30336 Overseas Highway	$508,371.00	7.3	AE	-	SS 100yr	Indirect Exposure	0
Safety and Security	Emergency Ops	MM 30 Overseas Highway	-	4.6	AE	-	SS 100yr	-	0
Communications	Communications	102180 Overseas Highway	$678,414.00	-	X (Shaded)	-	SS 100yr	Indirect Exposure	0
Health and Medical	Emergency Ops	8 S Conch Avenue	$707,904.00	6.8	AE	-	SS 100yr	-	-
Safety and Security	Emergency Ops	8 S Conch Avenue	$707,904.00	5.9	AE	-	SS 100yr	-	-
Communications	Communications	30769 Avenue A	$426,925.00	2.8	AE	-	SS 100yr	Indirect Exposure	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Transportation	Transportation	-	-	9.7	AE	NIL	SS 100yr	-	2.5
Energy	Energy	91605 Overseas Highway - Ocean	$1,226,926.00	0.0	AE	-	SS 500yr	-	0
Food, Hydration, Shelter	Emergency Ops	103800 Overseas Highway	$3,593,402.31	3.7	AE	-	SS 100yr	Indirect Exposure	0
Safety and Security	Emergency Ops	110 Anchor Dr	$2,279,078.47	3.7	AE	-	SS 100yr	Indirect Exposure	0
Safety and Security	Emergency Ops	751 Tropical Drive	-		X (Unshaded)	-	SS 500yr	-	0
Safety and Security	Emergency Ops	East Shore Dr	-	8.0	AE	NIL	SS 100yr	-	0
Health and Medical	Health	91500 Overseas Highway	$22,497,651.00	2.7	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	31300 Overseas Highway	$2,065,566.28	4.3	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Water	91620 Overseas Highway	$244,102.00	0.9	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	91200 Overseas Highway	$6,849,333.00	3.7	AE	-	SS 100yr	-	0
Safety and Security	Emergency Ops	1 East Drive	$906,995.00		X (Shaded)	-	-	-	0
Safety and Security	Emergency Ops	1 East Drive	$906,995.00		X (Shaded)	-	-	-	0
Communications	Communications	94930 Overseas Highway	$748,364.00	1.2	AE	-	SS 100yr	-	0
Safety and Security	Government	MM 8 Overseas Highway	-	6.8	AE	NIL	SS 100yr	Indirect Exposure	0
Safety and Security	Emergency Ops	141 Overseas Highway	-	7.8	AE	NIH	SS 100yr	Indirect Exposure	0
Safety and Security	Emergency Ops	121 Us 1	-	4.5	AE	-	SS 100yr	Indirect Exposure	0
Safety and Security	Emergency Ops	-	-	4.8	AE	-	-	Indirect Exposure	0
Safety and Security	Emergency Ops	151 Marine Avenue	$702,274.00	0.0	AE	-	SS 500yr		0
Food, Hydration, Shelter	Emergency Ops	69 Hibiscus Lane	-		X (Shaded)	-	SS 500yr	Direct Exposure	1
Health and Medical	Emergency Ops	98600 Overseas Highway	$1,118,726.00		X (Unshaded)	-	-	-	0
Safety and Security	Emergency Ops	State Road 905	$164,508.00	8.4	AE	NIL	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	500 St Croix Place	$842,436.00	-	X (Shaded)	-	SS 100yr	-	0
Water Systems	Water	30222 Drinka Ct	-	5.2	AE	NOAA 3ft	SS 100yr	Indirect Exposure	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Water Systems	Water	-	$200,788.00	3.3	AE	-	SS 100yr	Direct Exposure	2
Safety and Security	Emergency Ops	22352 Overseas Highway	$692,996.00	6.8	AE	-	SS 100yr	Indirect Exposure	0
Safety and Security	Government	450 Key Deer Boulevard	$1,443,707.00	4.7	AE	-	SS 100yr	Indirect Exposure	0
Energy	Energy	-	$303,198.00	5.6	AE	-	SS 100yr	Indirect Exposure	0
Energy	Energy	-	$303,198.00	5.6	AE	-	SS 100yr	Indirect Exposure	0
Energy	Energy	-	$11,197,550.00	1.3	AE	-	SS 100yr		0
Energy	Energy	-	-	-	X (Shaded)	-	SS 100yr	Indirect Exposure	0
Energy	Energy	-	-	-	X (Shaded)	-	SS 500yr		0
Communications	Communications	-	-	7.5	AE	NIL	SS 100yr	Direct Exposure	2.5
Communications	Communications	-	$218,924.00	8.0	AE	NIL	-	-	0
Communications	Communications	-	$2,572,398.00	4.4	AE	-	SS 100yr	-	0
Communications	Communications	-	-	10.0	AE	NIL		Indirect Exposure	0
Communications	Communications	-	$90,906.00	7.6	AE	NIL	SS 100yr	-	2.5
Communications	Communications	-	$39,181.00	0.9	AE		SS 100yr	-	-
Communications	Communications	-	$13,150.00	10.5	AE	NIL	SS 100yr	-	2.5
Communications	Communications	-	$171,952.00	9.7	AE	NIL	SS 100yr	Direct Exposure	2.5
Communications	Communications	-	$642,235.00	4.4	AE	NIH	SS 100yr	Indirect Exposure	0
Communications	Communications	-	$117,336.00	8.4	AE	NIL	SS 100yr	Direct Exposure	4.5
Communications	Communications	-	-	7.1	AE	NIL	SS 100yr	Indirect Exposure	0
Communications	Communications	-	$364,001.00	4.6	AE	-	SS 100yr	-	0
Communications	Communications	-	$92,860.00	-	X (Unshaded)	-	-	-	0
Communications	Communications	-	$363,533.00	6.5	AE	NIH	SS 100yr	Indirect Exposure	0
Communications	Communications	-	$990,380.00	-	X (Shaded)	-	SS 100yr	Direct Exposure	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Water Systems	Water	-	-	6.3	AE	NOAA 3ft	SS 100yr	-	0
Water Systems	Water	-	$655,787.54	4.3	AE	-	SS 100yr	-	0
Water Systems	Water	-	$1,330,348.23	6.6	VE	-	SS 100yr	-	0
Water Systems	Water	-	-	8.7	VE	-	SS 100yr	Indirect Exposure	0
Water Systems	Water	-	-	7.7	AE	NOAA 3ft	SS 100yr	Indirect Exposure	0
Water Systems	Water	-	$507,132.00	5.3	AE	NIH	SS 100yr		0
Water Systems	Water	-	-	4.5	AE	NIL	SS 100yr		0
Water Systems	Water	-	$593,399.00	2.6	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Water	-	-	5.5	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Water	-	-	1.9	AE	-	SS 100yr	Direct Exposure	2.5
Water Systems	Water	-	-	4.4	AE	-	SS 100yr	-	-
Water Systems	Water	-	$260,491.00	9.7	VE	NIL	SS 100yr	-	-
Water Systems	Water	-	-	0.0	X (Unshaded)	-	SS 500yr	-	0
Water Systems	Water	-	-	-	X (Unshaded)	-	-	-	0
Water Systems	Water	-	$1,158,954.00	0.0	AE	-	SS 500yr	Indirect Exposure	0
Water Systems	Water	-	$165,012.00	9.1	AE	-	-	Direct Exposure	2
Water Systems	Water	-	-	7.0	AE	NIH	SS 100yr	Indirect Exposure	0
Water Systems	Water	-	-	4.2	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Water	-	$593,399.00	3.2	AE	NIH	SS 100yr	Indirect Exposure	0
Water Systems	Water	-	$172,063.00	4.7	AE	NIH	SS 100yr	-	0
Water Systems	Waste	-	-	9.0	AE	NIL	-	-	0
Water Systems	Waste	-	-	6.0	AE	NIL	SS 100yr	-	0
Water Systems	Waste	-	-	6.1	AE	NOAA 3ft	SS 100yr	-	0
Water Systems	Waste	-	$839,768.00	3.9	AE	-	SS 100yr	Indirect Exposure	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Water Systems	Waste	-	-	7.4	AE	NOAA 3ft	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.6	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	8.0	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.3	AE	NIH	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	$401,959.00	8.4	AE	NOAA 3ft	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	8.6	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.5	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.8	AE	NIL	SS 100yr	Direct Exposure	4.5
Water Systems	Waste	-	-	5.7	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	8.2	AE	NIH	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.5	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.6	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.5	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.3	AE	NOAA 3ft	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	$593,399.00	3.4	AE	NIH	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.0	AE	NIH	SS 100yr	-	0
Water Systems	Waste	-	-	5.6	AE	NIH	SS 100yr	-	0
Water Systems	Waste	-	-	5.4	AE	NIH	SS 100yr	-	0
Water Systems	Waste	-	-	6.4	AE	-	SS 100yr	-	0
Water Systems	Waste	-	-	6.2	AE	-	SS 100yr	-	0
Water Systems	Waste	-	-	7.6	AE	NIH	SS 100yr	-	0
Water Systems	Waste	-	-	5.1	AE	NIH	SS 100yr	-	0
Water Systems	Waste	-	-	6.7	AE	NIH	SS 100yr	-	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Water Systems	Waste	-	-	6.3	AE	NIH	SS 100yr	-	0
Water Systems	Waste	-	-	4.9	AE	-	SS 100yr	-	0
Water Systems	Waste	-	-	6.2	AE	-	SS 100yr	-	0
Water Systems	Waste	-	-	4.5	AE	NIH	SS 100yr	-	2.5
Water Systems	Waste	-	-	7.3	AE	NIH	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	8.7	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.8	AE	-	SS 100yr	Direct Exposure	2
Water Systems	Waste	-	-	5.4	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	4.1	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	4.4	AE	NIH	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.8	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.9	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.4	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.7	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.8	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	3.5	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.2	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	3.3	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	3.5	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.3	AE	NOAA 3ft	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.3	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.3	AE	NIL	SS 100yr	Indirect Exposure	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Water Systems	Waste	-	-	8.2	VE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.2	AE	NIL	SS 100yr	Direct Exposure	2
Water Systems	Waste	-	-	6.5	AE	NIL	SS 100yr	-	0
Water Systems	Waste	-	-	5.8	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.7	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	4.6	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	4.2	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.6	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.7	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.7	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.6	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.6	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.2	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.5	AE	NIL	SS 100yr	Direct Exposure	3.5
Water Systems	Waste	-	-	8.3	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.1	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.5	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.6	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.9	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.6	AE	NIL	SS 100yr	Direct Exposure	2
Water Systems	Waste	-	-	8.2	AE	NIL	SS 100yr	Indirect Exposure	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Water Systems	Waste	-	-	8.0	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.7	AE	NIH	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	8.7	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	8.0	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	4.1	AE	NIH	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	3.6	AE	-	SS 100yr	-	0
Water Systems	Waste	-	-	7.1	VE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	3.7	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.3	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.7	AE	NOAA 3ft	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.2	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.0	AE	NIH	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.4	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	9.5	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	9.9	VE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	9.4	VE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	9.1	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.2	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	8.1	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.8	AE	NIH	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.4	AE	-	SS 100yr	Indirect Exposure	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Water Systems	Waste	-	-	7.2	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.7	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	4.2	AE	NIH	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	4.3	AE	NIH	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.9	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.1	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.4	VE	NIH	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	8.4	AE	NIL	SS 100yr	-	0
Water Systems	Waste	-	-	5.9	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.2	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.0	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.7	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.2	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.8	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.6	AE	NIH	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.4	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.2	AE	NIL	SS 100yr	-	0
Water Systems	Waste	-	-	6.4	AE	-	SS 100yr	-	-
Water Systems	Waste	-	-	8.6	AE	NIL	SS 100yr	-	-
Water Systems	Waste	-	-	9.4	AE	NIL	SS 100yr	-	-
Water Systems	Waste	-	-	6.3	AE	NIH	SS 100yr	-	-
Water Systems	Waste	-	-	8.0	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.9	AE	-	SS 100yr	Indirect Exposure	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Water Systems	Waste	-	-	5.9	AE	NIL	SS 100yr		0
Water Systems	Waste	-	-	5.5	AE	NOAA 3ft	SS 100yr		0
Water Systems	Waste	-	-	5.1	AE	NIH	SS 100yr	Direct Exposure	2
Water Systems	Waste	-	-	5.9	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.6	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.8	AE	NOAA 3ft	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.5	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.6	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	8.2	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.4	AE	NIH	SS 100yr	-	0
Water Systems	Waste	-	-	5.5	AE	-	SS 100yr	-	0
Water Systems	Waste	-	-	5.1	AE	NOAA 3ft	SS 100yr	-	0
Water Systems	Waste	-	-	7.0	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.0	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.9	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	8.5	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.1	AE	NIH	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	7.0	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.6	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.2	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.4	AE	NIL	SS 100yr	-	0
Water Systems	Waste	-	-	7.8	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.7	AE	-	SS 100yr	Indirect Exposure	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Water Systems	Waste	-	-	7.4	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	6.6	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	$84,546.00	5.9	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	4.9	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	4.4	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	4.4	AE	-	SS 100yr	-	-
Water Systems	Waste	-	-	2.2	AE	-	SS 500yr	Direct Exposure	2.5
Water Systems	Waste	-	-	5.9	AE	NIH	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	$839,768.00	1.3	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	$41,017,858.00	4.1	AE	-	SS 100yr	-	0
Water Systems	Waste	-	$13,569,818.00	3.1	AE	-	SS 100yr	-	0
Water Systems	Waste	-	$813,749.11	6.4	AE	NIL	SS 100yr	-	0
Water Systems	Waste	-	$3,084,076.00	6.8	AE	NIH	SS 100yr	-	0
Water Systems	Waste	-	-	6.2	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.6	AE	NIL	SS 100yr		4.5
Water Systems	Waste	-	-	4.8	AE	NIH	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.2	AE	NIL	SS 100yr	-	0
Water Systems	Waste	-	$1,042,716.00	2.1	AE		SS 100yr	-	0
Water Systems	Waste	-	-	6.3	AE	NIL	SS 100yr	-	0
Water Systems	Waste	-	$58,760.00	7.5	AE	NIL	SS 100yr	-	0
Water Systems	Waste	-	$416,952.00	5.7	AE	NIH	SS 100yr	Direct Exposure	1
Water Systems	Waste	-	$416,952.00	7.2	AE	NIL	SS 100yr	-	0
Water Systems	Waste	-	$53,696.00	5.2	AE		SS 100yr	-	2.5
Water Systems	Waste	-	$413,541.00	5.8	AE	NIH	SS 100yr	-	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Water Systems	Waste	-	$413,541.00	5.9	AE	NIH	SS 100yr	-	0
Water Systems	Waste	-	-	6.5	AE	-	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	5.9	AE	NIH	SS 100yr		0
Water Systems	Waste	-	-	7.4	AE	NIL	SS 100yr	Indirect Exposure	0
Water Systems	Waste	-	-	10.4	AE	-	-	Indirect Exposure	0
Communications	Communications	SR 94 AT JIM DILL LOOP	$137,039.00	0.9	AE	-	SS 100yr		0
Communications	Communications	US Highway 1 & Mako Road/Mm 104 (71752)	$642,235.00	6.2	AE	NIL	SS 100yr	Indirect Exposure	0
Communications	Communications	31 Ocean Reef Drive #300 (71757)	-	4.3	AE	-	SS 100yr	Indirect Exposure	0
Communications	Communications	809 Largo Road (71760)	-	0.0	AE	-	-	Indirect Exposure	0
Communications	Communications	359 U.S. Hwy 1 (71763)	-	7.9	AE	NIL	SS 100yr	Indirect Exposure	0
Communications	Communications	Everglades Natl Park (71794)	$3,390,825.00	8.3	AE	NOAA 3ft	SS 100yr	Direct Exposure	4
Communications	Communications	305 Magnolia Street (71749)	-	2.9	AE	-	SS 100yr	-	0
Communications	Communications	Palamino Horse Trail (71761)	$446,232.00	4.7	AE	-	SS 100yr	Indirect Exposure	0
Safety and Security	Government	20950 Overseas Highway	$374,662.00	2.3	AE	-	SS 100yr	Indirect Exposure	0
Safety and Security	Emergency Ops	151 Marine Avenue	$702,274.00	0.0	AE	-	SS 500yr		0
Safety and Security	Emergency Ops	20950 Overseas Highway	$374,662.00	2.6	AE	-	SS 100yr	Indirect Exposure	0
Safety and Security	Emergency Ops	Saratoga Avenue and Midway Avenue	-	0.9	AE	-	SS 100yr	Indirect Exposure	0
Safety and Security	Emergency Ops	50 High Point Road	$2,786,662.00	0.4	AE	-	SS 100yr	-	0
Safety and Security	Government	50 High Point Road, Suite 100	$2,786,662.00	0.3	AE	-	SS 100yr	-	0
Health and Medical	Emergency Ops	30358 Overseas Highway	$526,315.00	2.3	AE	-	SS 100yr	Indirect Exposure	0
Health and Medical	Emergency Ops	1 East Drive	$906,995.00	-	X (Shaded)	-	-	-	0
Health and Medical	Emergency Ops	110 Anchor Drive	$2,279,078.47	2.5	AE	-	SS 100yr	Indirect Exposure	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Health and Medical	Emergency Ops	Saratoga Avenue	$5,215.84	5.5	AE	-	SS 100yr	Indirect Exposure	0
Energy	Energy	22916 Overseas Hwy, Cudjoe Key, FL 33042	-	6.3	AE	NOAA 3ft	SS 100yr	Indirect Exposure	0
Energy	Energy	6444 2nd Street	-	6.3	AE	NIL	SS 100yr	-	0
Energy	Energy	6900 Front Street Extended	$357,753.81	2.3	AE	-	SS 100yr	-	0
Energy	Energy	380 County Road	$157,593.00	0.5	AE	-	SS 100yr	Indirect Exposure	0

A.2 RISK ASSESSMENT

This section contains a summary of the unincorporated Monroe County's asset inventory as well as hazard profile and vulnerability assessment for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Flood, Sea Level Rise, Storm Surge, and Wildfire.

A.2.1 FLOOD

Table A.3 details the acreage of unincorporated Monroe County's total area by flood zone on the effective DFIRM; it also shows a comparison to the preliminary DFIRM released in December 2019. Approximately 94.5 percent of the unincorporated areas of Monroe County falls within the mapped 1%-annual-chance floodplains. Data in this risk assessment is based off FEMA's 2005 DFIRM. Table A.4reflects the effective mapped flood hazard zones for unincorporated Monroe County while Table A.5 displays the 2019 preliminary map.

Table A.3 – Flood Zone Acreage in Unincorporated Monroe County

	Effective DFIRM (2005)		Preliminary DFIRM (2019)		Change from Effective (acres)
Flood Zone	**Acreage**	**Percent of Total (%)**	**Acreage**	**Percent of Total (%)**	
A	0	0%	44,683.8	5.2%	44,683.8
AE	618,571.9	71.7	555,564.9	64.4%	-63,007.0
VE	196,128.0	22.7%	214,501.5	24.9%	18,373.5
AO	1.1	0.0%	0.0	0.0%	-1.1
0.2% Annual Chance Flood Hazard	774.0	0.1%	1,628.8	0.2%	854.8
Unshaded X	1,220.6	0.1%	601.4	0.1%	-619.2
Open Water	45,809.2	5.3%	45,524.3	5.3%	-284.9
Total	862,504.7	100.0%	862,504.7	100.0%	0.0
SFHA Total	**814,700.9**	**94.5%**	**814,750.2**	**94.5%**	**49.3**

Source: FEMA Effective DFIRM

Note: The differences between the effective FIRM and the preliminary FIRM are significant will likely still change. These details are provided here only as a comparison – all further flood analysis is based in the 2005 Effective DFIRM.

Table A.4 and Table A.5 provide building counts and estimated damages by occupancy type for the 1% annual chance flood event using both the effective and preliminary DFIRM. Figure A-10 and Figure A-11 display the effective and preliminary depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

Table A.4 – Estimated Building Damage and Content Loss, 1% Annual Chance Flood Effective DFIRM, Unincorporated Monroe County

Occupancy Type	Total Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Agriculture	1	$535,470	$1,175	$18,807	$19,982	4%

Occupancy Type	Total Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Commercial	1,160	$1,313,331,737	$44,513,622	$146,451,674	$190,965,295	15%
Educational	27	$39,850,538	$413,223	$2,603,402	$3,016,625	8%
Government	436	$284,673,249	$3,355,559	$20,533,335	$23,888,894	8%
Industrial	222	$235,984,688	$2,193,865	$6,446,122	$8,639,987	4%
Religious	34	$44,024,638	$253,922	$1,953,365	$2,207,288	5%
Residential	22,515	$15,775,468,097	$3,439,333,831	$1,712,017,578	$5,151,351,409	33%
Total	**24,395**	**$17,693,868,417**	**$3,490,065,197**	**$1,890,024,283**	**$5,380,089,481**	**30%**

Source: HAZUS, FEMA Effective DFIRM

Table A.5 – Estimated Building Damage and Content Loss, 1% Annual Chance Flood Preliminary DFIRM, Unincorporated Monroe County

Occupancy Type	Total Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Agriculture	1	$535,470	$17,044	$58,053	$75,097	14%
Commercial	1,124	$1,305,064,074	$30,743,787	$100,840,335	$131,584,121	10%
Educational	24	$26,497,162	$463,343	$2,861,760	$3,325,103	13%
Government	448	$233,066,629	$3,444,682	$21,202,524	$24,647,206	11%
Industrial	221	$233,264,423	$2,216,574	$6,506,721	$8,723,295	4%
Religious	31	$36,879,592	$374,490	$2,819,096	$3,193,586	9%
Residential	21,866	$15,099,042,001	$2,836,303,403	$1,410,100,446	$4,246,403,849	28%
Total	**23,715**	**$16,934,349,351**	**$2,873,563,322**	**$1,544,388,935**	**$4,417,952,257**	**26%**

Source: HAZUS, FEMA Preliminary DFIRM

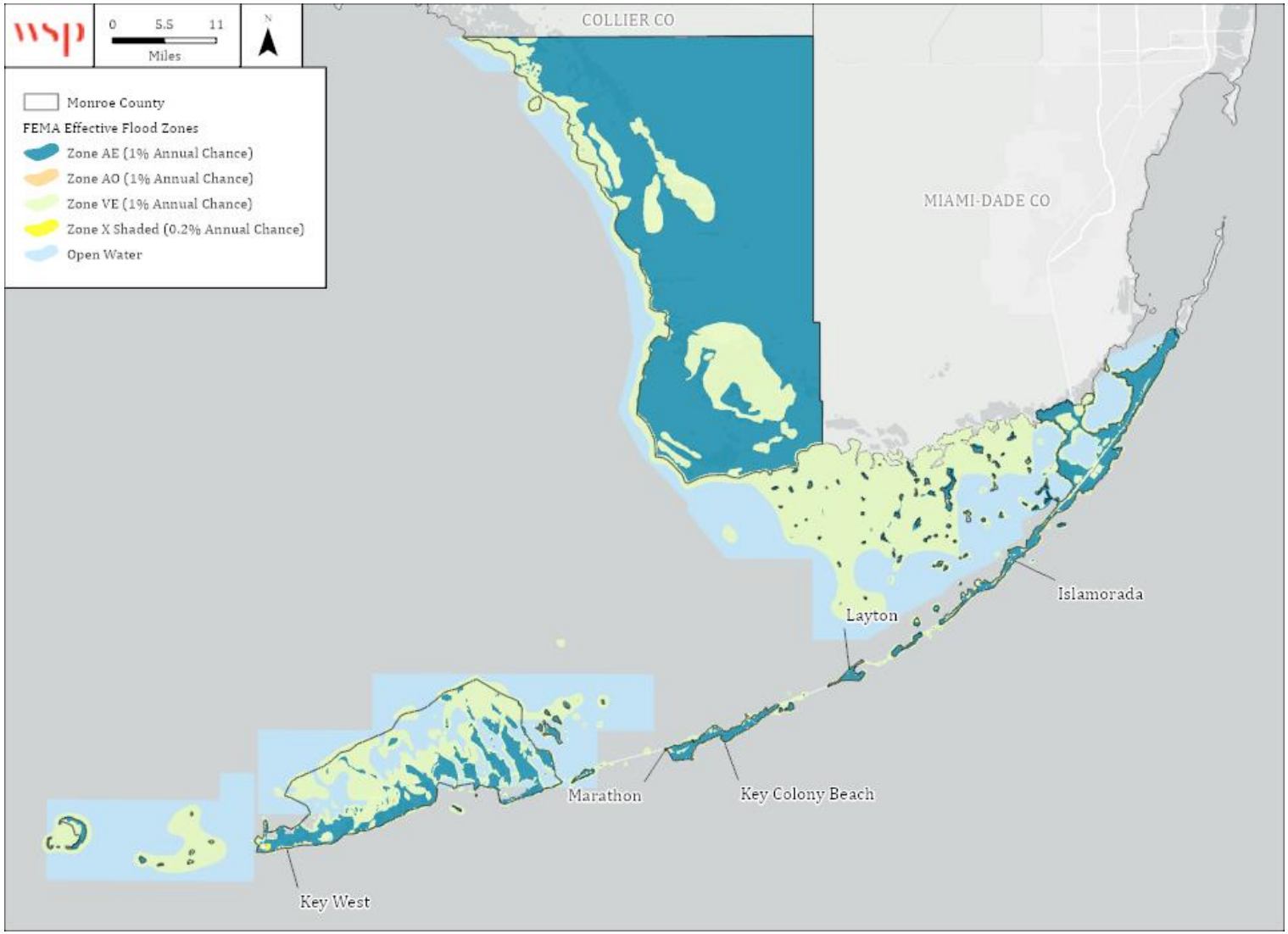
Table A.6 provides building counts and values for critical facilities by flood zone in unincorporated Mecklenburg County.

Table A.6 – Critical Facilities Exposed to Flooding, Unincorporated Monroe County

Flood Zone	Critical Facility Count	Structure Value
Zone AE	267	$223,949,644.01
Zone VE	10	$6,192,282.23
Zone X (500-year)	13	$27,296,751.00
Zone X Unshaded	8	$4,826,516.97
Total	**298**	**$262,265,194.21**

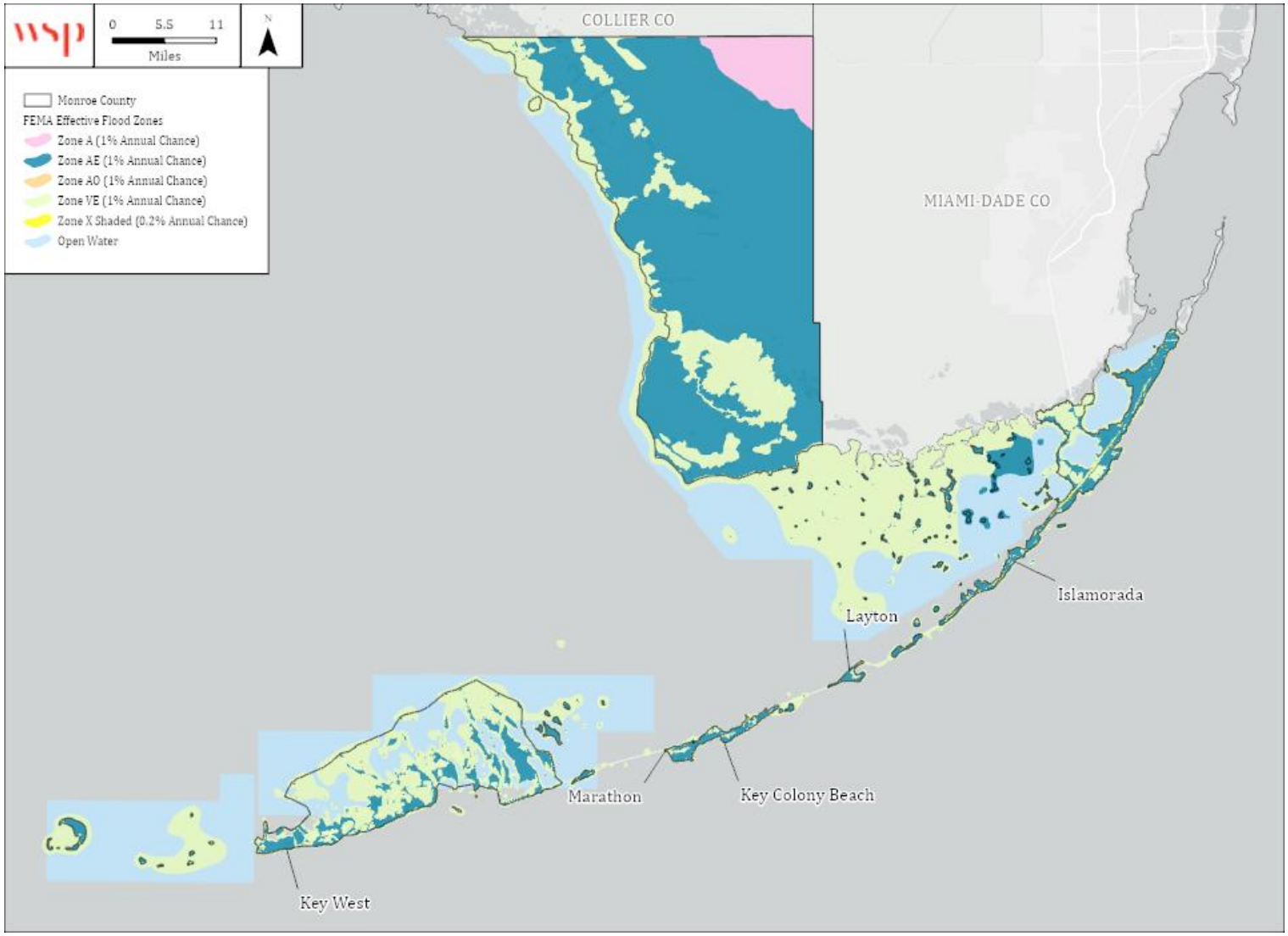
Source: FEMA Effective DFIRM, LMS Working Group

Figure A-8 – FEMA Flood Hazard Areas, Effective DFIRM, Unincorporated Monroe County



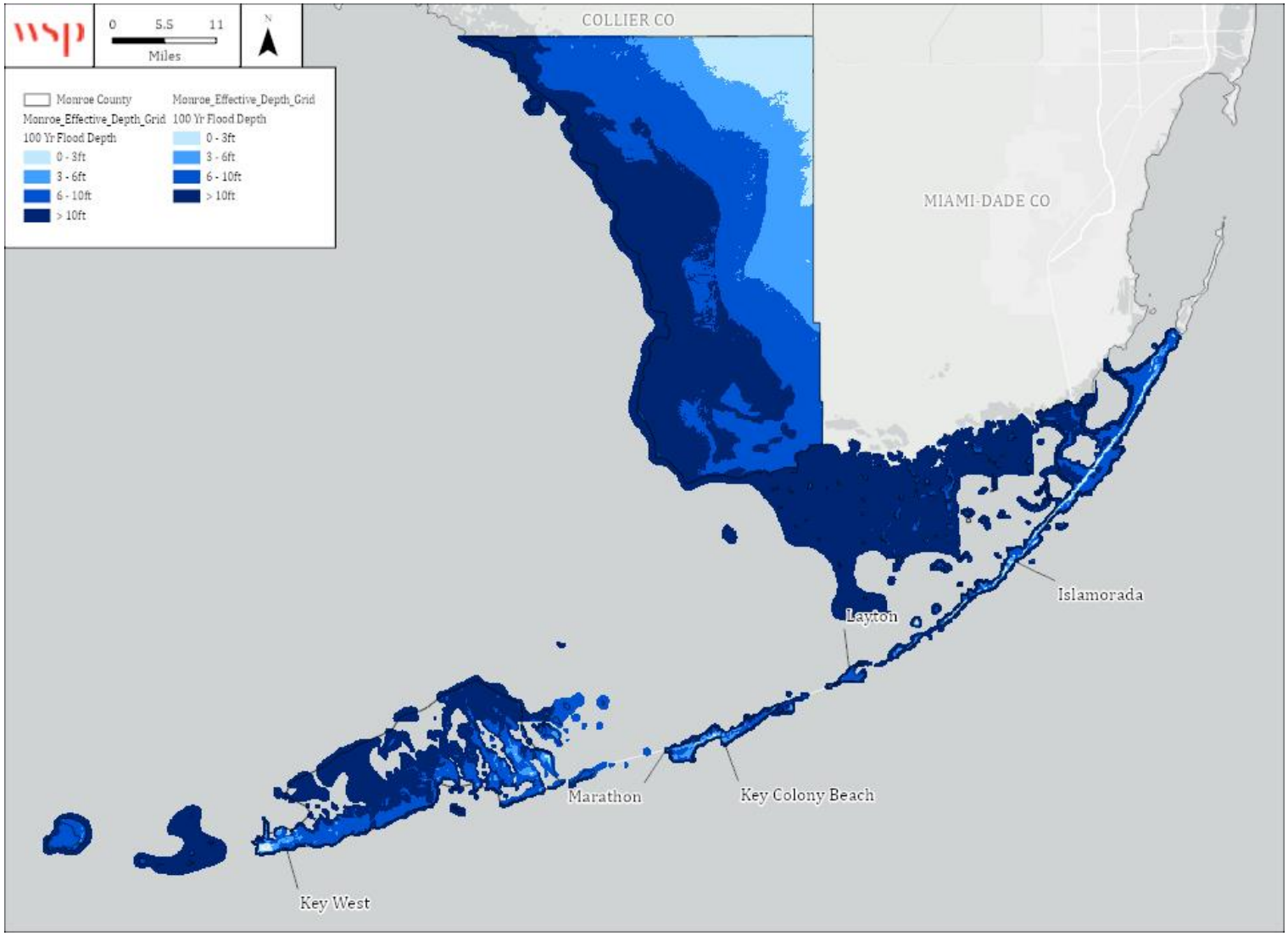
Source: FEMA Effective DFIRM

Figure A-9 – FEMA Flood Hazard Areas, Preliminary DFIRM, Unincorporated Monroe County



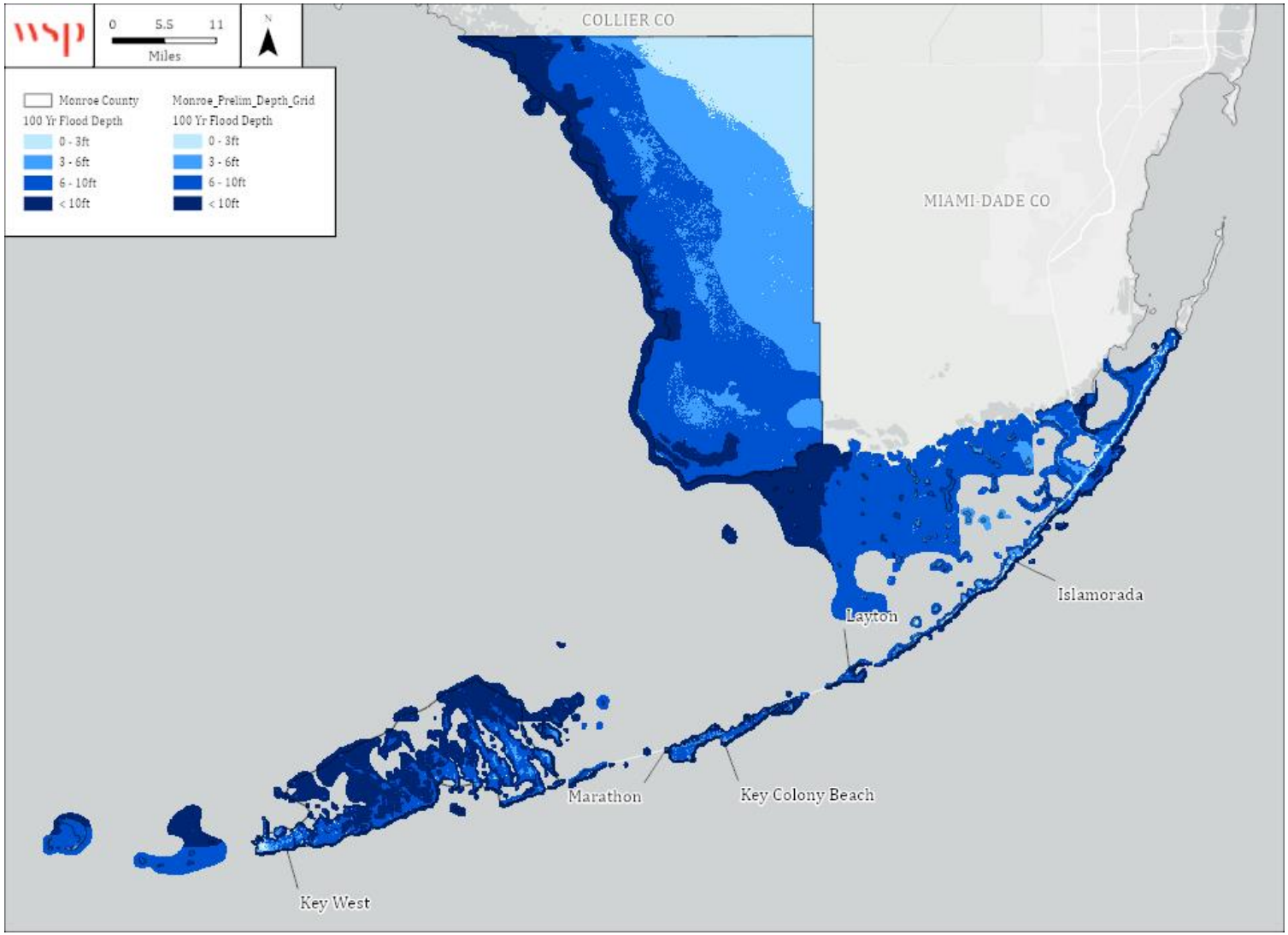
Source: FEMA Preliminary DFIRM

Figure A-10 – Flood Depth, 1%-Annual Chance Floodplain Effective DFIRM, Unincorporated Monroe County



Source: FEMA Effective DFIRM

Figure A-11 – Flood Depth, 1%-Annual Chance Floodplain Preliminary DFIRM, Unincorporated Monroe County



Source: FEMA Preliminary DFIRM

FLOODPLAIN MANAGEMENT

Monroe County joined the NFIP emergency program in 1970 and has been a regular participant in the NFIP since June 1973. Monroe County participates in the Community Rating System and is currently a Class 3 community. The following tables reflect NFIP policy and claims data for the County categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table A.7 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	7,486	$10,820,199	$2,077,201,000	14,377	$222,765,317.49
2-4 Family	730	$866,260	$177,589,000	722	$13,777,814.43
All Other Residential	2,079	$1,478,615	$466,375,000	332	$8,357,211.29
Non-Residential	542	$2,328,780	$225,461,000	1,483	$44,787,653.69
Total	**10,837**	**$15,493,854**	**$2,946,626,000**	**16,914**	**$289,687,996.90**

Source: FEMA Community Information System, accessed May 2025

Table A.8 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	10,057	$13,365,093	$2,729,764,000	14,232	$251,120,371.82
A Zones	9	$9,952	$2,392,000	72	$1,602,022.13
V01-30 & VE Zones	368	$1,622,434	$92,356,000	2,358	$34,148,318.68
V Zones	0	$0	$0	32	$309,611.81
D Zones	2	$7,273	$585,000	69	$1,504,732.83
B, C & X Zone					
Standard	401	$489,102	$121,529,000	79	$411,902.57
Preferred	0	$0	$0	39	$501,600.51
Total	**10,837**	**$15,493,854**	**$2,946,626,000**	**16,881**	**$289,598,560.35**

Source: FEMA Community Information System, accessed May 2025

Table A.9 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	2,939	$6,279,259	$668,859,000	7,765	$213,443,257.70
A Zones	0	$0	$0	56	$886,925.88
V01-30 & VE Zones	134	$553,909	$28,626,000	1,600	$31,126,867.27
V Zones	0	$0	$0	31	$309,611.81
D Zones	1	$4,348	$335,000	46	$866,611.05
B, C & X Zone	220	$213,035	$58,771,000	74	$612,124.23
Standard	220	$213,035	$58,771,000	54	$289,981.40

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Preferred	0	$0	$0	20	$322,142.83
Total	3,294	$7,050,551	$756,591,000	9,572	$247,245,397.94

Source: FEMA Community Information System, accessed May 2025

Table A.10 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	7,118	$7,085,834	$2,060,905,000	6,467	$37,677,114.12
A Zones	9	$9,952	$2,392,000	16	$715,096.25
V01-30 & VE Zones	234	$1,068,525	$63,730,000	758	$3,021,451.41
V Zones	0	$0	$0	1	$0.00
D Zones	1	$2,925	$250,000	23	$638,121.78
B, C & X Zone	181	$276,067	$62,758,000	44	$301,378.85
Standard	181	$276,067	$62,758,000	25	$121,921.17
Preferred	0	$0	$0	19	$179,457.68
Total	**7,543**	**$8,443,303**	**$2,190,035,000**	**7,309**	**$42,353,162.41**

Source: FEMA Community Information System, accessed May 2025

CONTINUED NFIP COMPLIANCE

Monroe County entered the NFIP in 1973 by adoption of an ordinance that complies with the requirement of the program. The Floodplain Management Ordinance specifies standards for residential and non-residential construction and water supply and sanitary sewer systems that are located in the SFHA. It prohibits the alteration of sand dunes, mangrove stands, or wetlands if such alterations would increase the potential for flooding. The dominant standard in the ordinance requires that the lowest floor of buildings (including manufactured homes) be elevated to or above base flood levels. Enclosures below the elevated lowest floor are allowed only if they meet requirements specific to the flood zone.

To ensure continued compliance with the NFIP, the County will continue to:

- Enforce the adopted floodplain management ordinance, including reviewing all development proposals within the SFHA for compliance and inspection of permitted development and unpermitted activities;
- Maintain records pertaining to development, including flood maps and Letters of Map Change, which shall be available for public inspection;
- Notify the public when there are proposed changes to the ordinance or FIRMS; and
- Promote the purchase of NFIP flood insurance policies as financial protection.

ENCLOSURES BELOW ELEVATED BUILDINGS

In 1995, FEMA notified Monroe County that the illegal conversion and occupancy of enclosures below elevated residential structures had resulted from a deficiency in the County's enforcement of its

floodplain management regulations. The County was directed to correct the deficiency or face suspension from the NFIP. The BOCC appointed a task force to address the problem which developed the "Flood Insurance Inspection Program." NFIP-insured homes with enclosures below the Base Flood Elevation were to be inspected to identify deficiencies; these were to be corrected in order for flood insurance policies to be written. Over 2,000 properties had been inspected through 2009; 1,600 had been brought into compliance. In mid-2014, FEMA ended the pilot program but directed Monroe County to continue enforcement. Section 122-15 of the Floodplain Management Ordinance requires the County to provide an inspection upon transfer of property. A report is provided to the new owner regarding any non-conformities associated with enclosures.

REPETITIVE LOSS PROPERTIES

Maps of repetitive loss areas in unincorporated Monroe County are on the following page.

Figure A-12 – Unincorporated Monroe County Repetitive Loss Areas: Overview

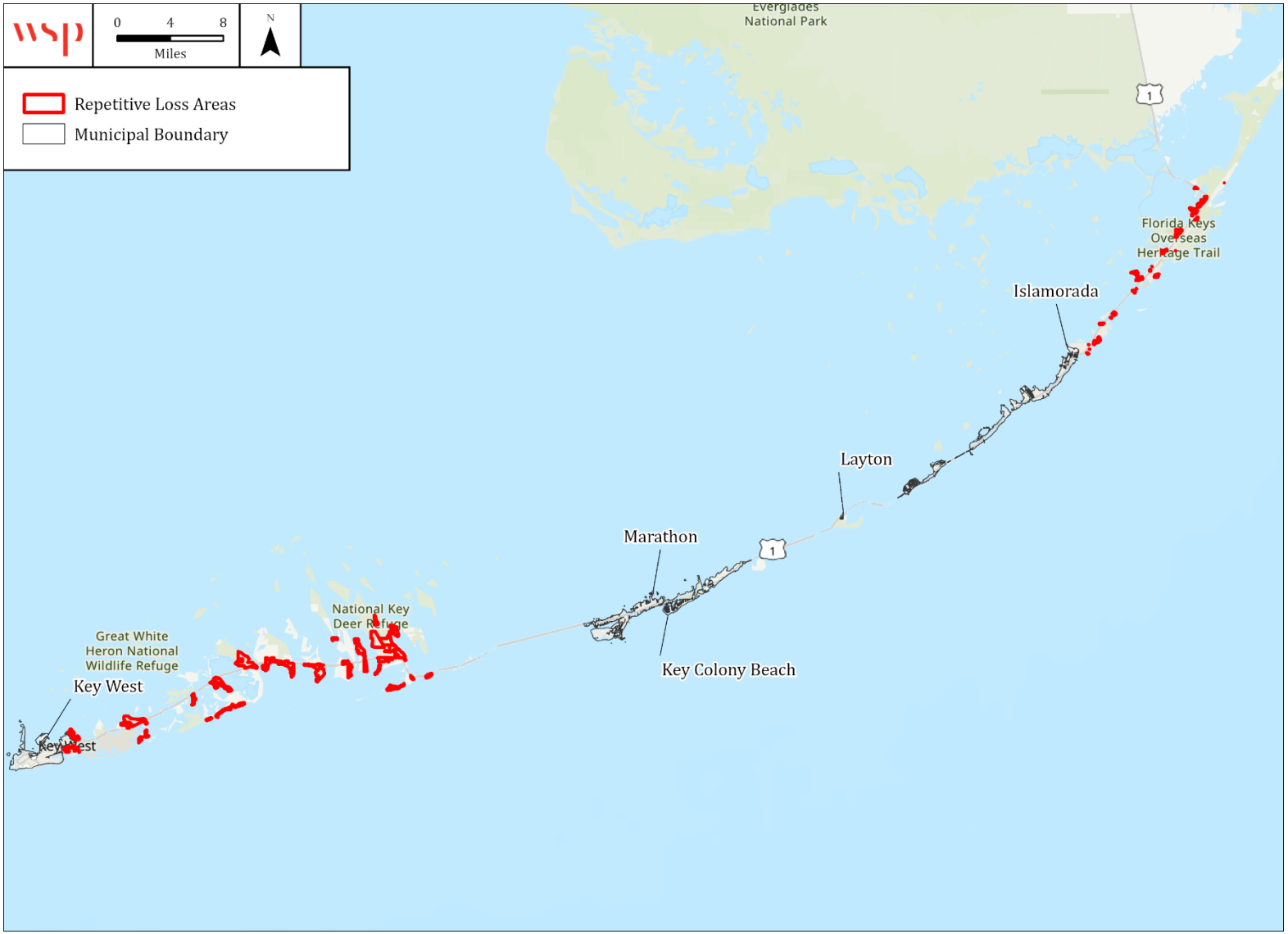


Figure A-13 – Unincorporated Monroe County Repetitive Loss Areas: Index Map 1

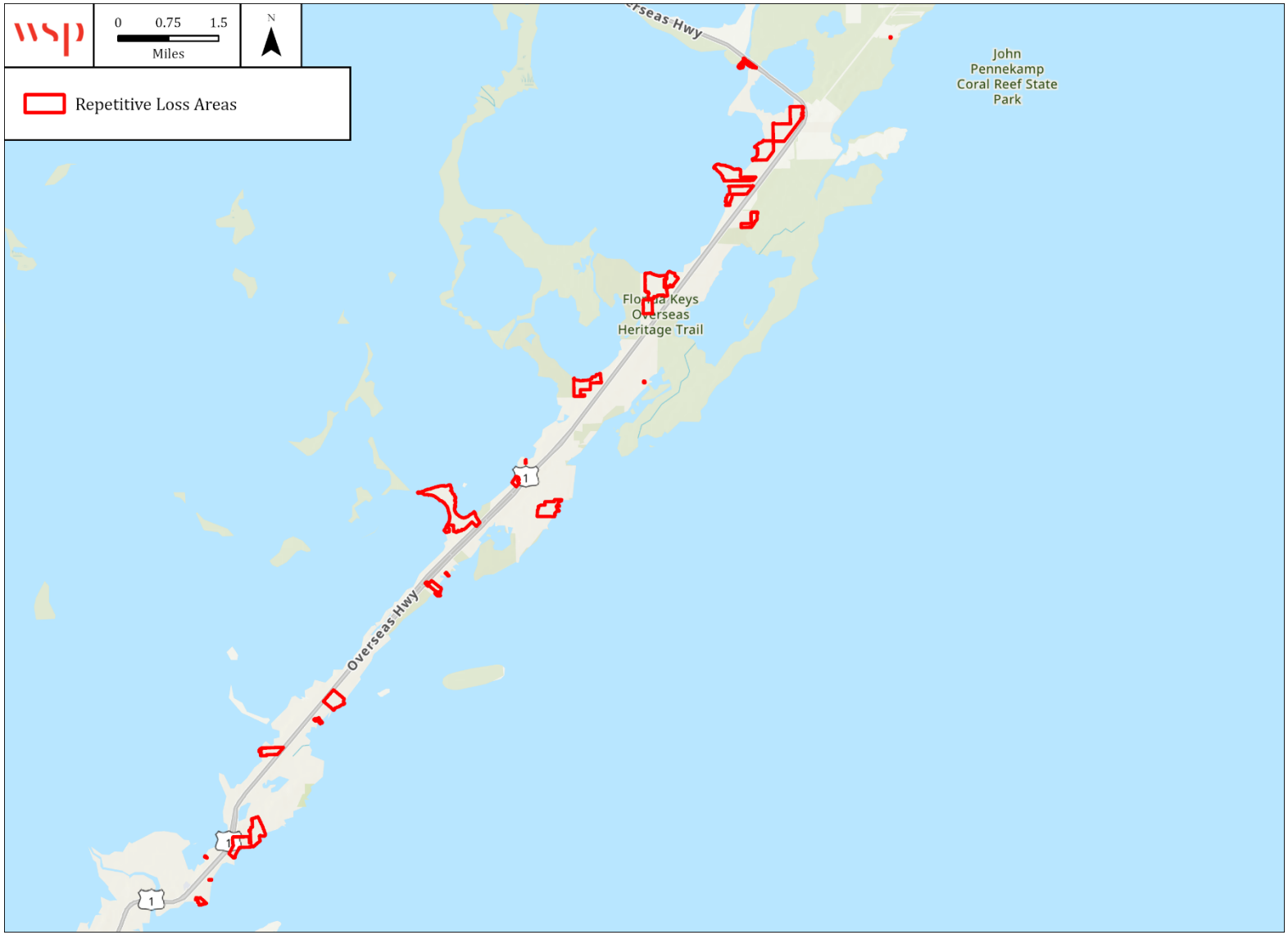
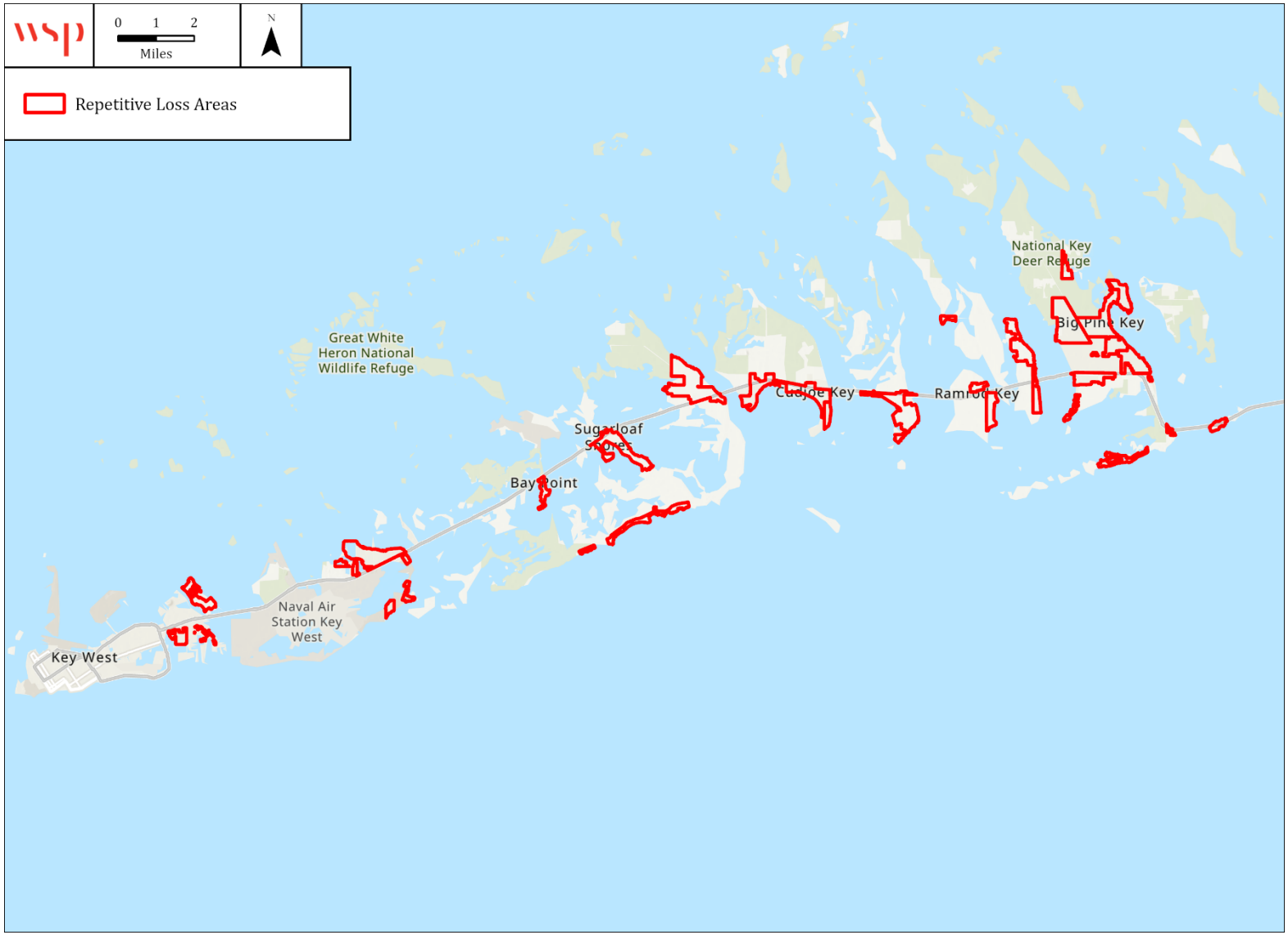


Figure A-14 – Unincorporated Monroe County Repetitive Loss Areas: Index Map 2



A.2.2 SEA LEVEL RISE

Table A.11 details the number of all buildings affected by sea level rise in the unincorporated areas of Monroe County following the NOAA sea level rise projections of intermediate low and intermediate high scenarios.

Table A.11 – All Buildings Affected by Sea Level Rise, Unincorporated Monroe County

Occupancy	Estimated Building Count	Structure Value	Estimated Content Value	Total Value
2040 NIL	**12,927**	**4,786,581,400**	**2,587,195,924**	**6,494,686,780**
Agriculture	1	$267,735	$267,735	$535,470
Commercial	549	$281,946,690	$281,946,690	$535,945,243
Education	19	$5,475,869	$5,475,869	$10,951,738
Government	177	$45,969,577	$45,969,577	$91,300,737
Industrial	69	$21,726,765	$32,590,148	$54,142,286
Religious	16	$10,697,044	$10,697,044	$21,394,089
Residential	12096	$4,420,497,718	$2,210,248,859	$5,780,417,218
2040 NIH	**16,573**	**6,223,400,056**	**3,383,967,776**	**8,403,265,410**
Agriculture	1	$267,735	$267,735	$535,470
Commercial	717	$377,546,051	$377,546,051	$724,985,494
Education	21	$7,733,660	$7,733,660	$15,467,320
Government	254	$68,258,644	$68,258,644	$135,456,469
Industrial	108	$38,833,744	$58,250,617	$95,665,834
Religious	22	$13,061,917	$13,061,917	$26,123,834
Residential	15450	$5,717,698,304	$2,858,849,152	$7,405,030,989

Source: HAZUS, NOAA, Monroe County Parcel Data

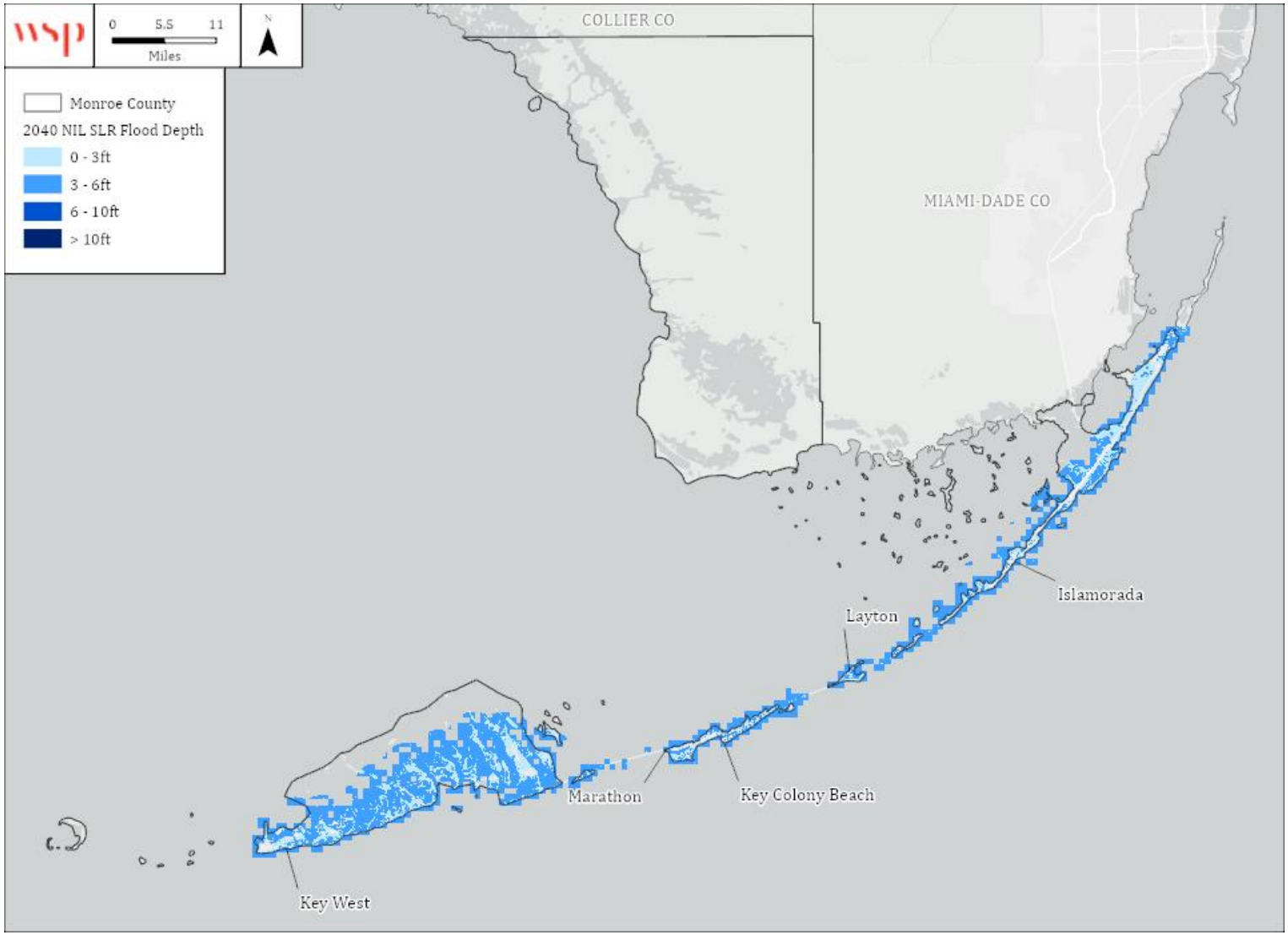
Figure A-15 and Figure A-16 display NOAA 2040 intermediate low and high sea level rise scenarios for unincorporated Monroe County. Note that data was not available to assess the impacts of sea level rise on mainland Monroe. Table A.12 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to sea level rise based on NOAA intermediate low and high scenarios.

Table A.12 – Critical Facilities Exposed to Sea Level Rise, Unincorporated Monroe County

Highest Level of SLR	Critical Facility Count	Structure Value
2040 NIL	103	$2,968,963.11
NOAA 3ft	16	$5,349,266.00
2040 NIH	43	$8,079,120.00
Total	**162**	**$16,397,349.11**

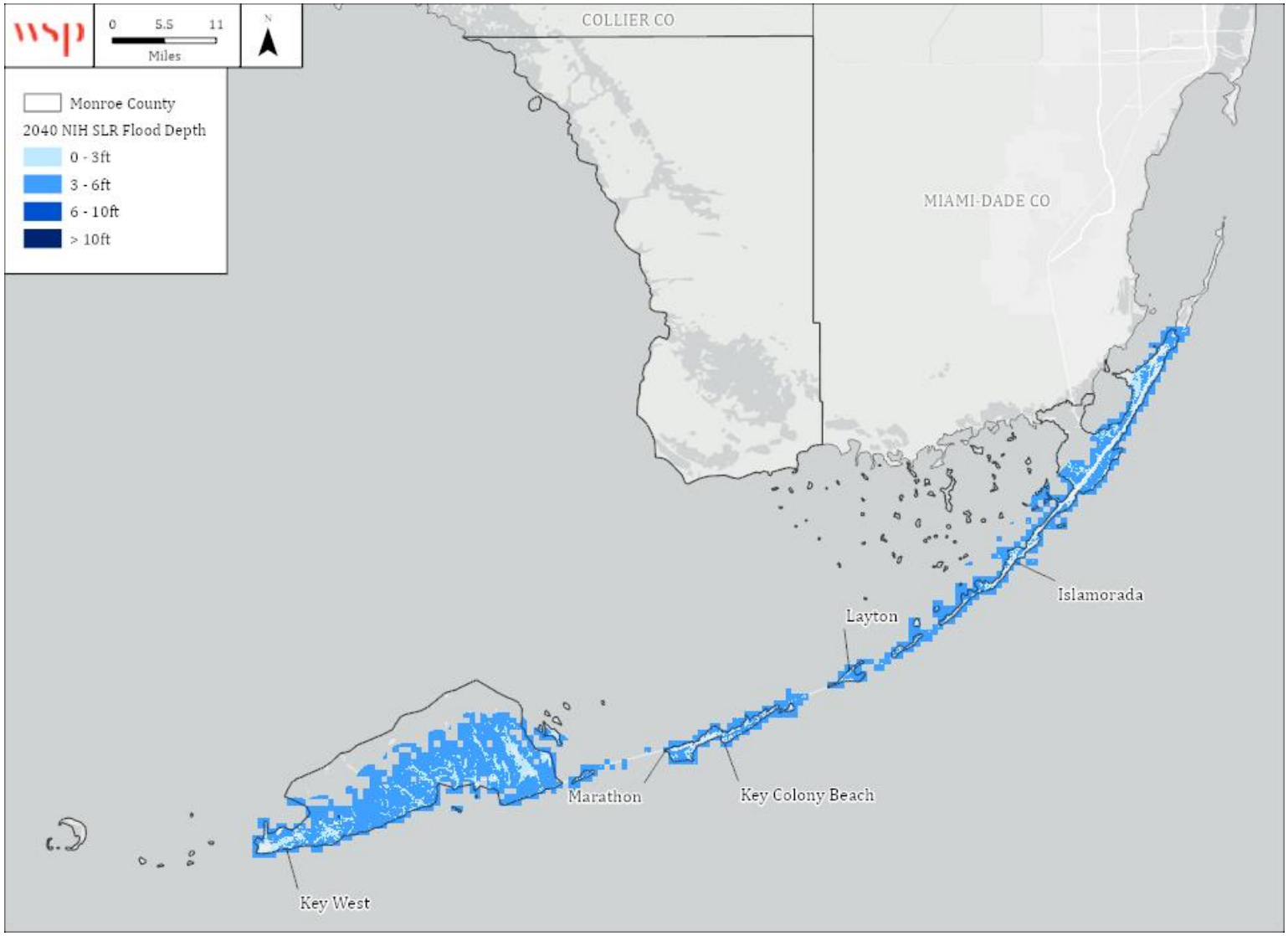
Source: NOAA, Monroe County LMS Working Group

Figure A-15 – NOAA 2040 Intermediate Low Sea Level Rise Scenario, Unincorporated Monroe County



Source: NOAA 2040 NIL, Monroe County Parcel Data

Figure A-16 – NOAA 2040 Intermediate High Sea Level Rise Scenario, Unincorporated Monroe County



Source: NOAA 2040 NIH, Monroe County Parcel Data

A.2.3 STORM SURGE

Table A.13 summarizes the number of buildings in unincorporated Monroe County that will be impacted by 100-yr and 500-yr storm surge events. Figure A-17 shows potential storm surge inundation for a 100-yr storm surge event and Figure A-18 shows inundation for the 500-yr storm surge event.

Table A.13 – Storm Surge Exposure by 100-yr and 500-yr Event, Unincorporated Monroe County

Occupancy	Estimated Building Count	Structure Value	Estimated Content Value	Total Value
100yr	**24,063**	**$11,285,322,571**	**$6,139,870,304**	**$17,425,192,875**
Agriculture	1	$267,735	$267,735	$535,470
Commercial	1,121	$645,867,962	$645,867,962	$1,291,735,924
Education	24	$13,248,581	$13,248,581	$26,497,162
Government	428	$121,181,468	$121,181,468	$242,362,935
Industrial	226	$96,880,156	$145,320,234	$242,200,390
Religious	32	$20,091,980	$20,091,980	$40,183,960
Residential	22,231	$10,387,784,689	$5,193,892,345	$15,581,677,034
500yr	**25,046**	**$11,628,831,563**	**$6,362,452,972**	**$17,991,284,535**
Agriculture	1	$267,735	$267,735	$535,470
Commercial	1,233	$733,159,071	$733,159,071	$1,466,318,141
Education	26	$15,569,386	$15,569,386	$31,138,772
Government	447	$128,343,371	$128,343,371	$256,686,743
Industrial	231	$98,037,689	$147,056,533	$245,094,222
Religious	35	$22,659,440	$22,659,440	$45,318,880
Residential	23,073	$10,630,794,871	$5,315,397,435	$15,946,192,306

Source: FEMA, NOAA, Monroe County Parcels

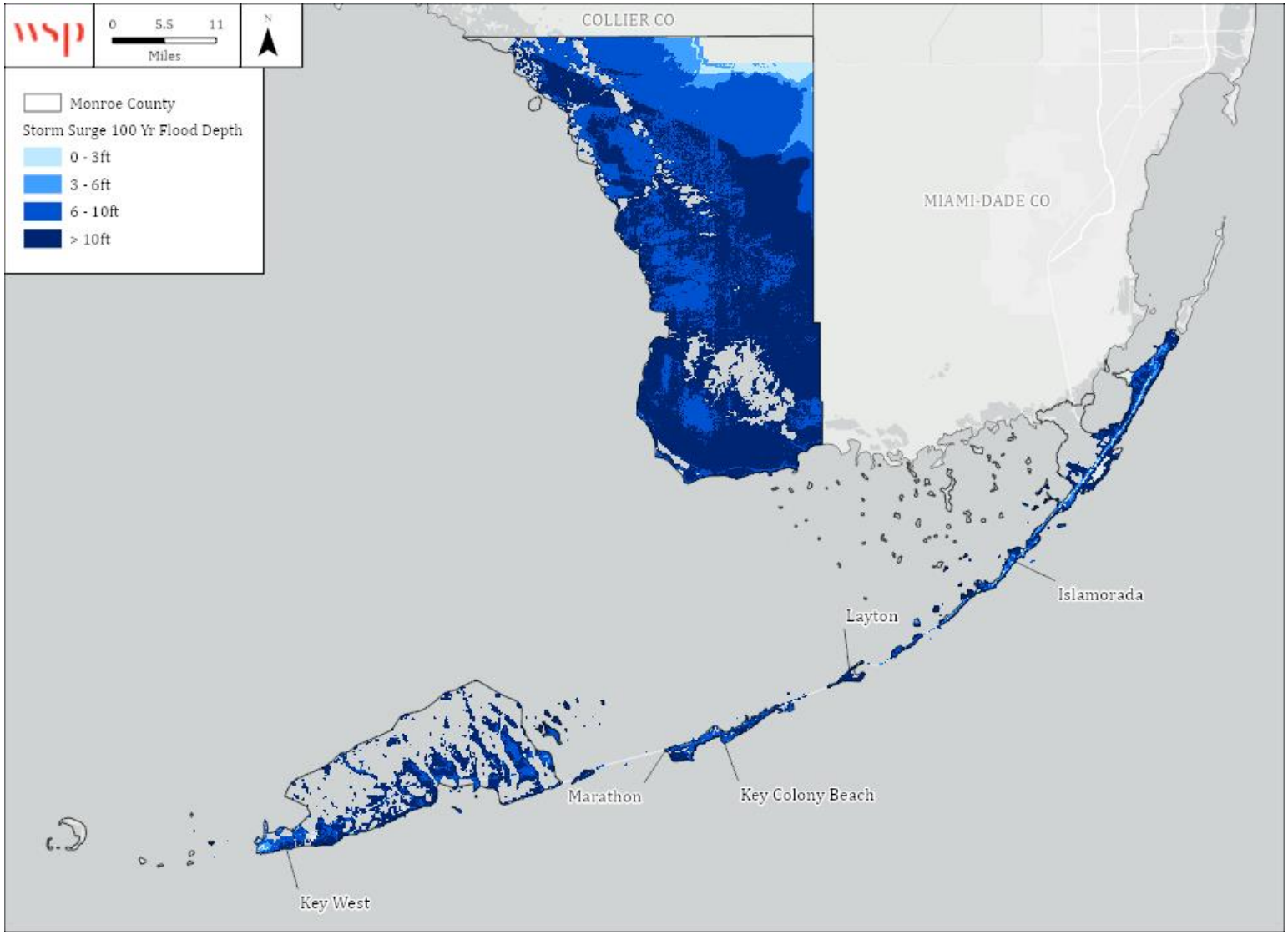
Table A.14 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to storm surge based on 100 and 500-year storm surge events.

Table A.14 – Critical Facilities Exposed to Storm Surge, Unincorporated Monroe County

Storm Surge Category	Critical Facility Count	Structure Value
100-Year	267	$218,894,322.55
500-Year	14	$12,971,166.00
Total	**279**	**$231,865,488.55**

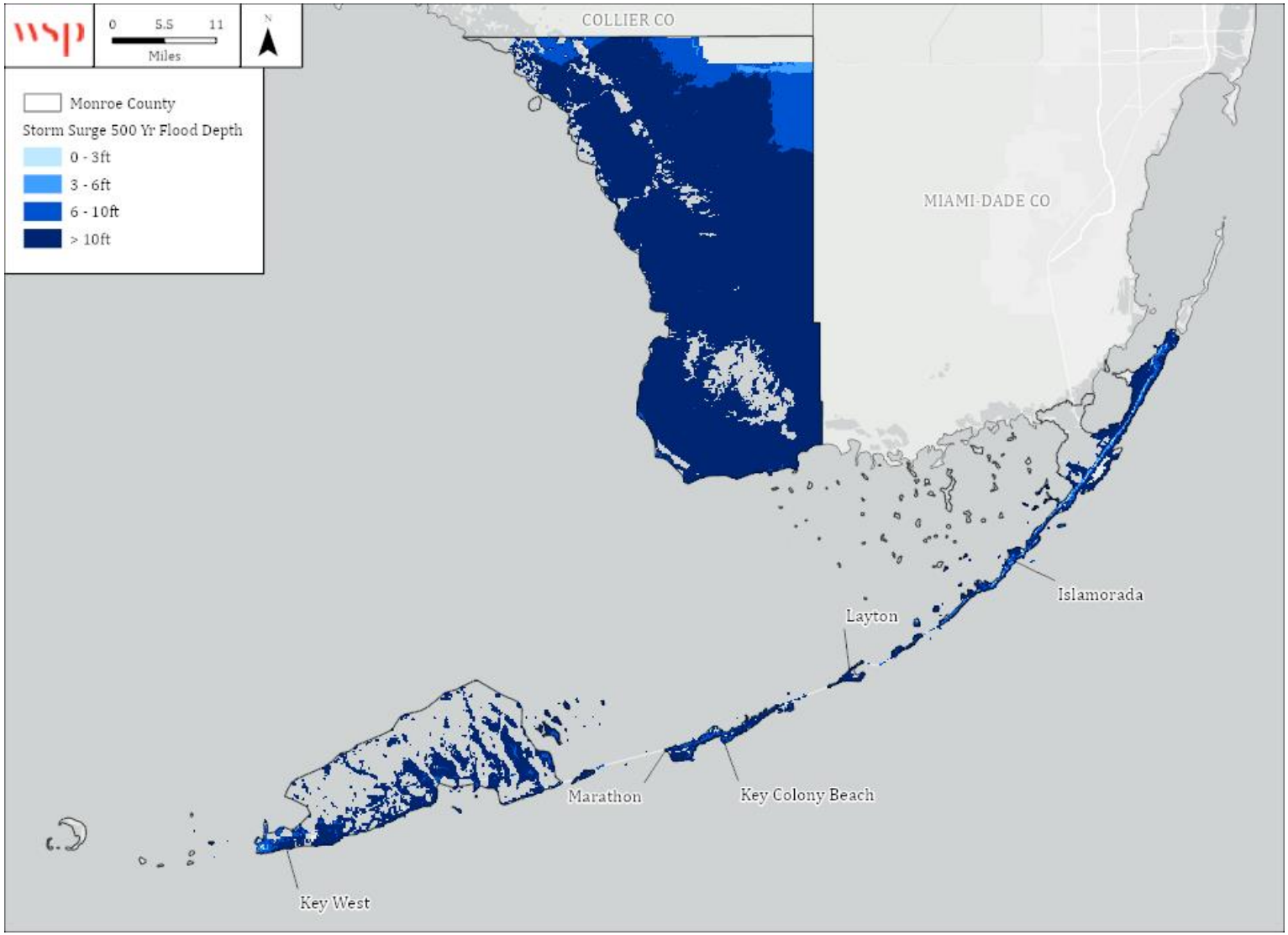
Source: FEMA, NOAA, Monroe County LMS Working Group

Figure A-17 – 100-Year Storm Surge Event Inundation, Monroe County Unincorporated Areas



Source: NOAA

Figure A-18 – 500-Year Storm Surge Event Inundation, Monroe County Unincorporated Areas



Source: NOAA

A.2.4 WILDFIRE

Table A.15 summarizes the acreage in unincorporated Monroe County that falls within the Functional Wildland Urban Interface (WUI), categorized into zones that describe the wildfire risk mitigation activities appropriate for each zone. Areas in the Functional WUI are those areas where development and building structures may intermix with burnable land cover. Approximately, 1 percent of unincorporated Monroe County is categorized as having direct exposure to wildfire risk within the Functional WUI.

Table A.15 – Functional Wildland Urban Interface, Unincorporated Monroe County

	Functional Wildland Urban Interface (WUI) Category	Acres	Percent
	Direct Exposure	3,608	1%
	Indirect Exposure	6,518	2%
	Critical Fireshed	45,638	14%
	Sources of Ember Load to Buildings	9,347	3%
	Little to No Exposure	3,863	1%
	Water	251,004	78%
	Total	**319,978**	**100%**

Source: Southern Wildfire Risk Assessment

Figure A-19 depicts the Functional WUI for Monroe County, including incorporated areas. Figure A-20 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts. Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors, is depicted in Figure A-21.

Functional WUI areas are distributed throughout the county; the mainland is largely outside of any direct exposure in the Functional WUI. The biggest clusters of direct exposure are shown through out unincorporated areas of the Keys. Burn probability is low throughout the unincorporated areas on the Keys with some swaths of moderate burn probability in the Middle and Upper Keys areas. On the mainland, burn probability is low near the coast but much of the area included in Everglades National Park has a high burn probability. There are pockets of high fire intensity throughout the unincorporated areas of the County; areas with particularly large clusters include Big Pine Key and the mainland areas of Monroe County.

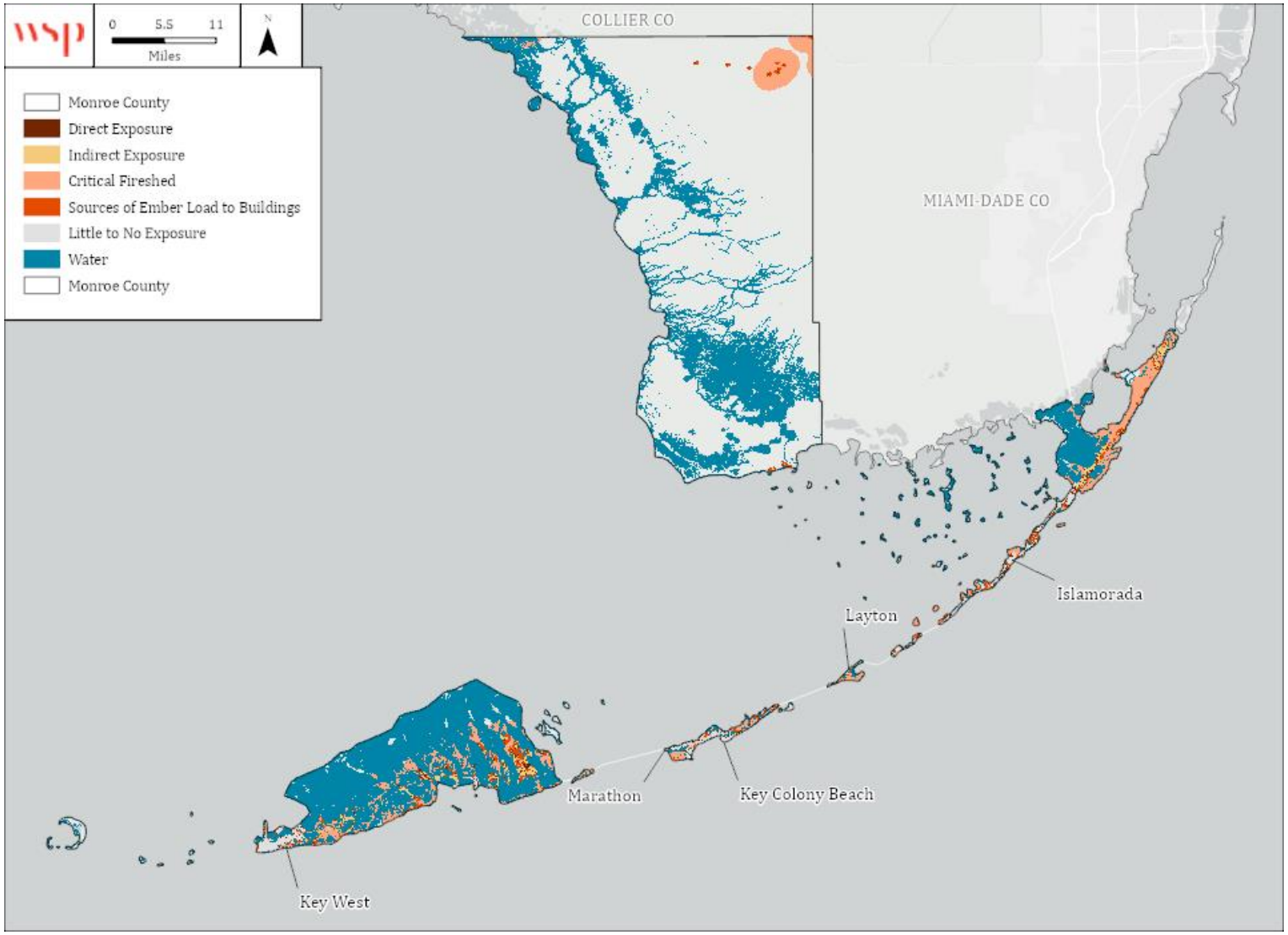
Table A.16 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to wildfire risk on the Functional WUI scale.

Table A.16 – Critical Facilities Exposed to Wildfire, Unincorporated Monroe County

Type	Critical Facility Count	Structure Value
Communications	6	$5,110,285.00
Energy	0	$0
Food, Hydration, Shelter	1	$0
Hazardous Materials	2	$238,623.00
Health and Medical	0	$0
Safety and Security	0	$0
Transportation	0	$0
Water Systems	11	$782,752.00
Total	**20**	**$6,131,660.00**

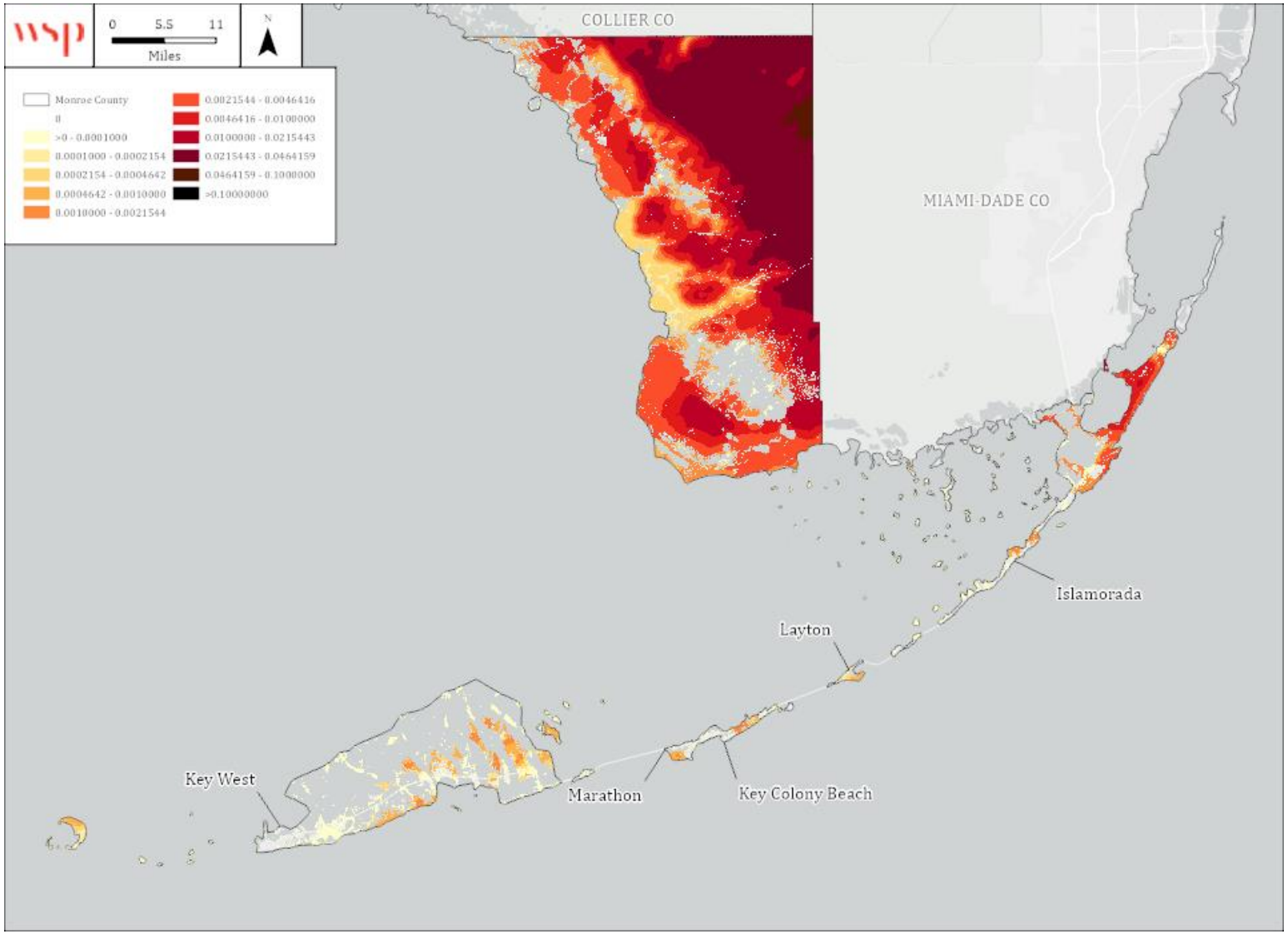
Source: Southern Wildfire Risk Assessment, Monroe County LMS Working Group

Figure A-19 – Functional Wildland Urban Interface, Unincorporated Monroe County



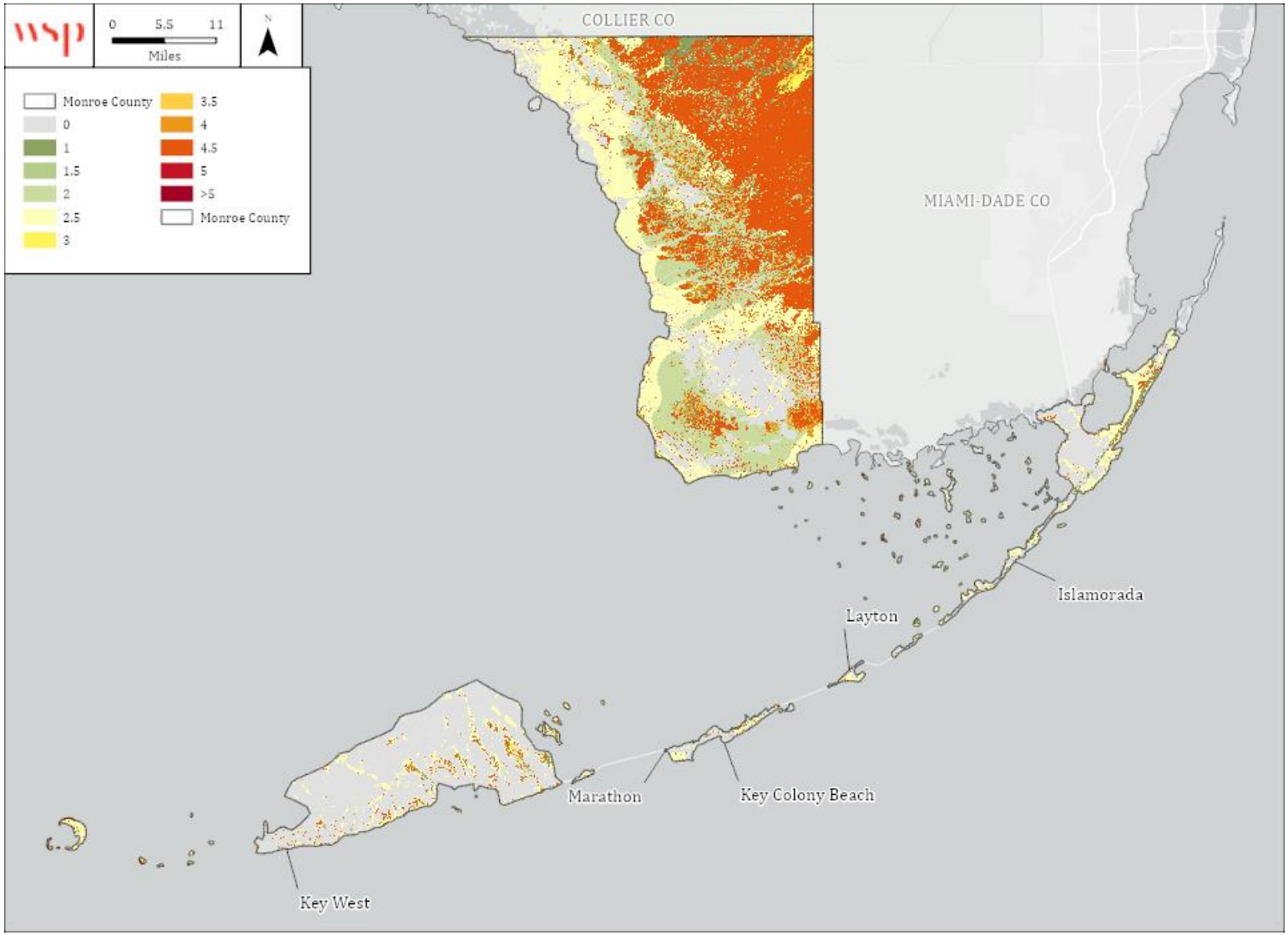
Source: Southern Wildfire Risk Assessment

Figure A-20 – Burn Probability, Unincorporated Monroe County



Source: Southern Wildfire Risk Assessment

Figure A-21 – Potential Fire Intensity, Unincorporated Monroe County



Source: Southern Wildfire Risk Assessment

A.3 MITIGATION STRATEGY

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
1	Monroe County and Municipalities	Support efforts in Monroe County to address the potential negative impacts related to climate change, including sea level rise. Monroe County is the most vulnerable partner that participates in the SE FL Compact with respect to climate change induced sea level increases. Critical resources like the primary source of drinking water as well as homes, businesses, and infrastructure are directly at risk. The LMS should actively support its own Climate Change action plans (Monroe County and Key West) and support the implementation of a Regional Collaborative Climate Action Plan with the neighboring counties through the Southeast Florida Regional Climate Compact to address the impacts of sea level rise and other related climate change impacts	Sea Level Rise	3	H	Prevention	County/Jurisdictional Planning and Engineering Departments	Less than $10,000	Staff Time	2025 - 2030	Carry Forward (Provide Update)	This is an ongoing collaboration. This county and municipalities continue to participate in the SE FL Compact and Climate Change Planning by attending summits and supporting initiatives. This includes incorporating Sea Level Rise projections into this plan.
2	Monroe County and Municipalities	Verify Repetitive Loss Property Data - Monroe County and municipalities that participate in the CRS will verify the repetitive loss property data obtained from FEMA. The NFIP maintains records of past flood insurance claims and tracks properties that have received multiple claims. These	Flood	1, 2	H	Prevention, Public Education	County/Jurisdictional Floodplain Management	$10,000 to $50,000	Staff Time	2020-2025	Carry Forward (Provide Update)	This action is ongoing in the communities with identified repetitive loss properties. Data verification occurs annually and repetitive loss area maps

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
		properties and similarly situated buildings present likely opportunities for mitigation. Verifying the data serves two purposes: it helps the NFIP improve its records, and it helps identify Repetitive Loss Areas. Prepare Repetitive Loss Area Maps - Monroe County and municipalities that prepare Repetitive Loss Area Analyses will identify repetitive loss areas within their jurisdiction using the methods described in FEMA/CRS guidance. Identification of Repetitive Loss Areas helps identify property owners who may be interested in reducing their exposure and working with the communities to seek mitigation funds.										are updated upon request.
3	Monroe County and Municipalities	Elevate Buildings Located within Floodprone Areas	Tropical Cyclones, Flood, Sea Level Rise	2	M	Property Protection	County Emergency Management Department with Jurisdictional Representatives	$5,225,000	HMGP, BRIC, FMA, CDBG-DR	5 years	Carry Forward (Provide Update)	Residential elevation projects are now covered under the Elevate Florida Program. Continue to pursue other elevation projects.
4	Monroe County and Municipalities	Wind Retrofit of County Facilities	Severe Storms and Tornadoes, Tropical Cyclones	2	M	Property Protection	Monroe County Public Works	$8,837,280	HMGP, BRIC, HLMP	1 - 5 years	Carry Forward (Provide Update)	On going upgrades to apartments. Final project will be to build new apartment buildings by 2028

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
5	Monroe County and Municipalities	County-wide Road Elevation and Drainage Improvements (Phase 1 of 2)	Tropical Cyclones, Flood, Sea Level Rise	2	M	Structural Projects	Monroe County Roads and Bridges ; Monroe County Public Works	$367,200,000	HMGP, BRIC, FMA, CDBG-MIT	5 years	Carry Forward (Provide Update)	Road Elevation projects in progress
6	Monroe County and Municipalities	Natural Resources Adaptation Plan	Flood, Sea Level Rise, Tropical Cyclones	2, 3	H	Prevention, Natural Resource Protection	Monroe County Planning and Environmental Resources	$142,000	BRIC, HMPG	3 Years	Carry Forward (Provide Update)	80% complete
7	Monroe County and Municipalities	Engine generators at Water Treatment Plant	All	2	M	Structural Projects	FKAA	$1,500,000	HMGP, BRIC, HLMP, CDBG	1 - 3 years	Carry Forward (Provide Update)	This project is currently in the bidding phase.
8	Monroe County and Municipalities	Hospital Hardening: Evaluate/identify necessary improvements needed to retrofit hospital facilities and perform needed retrofits to mitigate storm damages. Facilities include: Lower Keys Health Systems, De Poo Hospital, Fisherman's Hospital, Mariners' Hospital, Nursing Homes (including Bayshore Manor)	All	2	M	Property Protection	LKMC/Baptist Health/Monroe County	Over $1,000,000	HMGP, BRIC, CDBG-MIT, HLMP	5 - 10 years	Carry Forward (Provide Update)	No progress
9	Monroe County and Municipalities	Marathon Potable Water Pump Station Mitigation	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$3,000,000.00	DEP - Resilient Florida	2 years	New	-
10	Monroe County and Municipalities	Decentralized Wastewater Treatment Project	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$450,000.00	DEP - Water Quality Improvements	2 years	New	-
11	Monroe County and Municipalities	Plantation Key Transmission Main	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$1,750,000.00	DEP - Rep Gimenez Request	2 years	New	-
12	Monroe County	Peacock Apartments Rehabilitation Project: rehabilitation and retrofit of 24 unit special needs housing property. Serves very low income mentally ill adults.	Tropical Cyclones, Flood, Sea Level Rise, Severe Storms and Tornadoes	1, 2	M	Property Protection	US Fellowship of Florida	$150,000	BRIC, HMGP	1 - 5 years	Carry Forward (Provide Update)	On going upgrades to apartments. Final project will be to build new apartment

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
												buildings by 2028
13	Monroe County	Higgs Beach (KW) Seawall Replacement Project for flood water protection of the Historic West Martello Towers Fort	Tropical Cyclones, Flood, Sea Level Rise	2	M	Structural Projects	Monroe County Public Works	$1,050,000	HMA, FMA, BRIC, HMGP	1 - 5 years	Carry Forward (Provide Update)	No progress has been made on this action to date.
14	Monroe County	Sands Subdivision Drainage Improvement and Roadway Elevation Project	Tropical Cyclones, Flood, Sea Level Rise	2	M	Structural Projects	Monroe County Roads and Bridges/ Engineering	$9,500,000	Rep Gimenez Request (Federal Approp), DEP - Resilient Florida	1 - 5 years	Carry Forward (Provide Update)	Project currently with BOCC. Updated budget. Awarded initial funding in 2022
15	Monroe County	Twin Lakes Drainage Improvement and Roadway Elevation Project	Tropical Cyclones, Flood, Sea Level Rise	2	M	Structural Projects	Monroe County Roads and Bridges/ Engineering	$20,500,000	CDBG-MIT, DEP - Resilient Florida	1 - 5 years	Carry Forward (Provide Update)	Updated budget. Awarded initial funding in 2021 and 2025
16	Monroe County	Stillwright Point Road Elevation Project	Flood, Sea Level Rise, Tropical Cyclones	2, 3	H	Structural Projects	Monroe County Roads and Bridges	$21,700,000.00	HMGP, DEP - Resilient Florida	5 years	New	-
17	Monroe County	Winston Waterways Road Elevation	Flood, Sea Level Rise, Tropical Cyclones	2, 3	H	Structural Projects	Monroe County Roads and Bridges	$53,000,000.00	HMGP, DEP - Resilient Florida	5 years	New	-
18	Monroe County	Big Coppitt Road Elevation Project	Flood, Sea Level Rise, Tropical Cyclones	2, 3	H	Structural Projects	Monroe County Roads and Bridges	$88,000,000.00	HMGP, DEP - Resilient Florida	5 years	New	-
19	Monroe County	Flagler Avenue Road Resiliency Project	Flood, Sea Level Rise, Tropical Cyclones	2, 3	H	Structural Projects	Monroe County Roads and Bridges	$57,000,000.00	HMGP	5 years	New	-
20	Monroe County	Conch Key Road Elevation	Flood, Sea Level Rise, Tropical Cyclones	2, 3	H	Structural Projects	Monroe County Roads and Bridges	$4,000,000.00	DEP - Resilient Florida	5 years	New	-
21	Monroe County, Marathon, Islamorada, Key Colony Beach, Layton	Self-Supporting Transmission Poles	All	2	M	Structural Projects	FKEC	$6,000,000	HMGP, BRIC, FMA	1 - 5 years	Carry Forward (Provide Update)	Awaiting FDEM approval

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
22	Monroe County and Key West	Backup Generators for Critical Facilities	All	2	M	Property Protection	KEYS Energy Services	$200,000	HMGP, BRIC, CDBG-DR, CDBG-MIT	1 - 5 years	Carry Forward (Provide Update)	Some work completed. May pursue funding for substation generators
23	Monroe County and Key West	Harden Critical Facilities	All	2, 3	H	Structural Projects	KEYS Energy Services	$650,000	HMGP, BRIC, CDBG	1 - 2 years	New	Submitted HMGP application and budgeted for match to harden employee building that houses generation control center and vehicle mechanic shop
24	Monroe County and Key West	Improve System Redundancy	All	2, 3	H	Structural Projects	KEYS Energy Services	$5,000,000	HMGP, BRIC, CDBG	1 - 4 years	New	-
25	Monroe County and Key West	Storm Hardening of Electrical Service - Undergrounding of electric service	All	2, 3	H	Structural Projects	KEYS Energy Services	$20,000,000	HMGP, BRIC, CDBG	1 - 10 years	New	-
26	Monroe County and Key West	Storm Hardening of Electrical Service - Pole Strengthening	All	2, 3	H	Structural Projects	KEYS Energy Services	$10,000,000	HMGP, BRIC, CDBG	1 - 10 years	New	-

B CITY OF KEY COLONY BEACH

B.1 ASSET INVENTORY

The City of Key Colony Beach and the LMS Working Group provided a local inventory of critical facilities and community lifelines, which are a priority for mitigation planning and emergency management. Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function. Table B.1 provides a count of critical facilities by FEMA lifeline category in the City of Key Colony Beach. Figure B-1 shows the locations of all critical facilities in the City of Key Colony Beach.

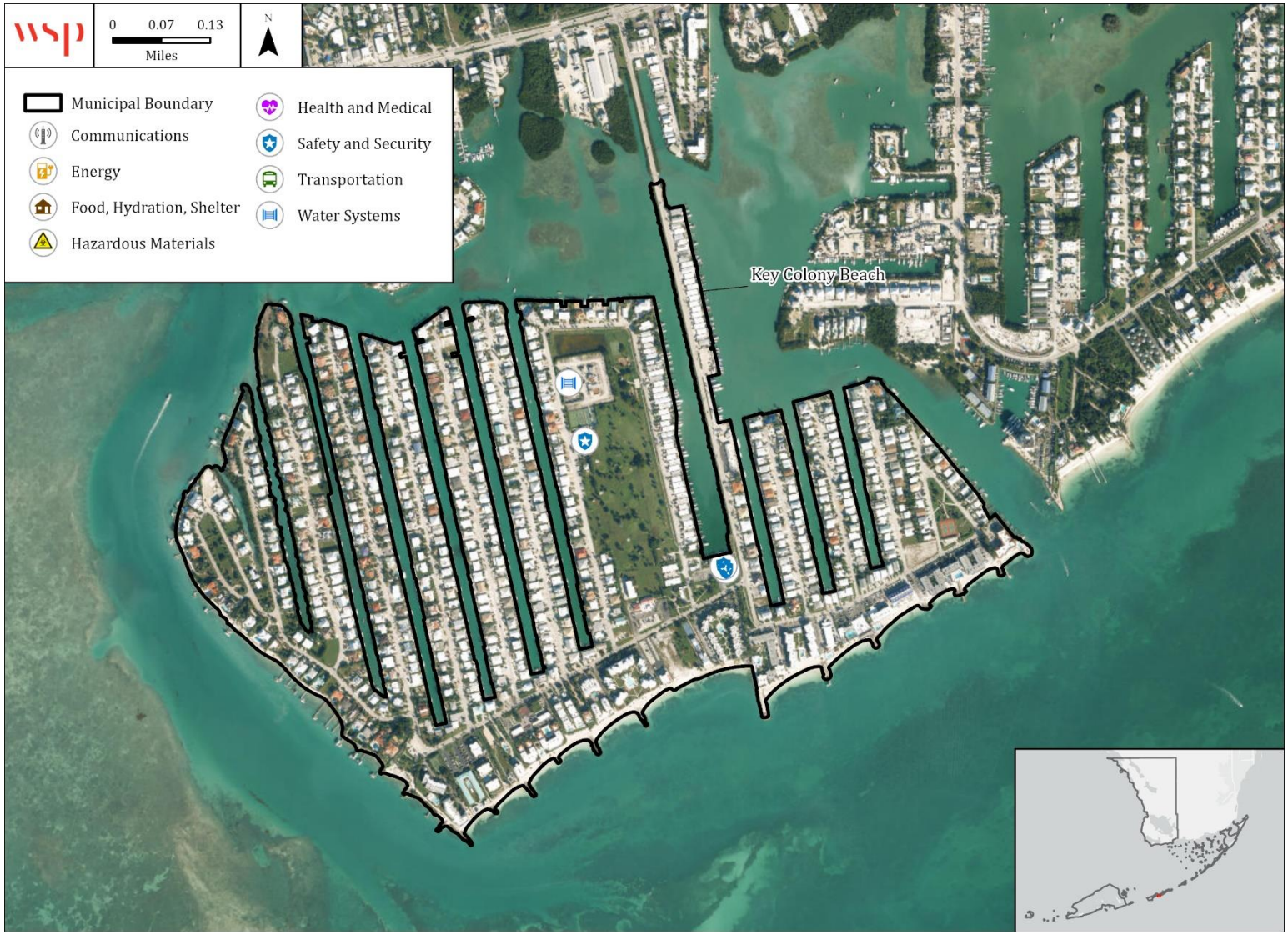
Table B.2 provides a detailed inventory of the critical facilities in the City of Key Colony Beach, indicating each facility's FEMA lifeline category, flood zone, 1% annual chance flood depth, sea level rise, storm surge, and wildfire. More information on hazard vulnerability is provided in the hazard profiles.

Table B.1 – Critical Facilities, City of Key Colony Beach

Facility Type	Count of Facility Type	Structure Value
Communications	0	$0
Energy	0	$0
Food, Hydration, Shelter	0	$0
Hazardous Materials	0	$0
Health and Medical	0	$0
Safety and Security	3	$2,705,814
Transportation	0	$0
Water Systems	1	$3,500,000
Total	**4**	**$6,205,814**

Source: LMS Working Group, GIS Analysis

Figure B-1 – Critical Facilities, City of Key Colony Beach



Source: LMS Working Group, GIS Analysis

Table B.2 – Critical Facilities Inventory, City of Key Colony Beach

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Safety and Security	Government	600 WEST OCEAN DRIVE	$1,052,907.00	3.2	AE	-	SS 100yr	-	0
Water Systems	Waste	600 8th St, Key Colony Beach, FL 33051	$3,500,000.00	3.7	AE	NIH	SS 100yr	-	0
Safety and Security	Government	600 W Ocean Dr, Key Colony Beach, FL 33051	$1,052,907.00	3.1	AE	-	SS 100yr	-	0
Safet and Security	Government	480 8th St, Key Colony Beach, FL 33051	$600,000	0.9	AE	-	SS 100yr	-	0

B.2 RISK ASSESSMENT

This section contains a summary of the City of Key Colony Beach's asset inventory as well as hazard profile and vulnerability assessment for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Flood, Sea Level Rise, Storm Surge, and Wildfire.

B.2.1 FLOOD

Table B.3 details the acreage of Key Colony Beach's total area by flood zone on the effective DFIRM; it also shows a comparison to the preliminary DFIRM released in December 2019. 100 percent of Key Colony Beach falls within the mapped 1%-annual-chance floodplains; this drops to 99.6 percent on the 2019 preliminary maps. The data in this risk assessment is based off FEMA's 2005 DFIRM. Figure B-2 reflects the effective mapped flood hazard zones for Key Colony Beach while Figure B-3 displays the 2019 preliminary map.

Table B.3 – Flood Zone Acreage in Key Colony Beach

	Effective DFIRM (2005)		Preliminary DFIRM (2019)		Change from Effective (acres)
Flood Zone	**Acreage**	**Percent of Total (%)**	**Acreage**	**Percent of Total (%)**	
AE	251.7	94.7%	245.5	92.4%	-6.2
VE	14.2	5.3%	19.1	7.2%	4.9
AO	0.0	0.0%	0.0	0.0%	0.0
0.2% Annual Chance Flood Hazard	0.0	0.0%	1.2	0.4%	1.2
Unshaded X	0.0	0.0%	0.0	0.0%	0.0
Open Water	0.0	0.0%	0.0	0.0%	0.0
Total	265.9	100.0 %	265.9	100.0%	0.0
SFHA Total	**265.9**	**100.0%**	**264.7**	**99.6%**	**-1.2**

Source: FEMA Effective DFIRM

Note: The differences between the effective FIRM and the preliminary FIRM are significant will likely still change. These details are provided here only as a comparison – all further flood analysis is based in the 2005 Effective DFIRM.

Table B.4 and Table B.5 provide building counts and estimated damages by occupancy type for the 1% annual chance flood event using both the effective and preliminary DFIRM. Figure B-4 and Figure B-5 display the effective and preliminary depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

Table B.4 – Estimated Building Damage and Content Loss, 1% Annual Chance Flood Effective DFIRM, City of Key Colony Beach

Occupancy Type	Total Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Agriculture	0	$0	$0	$0	$0	0%
Commercial	10	$27,492,958	$145,558	$456,727	$602,285	2%
Educational	0	$0	$0	$0	$0	0%
Government	8	$5,092,002	$25,435	$162,749	$188,185	4%
Industrial	0	$0	$0	$0	$0	0%
Religious	0	$0	$0	$0	$0	0%
Residential	1,409	$1,007,183,974	$178,886,110	$88,847,218	$267,733,328	27%
Total	**1,427**	**$1,039,768,934**	**$179,057,103**	**$89,466,695**	**$268,523,798**	**26%**

Source: HAZUS, FEMA Effective DFIRM

Table B.5 – Estimated Building Damage and Content Loss, 1% Annual Chance Flood Preliminary DFIRM, City of Key Colony Beach

Occupancy Type	Total Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Agriculture	0	$0	$0	$0	$0	0%
Commercial	10	$27,492,958	$102,883	$301,117	$404,001	1%
Educational	0	$0	$0	$0	$0	0%
Government	8	$5,092,002	$40,712	$250,685	$291,397	6%
Industrial	0	$0	$0	$0	$0	0%
Religious	0	$0	$0	$0	$0	0%
Residential	1,381	$982,326,817	$188,595,751	$94,362,208	$282,957,959	29%
Total	**1,399**	**$1,014,911,777**	**$188,739,347**	**$94,914,010**	**$283,653,357**	**28%**

Source: HAZUS, FEMA Preliminary DFIRM

Table B.6 provides building counts and values for critical facilities by flood zone in the City of Key Colony Beach.

Table B.6 – Critical Facilities Exposed to Flooding, City of Key Colony Beach

Flood Zone	Critical Facility Count	Structure Value
Zone AE	4	$6,205,814
Zone X (500-year)	0	$0
Zone X Unshaded	0	$0
Total	**4**	**$6,205,814**

Source: FEMA Effective DFIRM, LMS Working Group

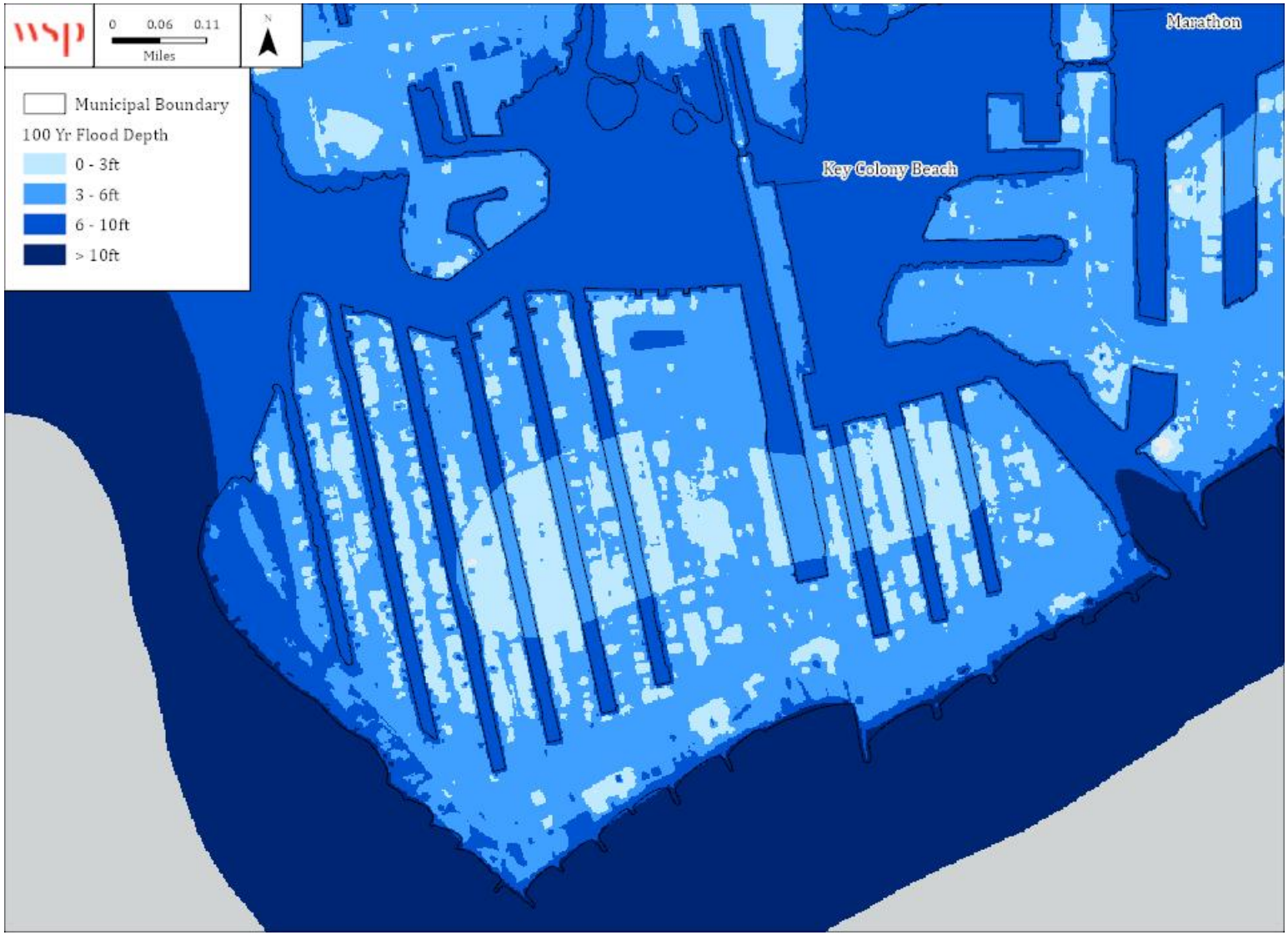
Figure B-2 – FEMA Flood Hazard Areas, Effective DFIRM, Key Colony Beach

Source: FEMA Effective DFIRM

Figure B-3 – FEMA Flood Hazard Areas, Preliminary DFIRM, City of Key Colony Beach

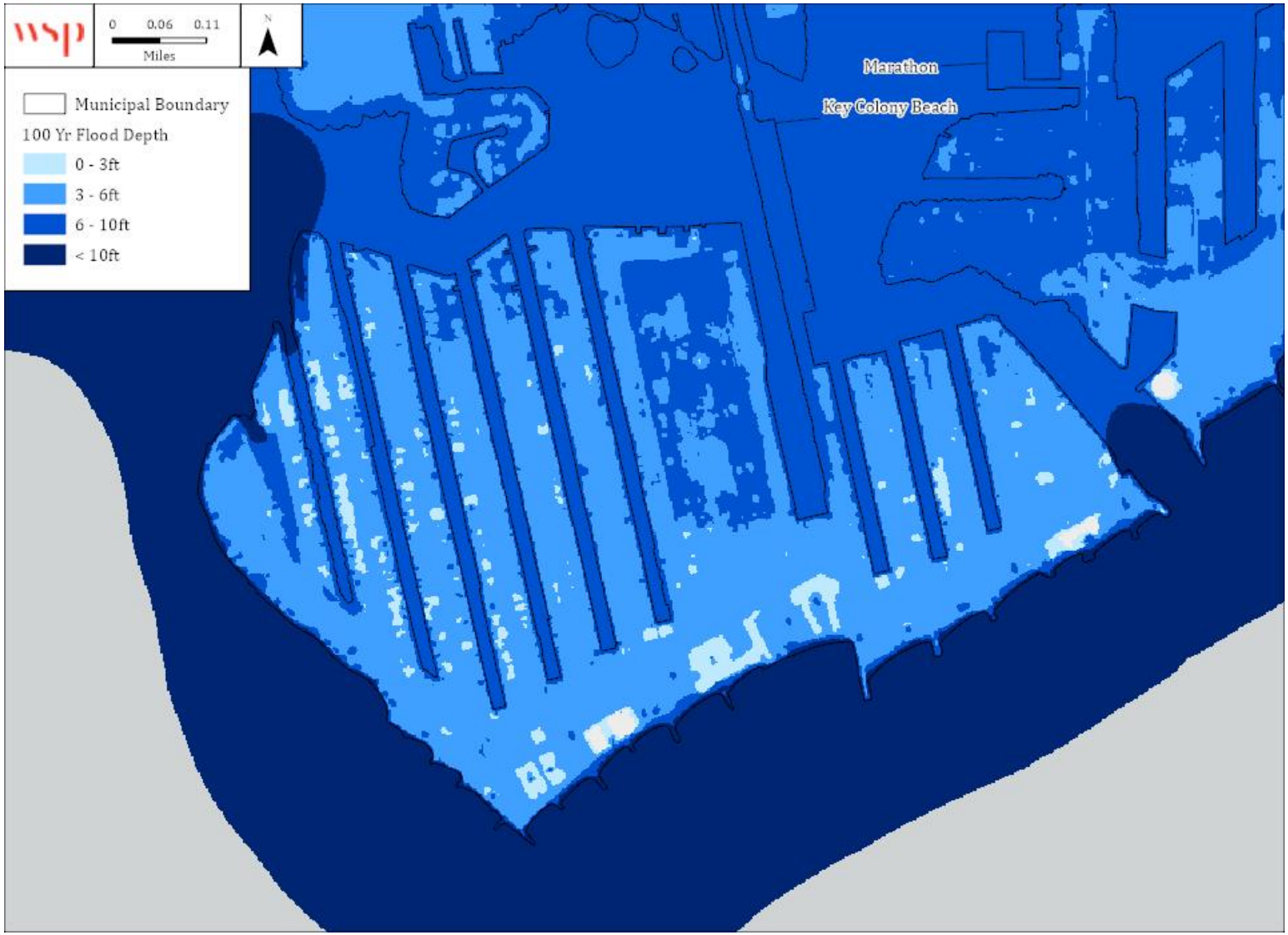
Source: FEMA Preliminary DFIRM

Figure B-4 – Flood Depth, 1%-Annual Chance Floodplain Effective DFIRM, City of Key Colony Beach



Source: FEMA Effective DFIRM

Figure B-5 – Flood Depth, 1%-Annual Chance Floodplain Preliminary DFIRM, City of Key Colony Beach



Source: FEMA Preliminary DFIRM

FLOODPLAIN MANAGEMENT

The City of Key Colony Beach joined the NFIP emergency program in 1970 and has been a regular participant in the NFIP since July 1971. The City is a participant in the Community Rating System and is a Class 6 community. The following tables reflect NFIP policy and claims data for the City categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table B.7 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	393	$870,846	$113,712,000	456	$17,069,853.90
2-4 Family	94	$205,153	$24,524,000	189	$5,813,692.17
All Other Residential	382	$394,112	$78,719,000	217	$13,592,513.80
Non-Residential	13	$100,970	$5,782,000	47	$4,681,081.64
Total	**882**	**$1,571,081**	**$222,737,000**	**909**	**$41,157,141.51**

Source: FEMA Community Information System, accessed May 2025

Table B.8 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	875	$1,506,266	$220,255,000	889	$39,948,170.57
A Zones	0	$0	$0	1	$0.00
V01-30 & VE Zones	7	$64,815	$2,482,000	18	$1,166,716.94
B, C & X Zone					
Standard	0	$0	$0	1	$42,254.00
Total	**882**	**$1,571,081**	**$222,737,000**	**909**	**$41,157,141.51**

Source: FEMA Community Information System, accessed May 2025

Table B.9 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	475	$987,708	$107,328,000	553	$32,718,903.26
A Zones	0	$0	$0	1	$0.00
V01-30 & VE Zones	3	$46,177	$1,666,000	14	$1,157,605.84
Total	**478**	**$1,033,885**	**$108,994,000**	**568**	**$33,876,509.10**

Source: FEMA Community Information System, accessed November 2020

Table B.10 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	400	$518,558	$112,927,000	336	$7,229,267.31
V01-30 & VE Zones	4	$18,638	$816,000	4	$9,111.10

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
B, C & X Zone	0	$0	$0	1	$42,254.00
Standard	0	$0	$0	1	$42,254.00
Total	**404**	**$537,196**	**$113,743,000**	**341**	**$7,280,632.41**

Source: FEMA Community Information System, accessed May 2025

CONTINUED NFIP COMPLIANCE

The City entered the NFIP in 1971 by adoption of an ordinance that complies with the requirement of the program. To continue compliance with the NFIP, the City will:

- Enforce the adopted floodplain management ordinance, including reviewing all development proposals in the SFHA and enforcing the requirements of the ordinance, and inspecting both permitted development and unpermitted activities;
- Maintain records pertaining to floodplain development, including flood maps and Letters of Map Change, which shall be available for public inspection;
- Notify the public when there are proposed changes to the ordinance or FIRMs;
- Implement activities recognized by the NFIPs CRS, such as maintaining elevation certificates, sending annual NFIP mailing to local lenders, realtors, and insurance companies, and keeping a library of NFIP materials at City Hall; and
- Promote the purchase of NFIP flood insurance policies as financial protection.

B.2.2 SEA LEVEL RISE

Table B.11 details the number of all buildings affected by sea level rise in the City of Key Colony Beach following the NOAA sea level rise projections of intermediate low and intermediate high scenarios.

Table B.11 – All Buildings Affected by Sea Level Rise, City of Key Colony Beach

Occupancy	Estimated Building Count	Structure Value	Estimated Content Value	Total Value
2040 NIL	**1,597**	**$831,866,662**	**$487,877,535**	**$1,319,744,198**
Agriculture	0	$0	$0	$0
Commercial	4	$2,387,093	$2,387,093	$4,774,186
Education	0	$0	$0	$0
Government	2	$1,514,513	$1,514,513	$3,029,026
Industrial	0	$0	$0	$0
Religious	0	$0	$0	$0
Residential	630	$284,910,225	$142,455,112	$261,272,822
2040 NIH	**825**	**378,920,023**	**191,926,559**	**353,076,204**
Agriculture	0	$0	$0	$0
Commercial	4	$2,387,093	$2,387,093	$0
Education	0	$0	$0	$0
Government	8	$2,546,001	$2,546,001	$5,092,002
Industrial	0	$0	$0	$0
Religious	0	$0	$0	$0
Residential	813	$373,986,929	$186,993,465	$347,984,202

Source: HAZUS, NOAA, Monroe County Parcel Data

Figure B-6 and Figure B-7 display NOAA 2040 intermediate low and high sea level rise scenarios for the City of Key Colony Beach. Table B.12 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to sea level rise based on NOAA intermediate low and high scenarios.

Table B.12 – Critical Facilities Exposed to Sea Level Rise, City of Key Colony Beach

Highest Level of SLR	Critical Facility Count	Structure Value
2040 NIL	-	-
NOAA 3ft	-	-
2040 NIH	1	$100,758.90
Total	1	**$100,758.90**

Source: NOAA, Monroe County LMS Working Group

Figure B-6 – NOAA 2040 Intermediate Low Sea Level Rise Scenario, City of Key Colony Beach

Source: NOAA 2040 NIL, Monroe County Parcel Data

Figure B-7 – NOAA 2040 Intermediate High Sea Level Rise Scenario, City of Key Colony Beach

Source: NOAA 2040 NIH, Monroe County Parcel Data

B.2.3 STORM SURGE

Table B.13 summarizes the number of buildings in the City of Key Colony Beach that will be impacted by 100-yr and 500-yr storm surge events. Figure B-8 shows potential storm surge inundation for a 100-yr storm surge event and Figure B-9 shows inundation for the 500-yr storm surge event.

Table B.13 – Storm Surge Exposure by 100-yr and 500-yr Event, City of Key Colony Beach

Occupancy	Estimated Building Count	Structure Value	Estimated Content Value	Total Value
100yr	**1,427**	**$687,748,463**	**$352,020,471**	**$1,039,768,934**
Agriculture	0	$0	$0	$0
Commercial	10	$13,746,479	$13,746,479	$27,492,958
Education	0	$0	$0	$0
Government	8	$2,546,001	$2,546,001	$5,092,002
Industrial	0	$0	$0	$0
Religious	0	$0	$0	$0
Residential	1,409	$671,455,983	$335,727,991	$1,007,183,974
500yr	**1,427**	**$687,748,463**	**$352,020,471**	**$1,039,768,934**
Agriculture	0	$0	$0	$0
Commercial	10	$13,746,479	$13,746,479	$27,492,958
Education	0	$0	$0	$0
Government	8	$2,546,001	$2,546,001	$5,092,002
Industrial	0	$0	$0	$0
Religious	0	$0	$0	$0
Residential	1,409	$671,455,983	$335,727,991	$1,007,183,974

Source: FEMA, NOAA, Monroe County Parcels

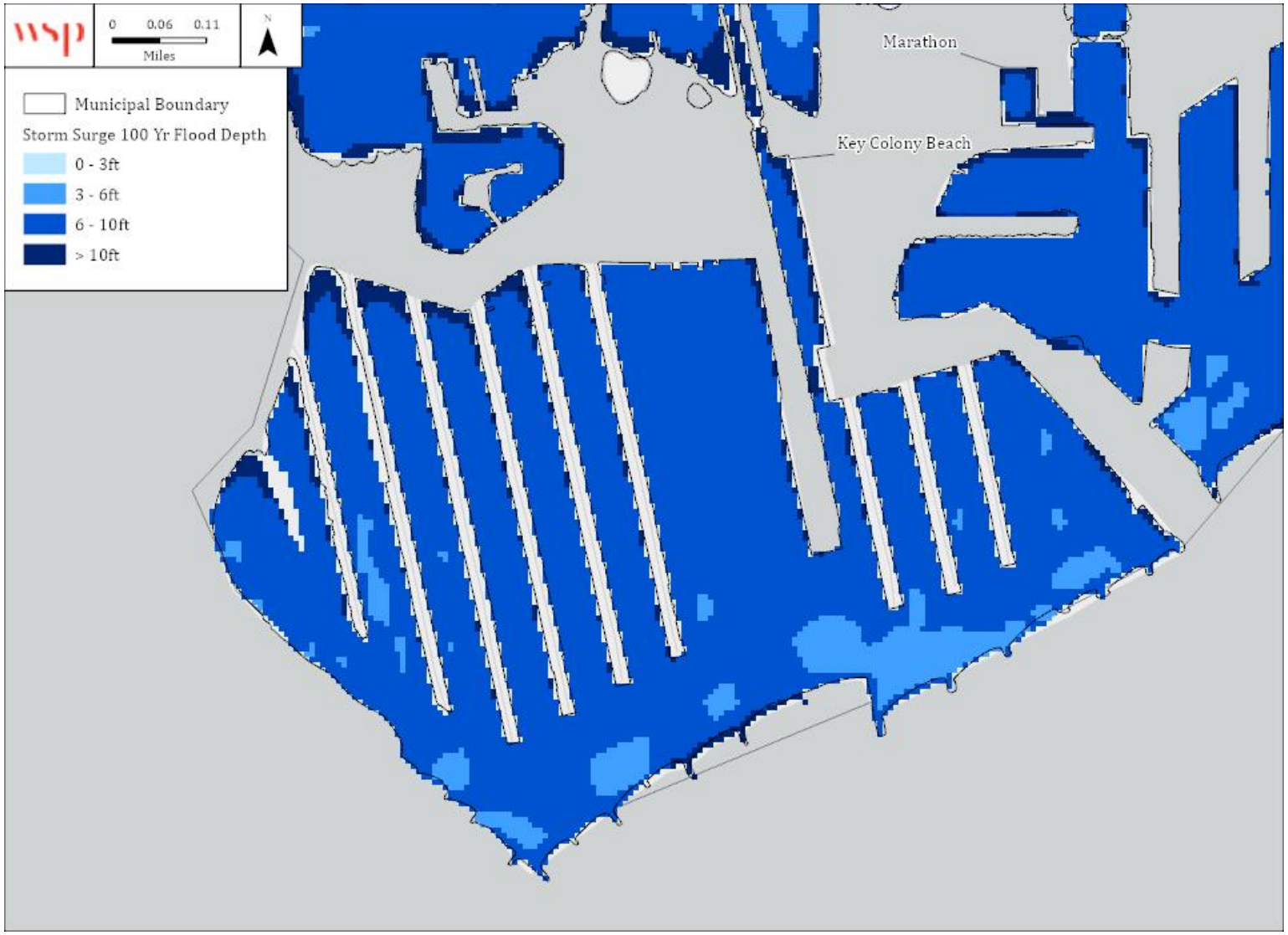
Table B.14 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to storm surge based on 100 and 500-year storm surge events.

Table B.14 – Critical Facilities Exposed to Storm Surge, City of Key Colony Beach

Storm Surge Category	Critical Facility Count	Structure Value
100-Year	3	$5,605,814
500-Year	1	$600,000
Total	**4**	**$6,205,814**

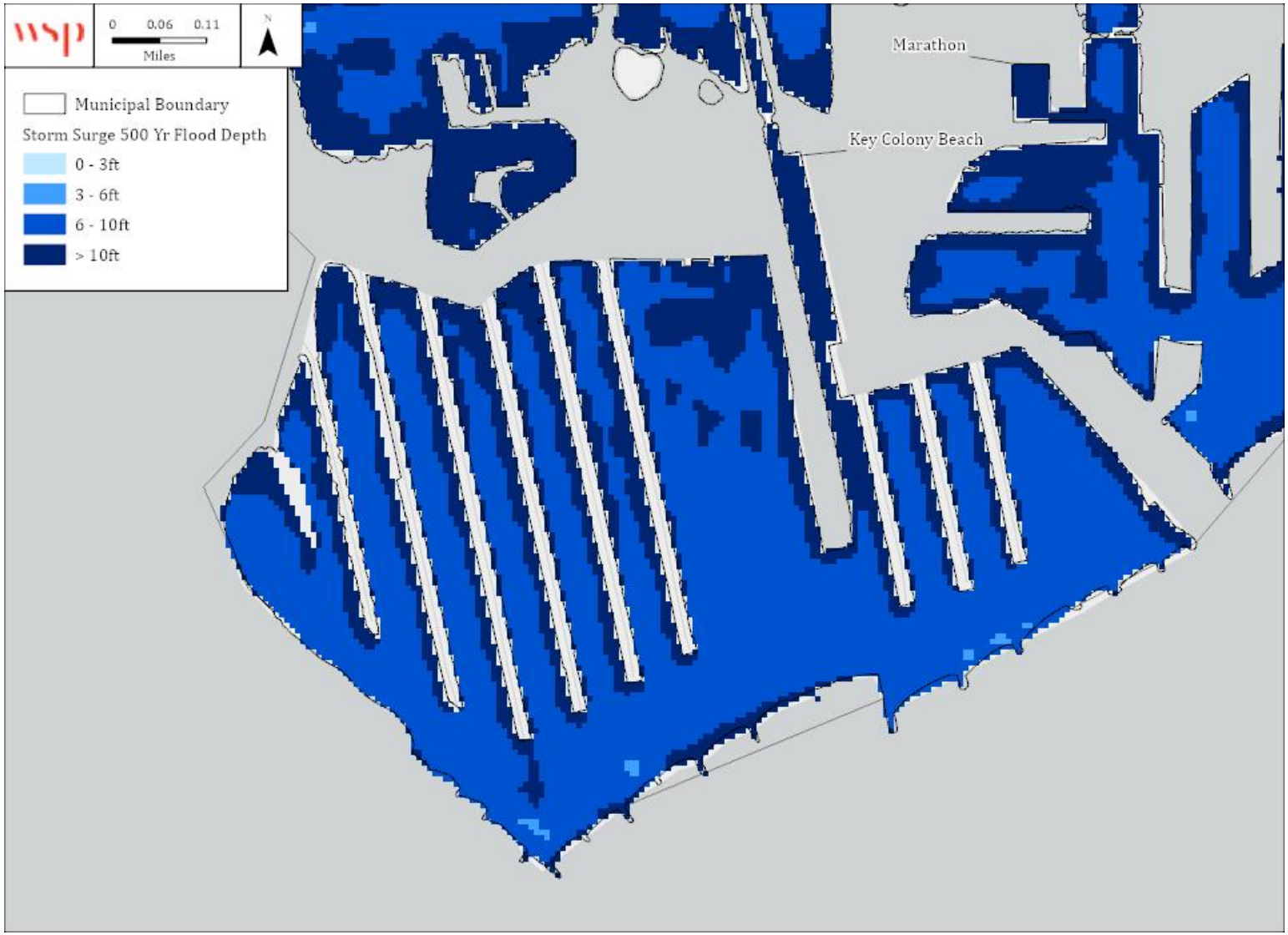
Source: FEMA, NOAA, Monroe County LMS Working Group

Figure B-8 – 100-Year Storm Surge Event Inundation, City of Key Colony Beach



Source: NOAA

Figure B-9 – 500-Year Storm Surge Event Inundation, City of Key Colony Beach



Source: NOAA

B.2.4 WILDFIRE

Table B.15 summarizes the acreage in the City of Key Colony Beach that falls within the Functional Wildland Urban Interface (WUI), categorized into zones that describe the wildfire risk mitigation activities appropriate for each zone. Areas in the Functional WUI are those areas where development and building structures may intermix with burnable land cover. Approximately, 6 percent of Key Colony Beach is categorized as having direct exposure to wildfire risk within the Functional WUI.

Table B.15 – Functional Wildland Urban Interface, City of Key Colony Beach

	Functional Wildland Urban Interface (WUI) Category	Acres	Percent
	Direct Exposure	17	6%
	Indirect Exposure		0%
	Critical Fireshed	2	1%
	Sources of Ember Load to Buildings		0%
	Little to No Exposure	233	90%
	Water	6	2%
	Total	**258**	**100%**

Source: Southern Wildfire Risk Assessment

Figure B-10 depicts the Functional WUI for Key Colony Beach. Figure B-11 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts. Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors, is depicted in Figure B-12.

Majority of the City is located within the Functional WUI with pockets of direct exposure being spread evenly throughout. Where there is a probability of burning, in the northwestern corner of the City, the burn probability is rated as very low; the remainder of the City has no burn probability associated with it. There are small pockets of high and moderate potential fire intensity, but much of the city has no fire intensity rating.

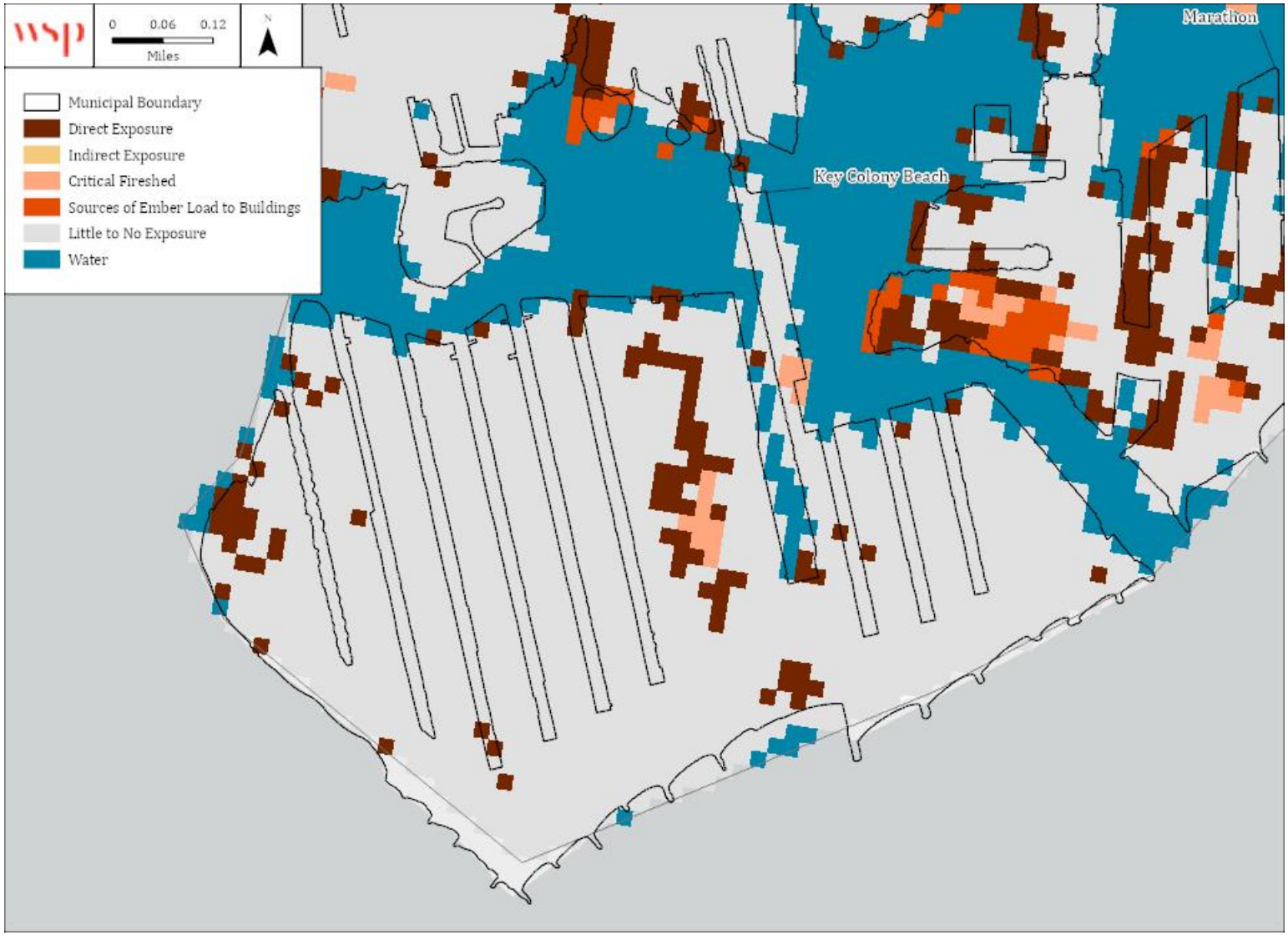
Table B.16 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to wildfire risk on the Functional WUI scale.

Table B.16 – Critical Facilities Exposed to Wildfire, City of Key Colony Beach

Type	Critical Facility Count	Structure Value
Communications	0	$0
Energy	0	$0
Food, Hydration, Shelter	0	$0
Hazardous Materials	0	$0
Health and Medical	0	$0
Safety and Security	0	$0
Transportation	0	$0
Water Systems	0	$0
Total	**0**	**$0**

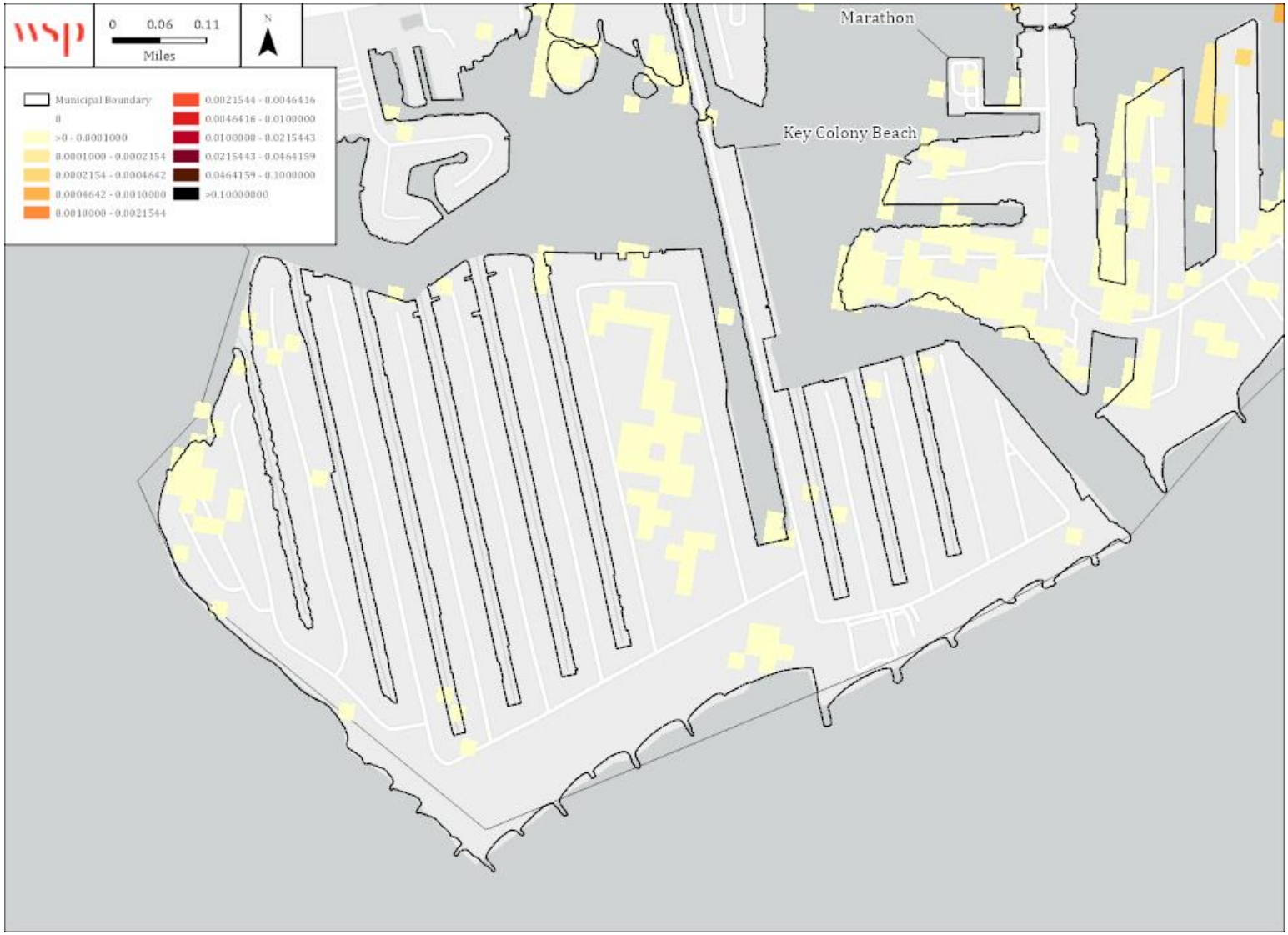
Source: Southern Wildfire Risk Assessment, Monroe County LMS Working Group

Figure B-10 – Functional Wildland Urban Interface, City of Key Colony Beach



Source: Southern Wildfire Risk Assessment

Figure B-11 – Burn Probability, City of Key Colony Beach



Source: Southern Wildfire Risk Assessment

Figure B-12 – Potential Fire Intensity, City of Key Colony Beach

Source: Southern Wildfire Risk Assessment

B.3 MITIGATION STRATEGY

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
1	Monroe County and Municipalities	Support efforts in Monroe County to address the potential negative impacts related to climate change, including sea level rise. Monroe County is the most vulnerable partner that participates in the SE FL Compact with respect to climate change induced sea level increases. Critical resources like the primary source of drinking water as well as homes, businesses, and infrastructure are directly at risk. The LMS should actively support its own Climate Change action plans (Monroe County and Key West) and support the implementation of a Regional Collaborative Climate Action Plan with the neighboring counties through the Southeast Florida Regional Climate Compact to address the impacts of sea level rise and other related climate change impacts	Sea Level Rise	3	H	Prevention	County/Jurisdictional Planning and Engineering Departments	Less than $10,000	Staff Time	2025 - 2030	Carry Forward (Provide Update)	This is an ongoing collaboration. This county and municipalities continue to participate in the SE FL Compact and Climate Change Planning by attending summits and supporting initiatives. This includes incorporating Sea Level Rise projections into this plan.
2	Monroe County and Municipalities	Verify Repetitive Loss Property Data - Monroe County and municipalities that participate in the CRS will verify the repetitive loss property data obtained from FEMA. The NFIP maintains records of past flood insurance claims and tracks properties that have	Flood	1, 2	H	Prevention, Public Education	County/Jurisdictional Floodplain Management	$10,000 to $50,000	Staff Time	2020-2025	Carry Forward (Provide Update)	This action is ongoing in the communities with identified repetitive loss properties. Data verification occurs annually and repetitive

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
		received multiple claims. These properties and similarly situated buildings present likely opportunities for mitigation. Verifying the data serves two purposes: it helps the NFIP improve its records, and it helps identify Repetitive Loss Areas. Prepare Repetitive Loss Area Maps - Monroe County and municipalities that prepare Repetitive Loss Area Analyses will identify repetitive loss areas within their jurisdiction using the methods described in FEMA/CRS guidance. Identification of Repetitive Loss Areas helps identify property owners who may be interested in reducing their exposure and working with the communities to seek mitigation funds.										loss area maps are updated upon request.
3	Monroe County and Municipalities	Elevate Buildings Located within Floodprone Areas	Tropical Cyclones, Flood, Sea Level Rise	2	M	Property Protection	County Emergency Management Department with Jurisdictional Representatives	$5,225,000	HMGP, BRIC, FMA, CDBG-DR	5 years	Carry Forward (Provide Update)	Residential elevation projects are now covered under the Elevate Florida Program. Continue to pursue other elevation projects.
4	Monroe County and Municipalities	Wind Retrofit of County Facilities	Severe Storms and Tornadoes, Tropical Cyclones	2	M	Property Protection	Monroe County Public Works	$8,837,280	HMGP, BRIC, HLMP	1 - 5 years	Carry Forward (Provide Update)	On going upgrades to apartments. Final project will be to build new apartment buildings by 2028

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
5	Monroe County and Municipalities	County-wide Road Elevation and Drainage Improvements (Phase 1 of 2)	Tropical Cyclones, Flood, Sea Level Rise	2	M	Structural Projects	Monroe County Roads and Bridges ; Monroe County Public Works	$367,200,000	HMGP, BRIC, FMA, CDBG-MIT	5 years	Carry Forward (Provide Update)	Road Elevation projects in progress
6	Monroe County and Municipalities	Natural Resources Adaptation Plan	Flood, Sea Level Rise, Tropical Cyclones	2, 3	H	Prevention, Natural Resource Protection	Monroe County Planning and Environmental Resources	$142,000	BRIC, HMPG	3 Years	Carry Forward (Provide Update)	80% complete
7	Monroe County and Municipalities	Engine generators at Water Treatment Plant	All	2	M	Structural Projects	FKAA	$1,500,000	HMGP, BRIC, HLMP, CDBG	1 - 3 years	Carry Forward (Provide Update)	This project is currently in the bidding phase.
8	Monroe County and Municipalities	Hospital Hardening: Evaluate/identify necessary improvements needed to retrofit hospital facilities and perform needed retrofits to mitigate storm damages. Facilities include: Lower Keys Health Systems, De Poo Hospital, Fisherman's Hospital, Mariners' Hospital, Nursing Homes (including Bayshore Manor)	All	2	M	Property Protection	LKMC/Baptist Health/Monroe County	Over $1,000,000	HMGP, BRIC, CDBG-MIT, HLMP	5 - 10 years	Carry Forward (Provide Update)	No progress
9	Monroe County and Municipalities	Marathon Potable Water Pump Station Mitigation	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$3,000,000.00	DEP - Resilient Florida	2 years	New	-
10	Monroe County and Municipalities	Decentralized Wastewater Treatment Project	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$450,000.00	DEP - Water Quality Improvements	2 years	New	-
11	Monroe County and Municipalities	Plantation Key Transmission Main	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$1,750,000.00	DEP - Rep Gimenez Request	2 years	New	-
21	Monroe County, Marathon, Islamorada, Key Colony Beach, Layton	Self-Supporting Transmission Poles	All	2	M	Structural Projects	FKEC	$6,000,000	HMGP, BRIC, FMA	1 - 5 years	Carry Forward (Provide Update)	Awaiting FDEM approval

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
27	Key Colony Beach	Raise wastewater 13 lift station electrical control boxes to assure functionality after storms. Estimated cost to raise each control box is $4,000 per box, total $52,000. Raise all remaining lower lift stations to current specifications	All	2, 3	H	Property Protection	KCB Wastewater Utility; KCB Public Works	$12,000	HMGP	3 - 5 years	Carry Forward (Provide Update)	Action description updated. Update grant request for potential new wastewater grant application in Fall 2025
28	Key Colony Beach	City Maintenance Building Dry-Flood proofing project with flood log protections on all entry doors, providing protection to an elevation of 11 feet. Protecting critical city vehicles (police/public works) , generators, city lawn and maintenance equipment, storage of documents, etc.	Tropical Cyclones, Flood, Sea Level Rise, Severe Storms and Tornadoes	2	H	Property Protection	KCB Public Works; KCB Police Department	$15,000	HMGP	2 - 4 years	Carry Forward (Provide Update)	Action description updated. Phase I design work is complete. Completing grant work for closure of Phase I. Updating budgeting and grant application for Phase II implementation step.
29	Key Colony Beach	7th street stormwater improvements to reduce flooding from excessive rain events of 4-8 inches of rain within a 24 hour period	Tropical Cyclones, Flood, Sea Level Rise, Severe Storms and Tornadoes	2	H	Structural Projects	KCB Public Works	$7,000	HMGP	1 year	Carry Forward (Provide Update)	Design completed for improvements. Approval for Phase I work May 2025, Contractor agreed upon for Phase I May 2025. Work to be completed by the end of 2025.
30	Key Colony Beach	City Hall Hardening for improved flood and wind protection. Implementation of a local EOC center.	All	2, 3	M	Structural Projects, Emergency Services	KCB Public Works	$100,000	HMGP	2 - 3 years	Carry Forward (Provide Update)	Action description updated. Initial design in process, with completion by 15Au25. Then request for quote

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
												will be advertised for cost estimates
31	Key Colony Beach	Sunset Park beach and park erosion protection	Flood, Coastal Erosion	2, 3	M	Natural Resource Protection	KCB City Staff	$150,000	Florida DEP Grant	3 years	New	-
32	Key Colony Beach	Road elevation in limited areas based on Sea Level Rise Lidar report and localized flooding feedback	Flood, Sea Level Rise	2	M	Structural Projects	KCB City Staff	$3,000,000	HMGP	3 years	New	-
33	Key Colony Beach	11th and 12th street stormwater drainage improvements and installation of remaining injection wells	Flood	2	M	Structural Projects	KCB Stormwater Utility Board	$3,000,000	HMGP	5 years	New	Initial Design completed. Will need to review and update designs when funding is available
34	Islamorada, Key Colony Beach, Key West, Layton, Marathon	Evaluate protective measures for critical infrastructure and facilities to protect against dynamic hazards including flood, wind, sea level rise, and strong storms. Critical facilities provide services that the whole community depends on for basic functioning. The communities will evaluate the need for protecting critical facilities and infrastructure and address as needed.	All	2	M	Property Protection, Prevention	Jurisdiction Engineering/Public Works	$10,000 to $50,000	Staff Time	1 - 5 years	Carry Forward (Provide Update)	Completed flood protection project - elevated breakwater, protected marina office. Continue to pursue additional projects. Adaptation action Plan is underway and will identify new opportunities.

C CITY OF KEY WEST

C.1 ASSET INVENTORY

The City of Key West and the LMS Working Group provided a local inventory of critical facilities and community lifelines, which are a priority for mitigation planning and emergency management. Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function. Table C.1 provides a count of critical facilities by FEMA lifeline category in the City of Key West. Figure C-1 shows the locations of all critical facilities in the City of Key West.

Table C.2 provides a detailed inventory of the critical facilities in the City of Key West, indicating each facility's FEMA lifeline category, flood zone, 1% annual chance flood depth, sea level rise, storm surge, and wildfire. More information on hazard vulnerability is provided in the hazard profiles.

Table C.1 – Critical Facilities, City of Key West

Facility Type	Count of Facility Type	Structure Value
Communications	0	$0
Energy	7	$3,953,014
Food, Hydration, Shelter	22	$227,076,971
Hazardous Materials	1	$6,496,246
Health and Medical	5	$12,863,340
Safety and Security	20	$123,374,417
Transportation	2	$9,291,598
Water Systems	6	$10,765,921
Total	**63**	**$393,821,507**

Source: LMS Working Group, GIS Analysis

Figure C-1 – Critical Facilities, City of Key West

Source: LMS Working Group, GIS Analysis

Table C.2 – Critical Facilities Inventory, City of Key West

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Water Systems	Water	1100 Kennedy Boulevard	$2,576,971.00	2.2	AE	-	SS 100yr	-	0
Health and Medical	Health	1200 Kennedy Avenue	$3,714,774.00	1.0	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	Kennedy Drive	$2,012,308.00	2.9	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	Roosevelt Boulevard and Kennedy Drive	$234,098.11	3.3	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	1525 Kennedy Avenue	$1,125,867.31	4.9	AE	NIH	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	1212 14Th Street	$70,845.15	0.6	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	Kennedy Dr	$391,141.00	4.9	AE	NIL	SS 100yr	-	0
Energy	Energy	1007 Kennedy Drive	-	4.2	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	1105 Leon Street	$9,821,286.25	0.6	AE	-	SS 100yr	-	0
Safety and Security	Government	Trumbo Point	$201,908.18	4.9	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	Palm Avenue	$643,076.42	4.8	AE	-	SS 100yr	-	0
Safety and Security	Government	620 Palm Avenue	$434,353.31	1.6	AE	-	SS 100yr	-	0
Safety and Security	Government	201 Trumbo Road	$115,489.56	4.9	AE	-	SS 100yr	-	0
Safety and Security	Government	Trumbo Point Complex	$1,227,246.00	4.4	VE	-	SS 100yr	-	0
Safety and Security	Government	Trumbo Road	$1,227,246.00	3.4	AE	-	SS 100yr	-	0
Water Systems	Water	5226 College Road	$144,322.95	4.7	AE	-	SS 100yr	-	0
Safety and Security	Government		$13,950,887.00	4.8	AE	-	SS 100yr	-	0
Safety and Security	Government	500 Whitehead Street	$8,272,307.62	-	X (Unshaded)	-	-	-	0
Energy	Energy	1001 James Street	$2,586,545.95	4.6	AE	NIL	SS 100yr	-	0
Safety and Security	Emergency Ops	525 Angela Street	$2,641,508.00	-	X (Unshaded)	-	SS 500yr	-	0
Safety and Security	Emergency Ops	525 Angela Street	$2,641,508.00	-	X (Unshaded)	-	SS 500yr	-	0
Food, Hydration, Shelter	Emergency Ops	430 Duval Street	$22,858,463.00	-	X (Unshaded)	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	1500 Reynolds Street	$58,452,929.44	0.1	AE	-	SS 100yr	-	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	Emergency Ops	5855 College Road	$8,149,289.62	2.4	AE	-	SS 500yr	-	0
Water Systems	Water	5101 College Road	$476,637.85	1.4	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	Roosevelt Boulevard & Jose Marti Drive	$392,658.00	3.2	AE	NOAA 3ft	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	1600 North Roosevelt Avenue	$2,797,915.52	0.2	AE	-	SS 100yr	-	0
Safety and Security	Government	1200 Truman Avenue	$3,964,153.87		X (Shaded)	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	5901 College Road	$16,218,275.29	0.4	AE	-	SS 100yr	-	0
Safety and Security	Government	5501 College Road	$61,497,539.54	7.5	VE	NIH	SS 100yr	-	0
Safety and Security	Government	5501 College Road	$5,650,525.07	9.9	VE	NIH	SS 100yr	-	0
Transportation	Transportation	-	$1,094,442.00	1.1	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	-	$1,094,442.00	1.6	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	Government Road	-	0.0	AE	-		-	0
Safety and Security	Government	510 Greene Street	$3,336,013.00		X (Shaded)	-	SS 100yr	-	0
Energy	Government	3491 S Roosevelt Boulevard	$2,944.89	8.3	VE	NIL	SS 100yr	-	0
Safety and Security	Government	3583 S Roosevelt Boulevard	$17,727.10	7.8	VE	NOAA 3ft	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	2100 Flagler Avenue	$8,532,280.25	1.7	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	West End Of Margaret Street	-	7.5	VE	NIL	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	Sigsbee Boulevard & Arthur Sawyer Road	$7,508,886.00	4.1	AE	-	SS 100yr	-	0
Water Systems	Water	Dredger'S Key Road	$24,684.77	1.3	AE	-	SS 100yr	Direct Exposure	3
Water Systems	Water	Behind Sigsbee School	$7,508,886.00	4.1	AE	-	SS 100yr	-	0
Safety and Security	Government	5100 College Road	$160,537.00	4.7	AE	-	SS 100yr	-	0
Water Systems	Water	Fleming Key	$34,417.97	0.3	AE	-	SS 100yr	-	0
Health and Medical	Health	5200 College Road	$800,510.00	5.2	AE	-	SS 100yr	-	0
Hazardous Materials	Landfill	5701 College Road	$6,496,246.00	0.0	AE	-		-	0
Health and Medical	Health	5860 College Road	$2,735,956.00	4.4	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	939 Felton Road	$4,859,091.00	2.1	AE	-	SS 100yr	-	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	Emergency Ops	700 Truman Avenue	$10,086,013.00	-	X (Unshaded)	-	SS 100yr	-	0
Transportation	Transportation	3501 S Roosevelt Boulevard	$8,197,155.97	7.4	VE	NIL	SS 100yr	-	0
Safety and Security	Emergency Ops	3471 S Roosevelt Boulevard	$8,197,155.97	6.5	VE	NIH	SS 100yr	-	0
Health and Medical	Health	5900 College Road	$5,175,976.83	2.5	AE	-	SS 100yr	-	0
Safety and Security	Government	5525 COLLEGE ROAD	$5,650,525.07	10.1	VE	NOAA 3ft	SS 100yr	-	0
Safety and Security	Government	1604 NORTH ROOSEVELT BOULEVARD	$3,421,865.48	0.4	AE	-	SS 100yr	-	0
Safety and Security	Emergency Ops	Sunset Key Drive	$365,829.78	-	X (Shaded)	-		-	0
Safety and Security	Emergency Ops	507 Dekalb Avenue	-	6.6	AE	-	SS 100yr	-	0
Health and Medical	Emergency Ops	1980 NORTH ROOSEVELT BOULEVARD	$436,123.00	4.2	AE	NOAA 3ft	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	86800 Overseas Hwy, Islamorada, FL 33036	$3,176,091.00	1.4	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	5537 College Rd, Key West, FL 33040	$68,652,015.00	7.1	AE	NOAA 3ft	SS 100yr	-	0
Energy	Energy	110 Angela Street	$41,798.00	1.3	AE	-	SS 100yr	-	0
Energy	Energy	1520 United Street	-	4.0	AE	NIL	SS 100yr	-	0
Energy	Energy	250 White Street	$98,703.00	2.7	AE	-	SS 100yr	-	0
Energy	Energy	1007 Kennedy Drive	-	4.2	AE	-	SS 100yr	-	0

C.2 RISK ASSESSMENT

This section contains a summary of the City of Key West's asset inventory as well as hazard profile and vulnerability assessment for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Flood, Sea Level Rise, Storm Surge, and Wildfire.

C.2.1 FLOOD

Table C.3 details the acreage of Key West's total area by flood zone on the effective DFIRM; it also shows a comparison to the preliminary DFIRM released in December 2019. Slightly over 89 percent of Key West falls within the mapped 1%-annual-chance floodplains; this area would grow to 92.9 percent on the 2019 preliminary maps. The data in this risk assessment is based off FEMA's 2005 DFIRM. Figure C-2 reflects the effective mapped flood hazard zones for the City of Key West while Figure C-3 displays the 2019 preliminary map.

Table C.3 – Flood Zone Acreage in Key West

	Effective DFIRM (2005)		Preliminary DFIRM (2019)		Change from Effective (acres)
Flood Zone	**Acreage**	**Percent of Total (%)**	**Acreage**	**Percent of Total (%)**	
AE	2,928.6	76.1%	3,298.1	85.7%	369.5
VE	497.7	12.9%	255.9	6.7%	-241.8
AO	2.4	0.1%	19.1	0.5%	16.7
0.2% Annual Chance Flood Hazard	277.4	7.2%	136.1	3.5%	-141.3
Unshaded X	141.9	3.7%	138.8	3.6%	-3.1
Open Water	0.0	0.0%	0.0	0.0%	0.0
Total	3,848.0	100.0%	3,848.0	100.0%	0.0
SFHA Total	**3,428.7**	**89.1%**	**3,573.1**	**92.9%**	**144.4**

Source: FEMA Effective DFIRM

Note: The differences between the effective FIRM and the preliminary FIRM are significant will likely still change. These details are provided here only as a comparison – all further flood analysis is based in the 2005 Effective DFIRM.

Table C.4 and Table C.5 provide building counts and estimated damages by occupancy type for the 1% annual chance flood event using both the effective and preliminary DFIRM. Figure C-4 and Figure C-5 display the effective and preliminary depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

Table C.4 – Estimated Building Damage and Content Loss, 1% Annual Chance Flood Effective DFIRM, City of Key West

Occupancy Type	Total Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Agriculture	0	$0	$0	$0	$0	0%
Commercial	1,322	$2,874,224,712	$57,616,223	$189,835,920	$247,452,143	9%
Educational	1	$1,278,998	$57,555	$401,503	$459,058	36%
Government	867	$752,646,337	$5,149,489	$31,112,664	$36,262,153	5%
Industrial	75	$55,875,723	$304,284	$898,065	$1,202,349	2%
Religious	29	$34,683,776	$166,689	$1,197,420	$1,364,110	4%
Residential	6,666	$4,845,068,494	$824,785,208	$407,226,587	$1,232,011,795	25%
Total	**8,960**	**$8,563,778,040**	**$888,079,449**	**$630,672,160**	**$1,518,751,608**	**18%**

Source: HAZUS, FEMA Effective DFIRM

Table C.5 – Estimated Building Damage and Content Loss, 1% Annual Chance Flood Preliminary DFIRM, City of Key West

Occupancy Type	Total Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Agriculture	0	$0	$0	$0	$0	0%
Commercial	1,627	$3,180,252,543	$50,762,576	$166,340,569	$217,103,145	7%
Educational	16	$34,807,794	$120,210	$750,281	$870,490	3%
Government	871	$807,907,705	$2,110,302	$13,100,445	$15,210,747	2%
Industrial	82	$66,776,878	$424,716	$1,270,548	$1,695,264	3%
Religious	49	$57,685,978	$194,760	$1,576,699	$1,771,459	3%
Residential	8,256	$5,975,803,647	$1,200,456,414	$593,970,490	$1,794,426,904	30%
Total	**10,901**	**$10,123,234,546**	**$1,254,068,978**	**$777,009,031**	**$2,031,078,009**	**20%**

Source: HAZUS, FEMA Preliminary DFIRM

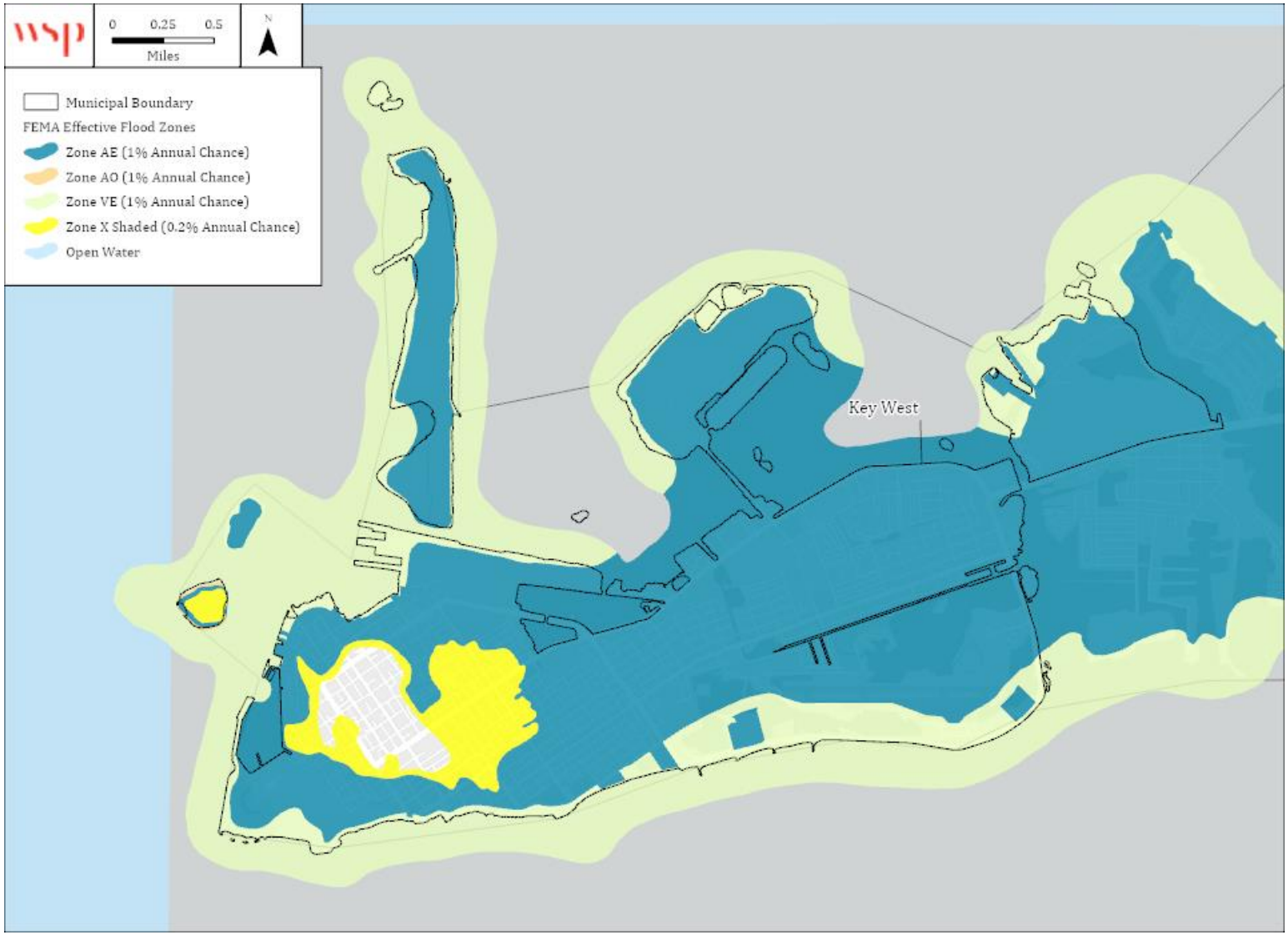
Table C.6 provides building counts and values for critical facilities by flood zone in the City of Key West.

Table C.6 – Critical Facilities Exposed to Flooding, City of Key West

Flood Zone	Critical Facility Count	Structure Value
Zone AE	46	$247,591,777.19
Zone VE	9	$90,440,819.60
Zone X (500-year)	3	$7,665,996.66
Zone X Unshaded	5	$46,499,799.62
Total	**63**	**$392,198,393.07**

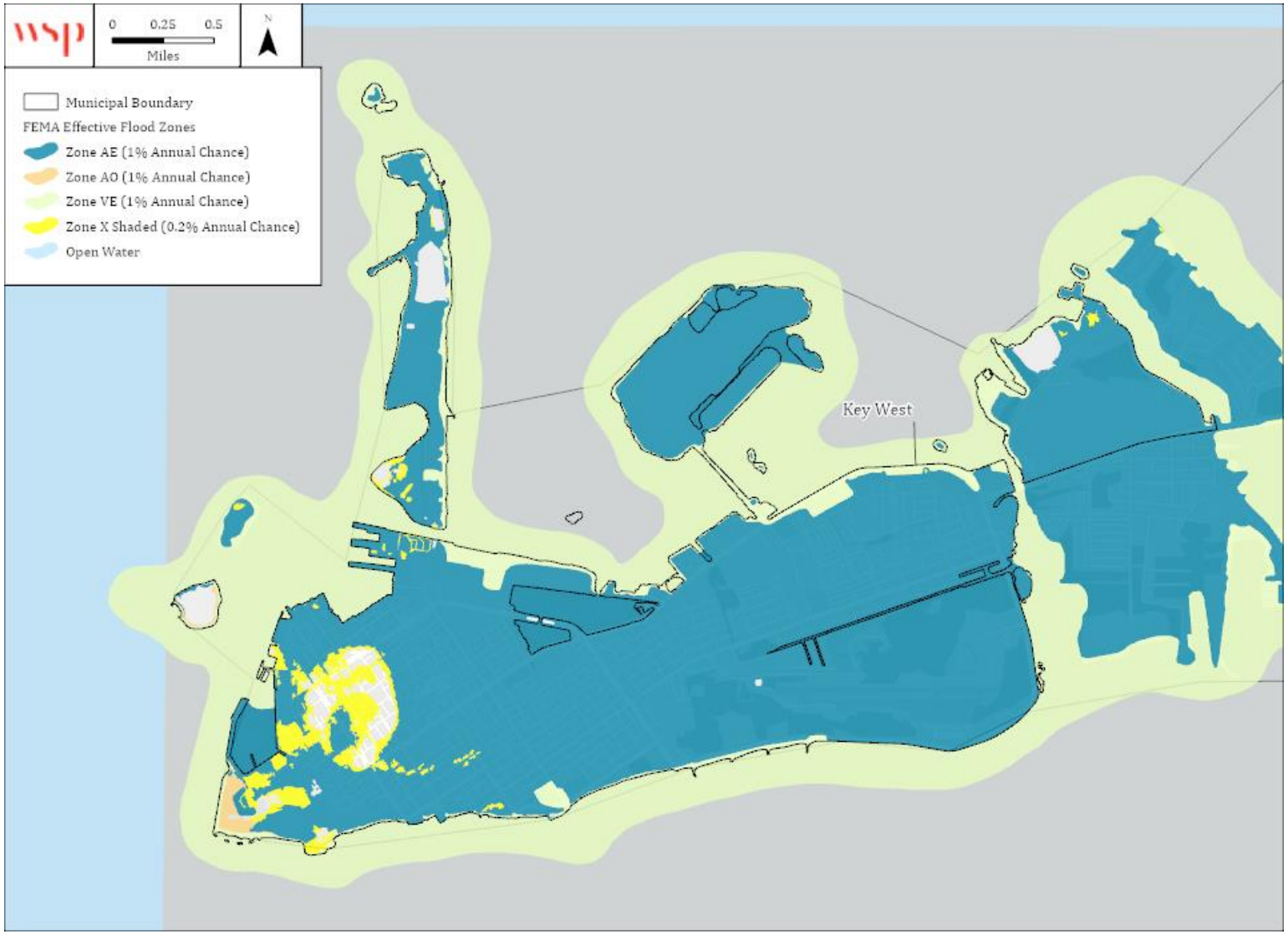
Source: FEMA Effective DFIRM, LMS Working Group

Figure C-2 – FEMA Flood Hazard Areas, Effective DFIRM, City of Key West



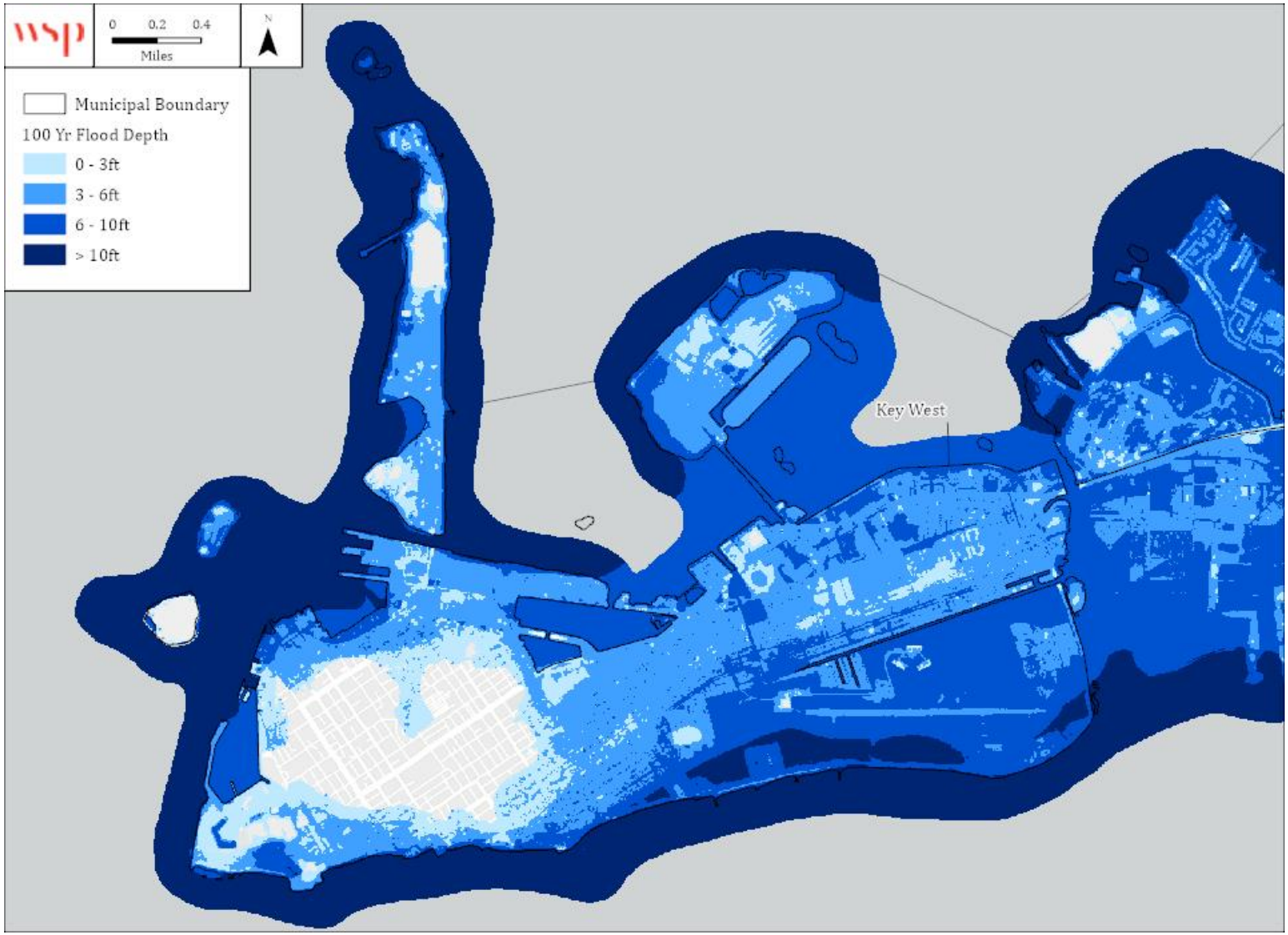
Source: FEMA Effective DFIRM

Figure C-3 – FEMA Flood Hazard Areas, Preliminary DFIRM, City of Key West



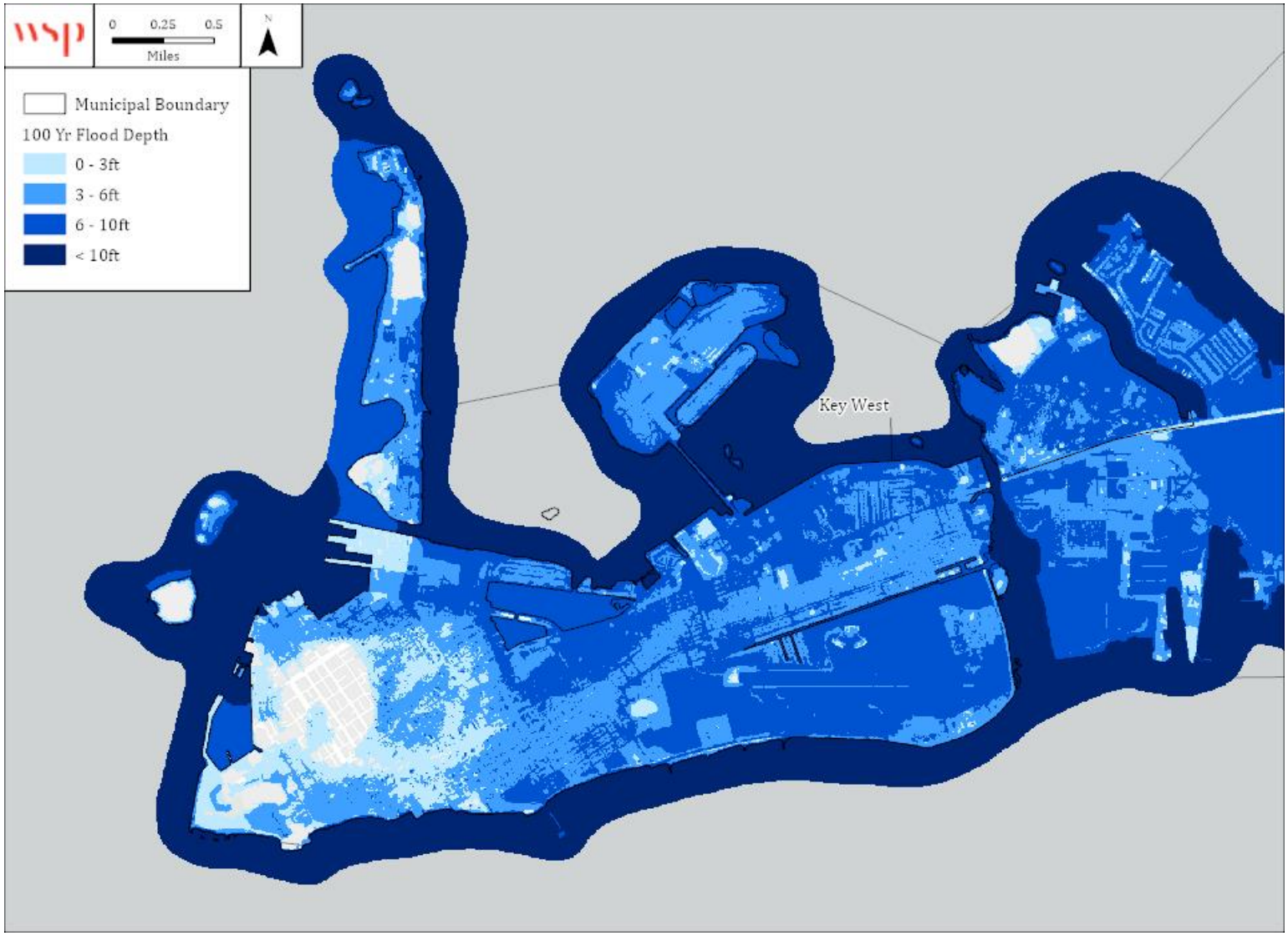
Source: FEMA Preliminary DFIRM

Figure C-4 – Flood Depth, 1%-Annual Chance Floodplain Effective DFIRM, City of Key West



Source: FEMA Effective DFIRM

Figure C-5 – Flood Depth, 1%-Annual Chance Floodplain Preliminary DFIRM, City of Key West



Source: FEMA Preliminary DFIRM

FLOODPLAIN MANAGEMENT

The City of Key West joined the NFIP emergency program in 1970 and has been a regular participant in the NFIP since September 1971. The City is a participant in the Community Rating System and is a Class 5 community. The following tables reflect NFIP policy and claims data for the City categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table C.7 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	2,973	$5,658,356	$872,546,000	3,883	$141,299,563.25
2-4 Family	736	$1,395,401	$182,203,000	540	$16,203,490.04
All Other Residential	1,038	$724,912	$217,141,000	322	$7,388,847.29
Non-Residential	505	$2,751,715	$257,038,000	993	$48,624,293.19
Total	**5,252**	**$10,530,384**	**$1,528,928,000**	**5,738**	**$213,516,193.77**

Source: FEMA Community Information System, accessed May 2025

Table C.8 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	4,411	$9,427,930	$1,243,644,000	5,306	$207,165,795.09
A Zones	0	$0	$0	1	$0.00
AO Zones	4	$6,484	$713,000	3	$73,283.01
V01-30 & VE Zones	23	$258,996	$12,549,000	160	$4,788,462.71
B, C & X Zone					
Standard	814	$836,974	$272,022,000	190	$1,239,829.76
Preferred	0	$0	$0	79	$285,667.23
Total	**5,252**	**$10,530,384**	**$1,528,928,000**	**5,739**	**$213,553,037.80**

Source: FEMA Community Information System, accessed May 2025

Table C.9 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	2,367	$6,998,333	$674,585,000	4,403	$190,615,182.98
A Zones	0	$0	$0	1	$0.00
AO Zones	2	$3,004	$345,000	3	$73,283.01
V01-30 & VE Zones	9	$143,571	$5,947,000	84	$3,533,705.11
B, C & X Zone	560	$567,626	$189,678,000	187	$1,388,898.33
Standard	560	$567,626	$189,678,000	126	$1,162,484.05
Preferred	0	$0	$0	62	$263,258.31
Total	**2,938**	**$7,712,534**	**$870,555,000**	**4,678**	**$195,611,069.43**

Source: FEMA Community Information System, accessed May 2025

Table C.10 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	2,044	$2,429,597	$569,059,000	903	$16,550,612.11
AO Zones	2	$3,480	$368,000	0	$0.00
V01-30 & VE Zones	14	$115,425	$6,602,000	76	$1,254,757.60
B, C & X Zone	254	$269,348	$82,344,000	81	$99,754.63
Standard	254	$269,348	$82,344,000	64	$77,345.71
Preferred	0	$0	$0	17	$22,408.92
Total	**3,735**	**$2,753,629**	**$957,311,400**	**1,009**	**$15,828,271.60**

Source: FEMA Community Information System, accessed May 2025

CONTINUED NFIP COMPLIANCE

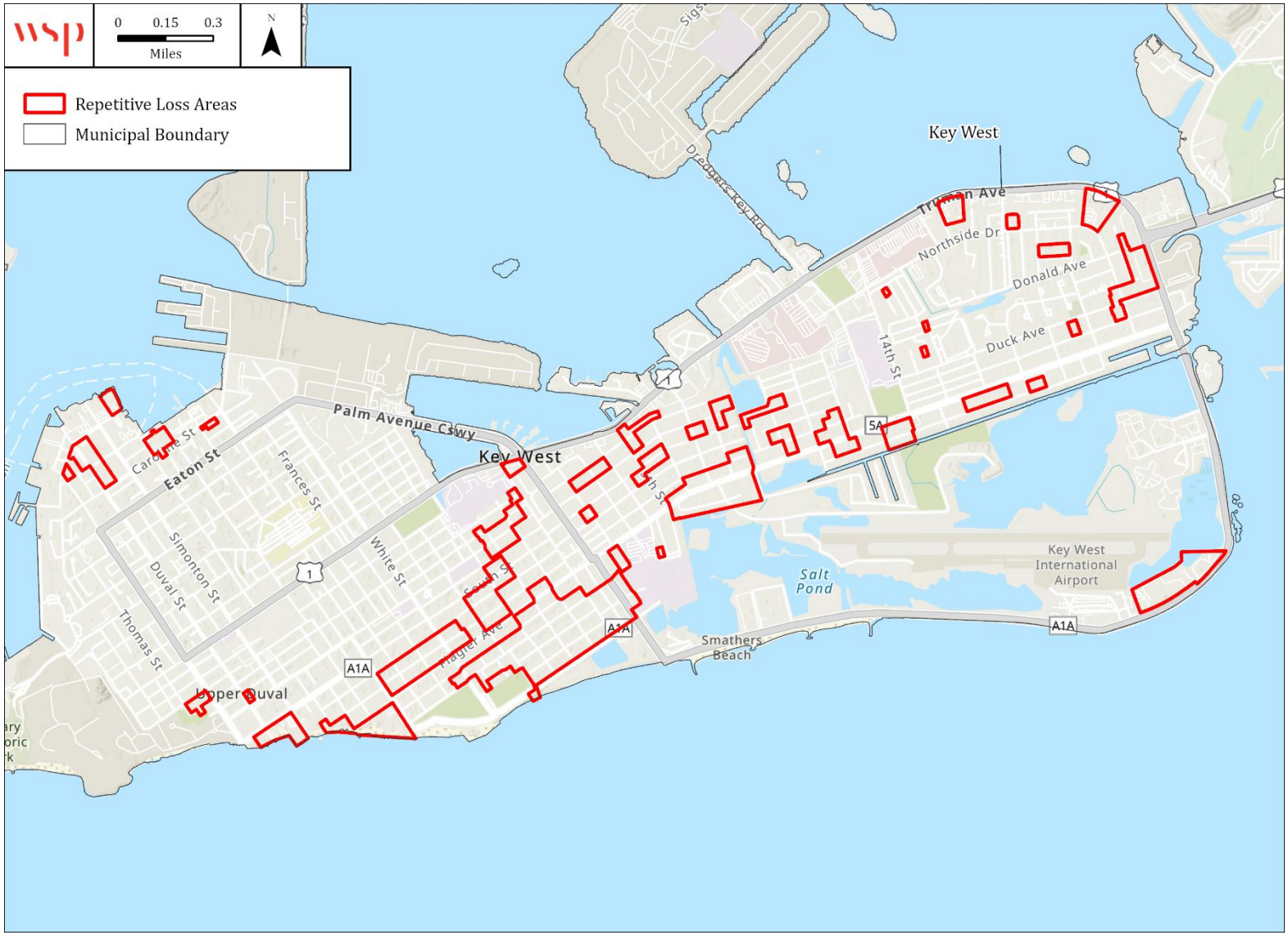
The City entered the NFIP in 1971 by adoption of an ordinance that complies with the requirement of the program. The ordinance has been revised several times, including updates that aligned with the statewide effort to coordinate local ordinances with the flood provisions of the Florida Building Code. To continue compliance with the NFIP, the City will:

- Enforce the adopted floodplain management ordinance, including reviewing all development proposals in any floodplain and enforcing the requirements of the ordinance, and inspecting both permitted development and unpermitted activities;
- Maintain records pertaining to floodplain development, including flood maps and Letters of Map Change, which shall be available for public inspection;
- Notify the public when there are proposed changes to the ordinance or FIRMs;
- Implement activities recognized by the NFIPs CRS including brochure publication and distribution and annual mailers;
- Promote the purchase of NFIP flood insurance policies as financial protection;
- Maintain a consolidated GIS database for monitoring floodplain related permitting reviews;
- City Floodplain Administrator has a seat on the City's Development Review Committee, is an integral plan reviewer for all floodplain related permit applications and is in the variance pre-review network required of all applications within the SFHA; and
- Continuing to implement higher regulatory standards including, but not limited to, multi-phase elevation certifications, minimum 12-inch elevation of the first finished floor outside the SFHA, and a one-year substantial improvement cumulative period of calculations.

REPETITIVE LOSS PROPERTIES

A map of repetitive loss areas in Key West is on the following page.

Figure C-6 – Key West Repetitive Loss Areas



C.2.2 SEA LEVEL RISE

Table C.11 details the number of all buildings affected by sea level rise in the City of Key West following the NOAA sea level rise projections of intermediate low and intermediate high scenarios.

Table C.11 – All Buildings Affected by Sea Level Rise, City of Key West

Occupancy	Estimated Building Count	Structure Value	Estimated Content Value	Total Value
2040 NIL	**4,091**	**2,266,531,613**	**1,631,214,285**	**3,023,307,051**
Agriculture	0	$0	$0	$0
Commercial	747	$790,784,670	$790,784,670	$1,307,377,327
Education	1	$639,499	$639,499	$1,278,998
Government	176	$160,186,817	$160,186,817	$320,341,179
Industrial	15	$16,137,560	$24,206,341	$40,325,406
Religious	19	$12,010,850	$12,010,850	$23,353,462
Residential	3133	$1,286,772,216	$643,386,108	$1,330,630,680
2040 NIH	**5,915**	**3,221,033,878**	**2,248,839,779**	**4,197,433,423**
Agriculture	0	$0	$0	$0
Commercial	913	$1,011,166,180	$1,011,166,180	$1,709,019,545
Education	1	$639,499	$639,499	$1,278,998
Government	357	$213,658,831	$213,658,831	$427,285,205
Industrial	19	$18,935,571	$28,403,357	$47,320,433
Religious	22	$13,310,027	$13,310,027	$25,951,816
Residential	4603	$1,963,323,770	$981,661,885	$1,986,577,427

Source: HAZUS, NOAA, Monroe County Parcel Data

Figure C-7 and Figure C-8 display NOAA 2040 intermediate low and high sea level rise scenarios for the City of Key West. Table C.12 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to sea level rise based on NOAA intermediate low and high scenarios.

Table C.12 – Critical Facilities Exposed to Sea Level Rise, City of Key West

Highest Level of SLR	Critical Facility Count	Structure Value
2040 NIL	6	$11,177,787.81
NOAA 3ft	5	$75,149,048.17
2040 NIH	4	$76,471,087.88
Total	**15**	**$162,797,923.86**

Source: NOAA, Monroe County LMS Working Group

Figure C-7 – NOAA 2040 Intermediate Low Sea Level Rise Scenario, City of Key West

Source: NOAA 2040 NIL, Monroe County Parcel Data

Figure C-8 – NOAA 2040 Intermediate High Sea Level Rise Scenario, City of Key West

Source: NOAA 2040 NIH, Monroe County Parcel Data

C.2.3 STORM SURGE

Table C.13 summarizes the number of buildings in the City of Key West that will be impacted by 100-yr and 500-yr storm surge events. Figure C-9 shows potential storm surge inundation for a 100-yr storm surge event and Figure C-10 shows inundation for the 500-yr storm surge event.

Table C.13 – Storm Surge Exposure by 100-yr and 500-yr Event, City of Key West

Occupancy	Estimated Building Count	Structure Value	Estimated Content Value	Total Value
100yr	**11,257**	**$6,321,676,484**	**$4,253,337,538**	**$10,575,014,023**
Agriculture	0	$0	$0	$0
Commercial	1,692	$1,675,821,726	$1,675,821,726	$3,351,643,452
Education	16	$17,403,897	$17,403,897	$34,807,794
Government	885	$408,973,878	$408,973,878	$817,947,756
Industrial	82	$26,710,751	$40,066,127	$66,776,878
Religious	51	$29,377,588	$29,377,588	$58,755,176
Residential	8,531	$4,163,388,644	$2,081,694,322	$6,245,082,966
500yr	**11,731**	**$6,613,685,998**	**$4,460,511,225**	**$11,074,197,223**
Agriculture	0	$0	$0	$0
Commercial	1,868	$1,767,783,254	$1,767,783,254	$3,535,566,509
Education	16	$17,403,897	$17,403,897	$34,807,794
Government	897	$431,771,965	$431,771,965	$863,543,930
Industrial	84	$28,006,740	$42,010,111	$70,016,851
Religious	56	$34,363,855	$34,363,855	$68,727,709
Residential	8,810	$4,334,356,287	$2,167,178,143	$6,501,534,430

Source: FEMA, NOAA, Monroe County Parcels

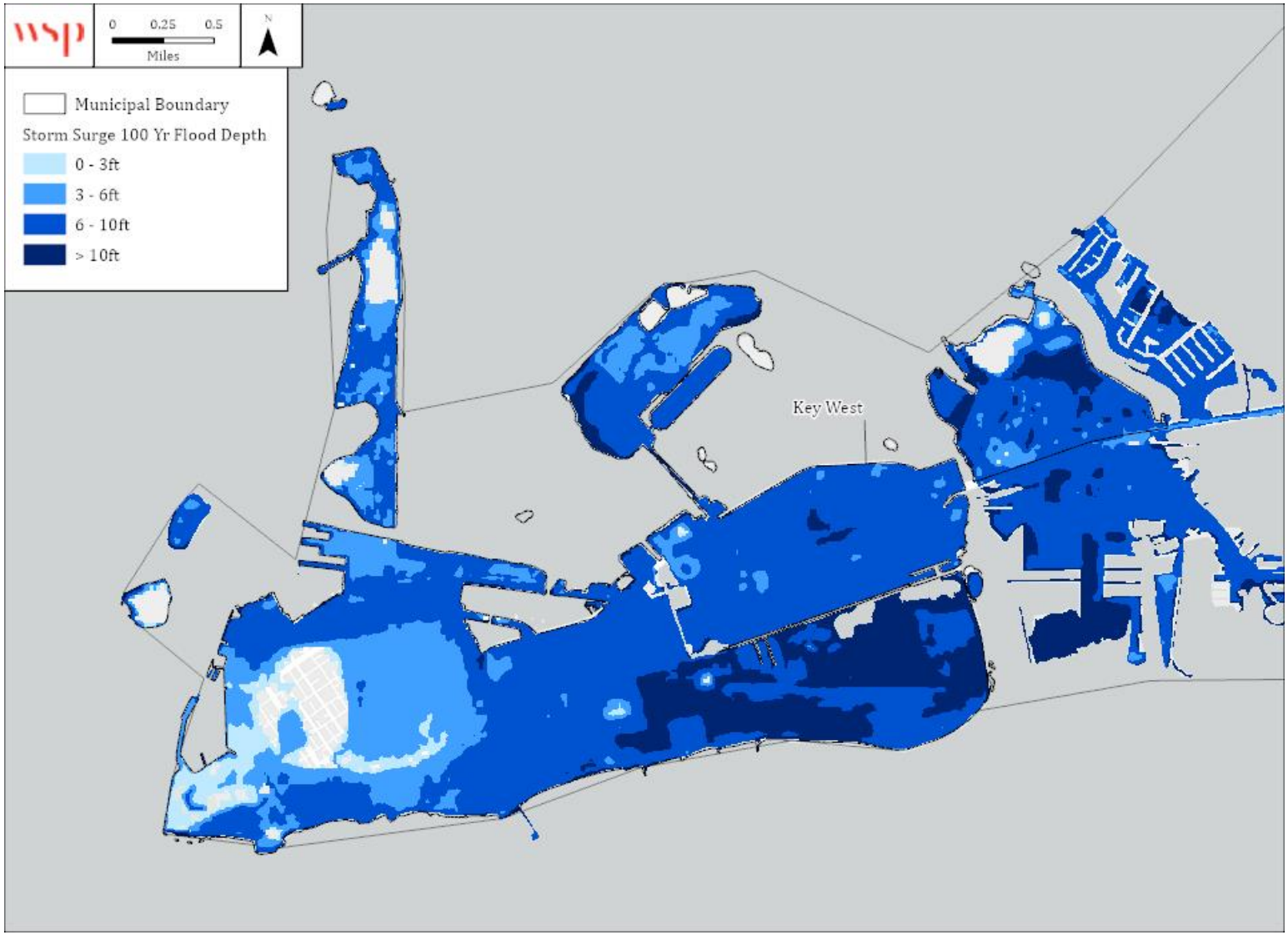
Table C.14 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to storm surge based on 100 and 500-year storm surge events.

Table C.14 – Critical Facilities Exposed to Storm Surge, City of Key West

Storm Surge Category	Critical Facility Count	Structure Value
100-Year	56	$363,631,704.04
500-Year	3	$13,432,305.62
Total	**59**	**$377,064,009.67**

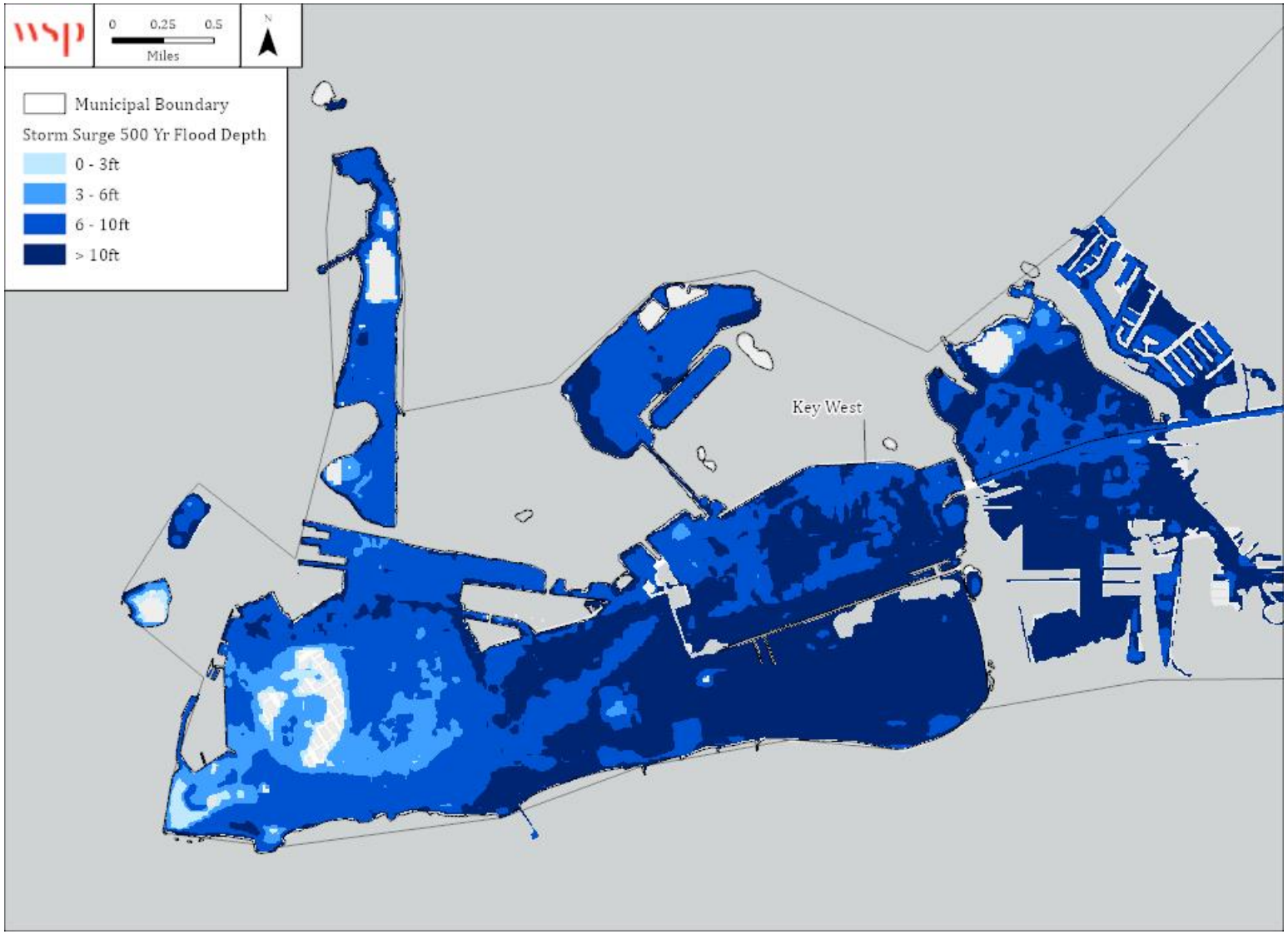
Source: FEMA, NOAA, Monroe County LMS Working Group

Figure C-9 – 100-Year Storm Surge Event Inundation, City of Key West



Source: NOAA

Figure C-10 – 500-Year Storm Surge Event Inundation, City of Key West



Source: NOAA

C.2.4 WILDFIRE

Table C.15 summarizes the acreage in the City of Key West that falls within the Functional Wildland Urban Interface (WUI), categorized into zones that describe the wildfire risk mitigation activities appropriate for each zone. Areas in the Functional WUI are those areas where development and building structures may intermix with burnable land cover. Approximately, 4 percent of Key West is categorized as having direct exposure to wildfire risk within the Functional WUI.

Table C.15 – Functional Wildland Urban Interface, City of Key West

	Functional Wildland Urban Interface (WUI) Category	Acres	Percent
	Direct Exposure	142	4%
	Indirect Exposure		0%
	Critical Fireshed	460	12%
	Sources of Ember Load to Buildings	266	7%
	Little to No Exposure	2,781	73%
	Water	163	4%
	Total	**3,812**	**100%**

Source: Southern Wildfire Risk Assessment

Figure C-11 depicts the Functional WUI for Key West. Figure C-12 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts. Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors, is depicted in Figure C-13.

Functional WUI areas are focused along the outer edges of the City, with the central, downtown area being excluded from the Functional WUI. Where there is a rating for burn probability, mainly in southern and eastern Key West, it is very low; otherwise, much of the city is without a burn probability rating. There are pockets of moderate to high characteristic fire intensity, especially around the outer edges of the City, but a large swath of the City is not rated on the characteristic fire intensity scale.

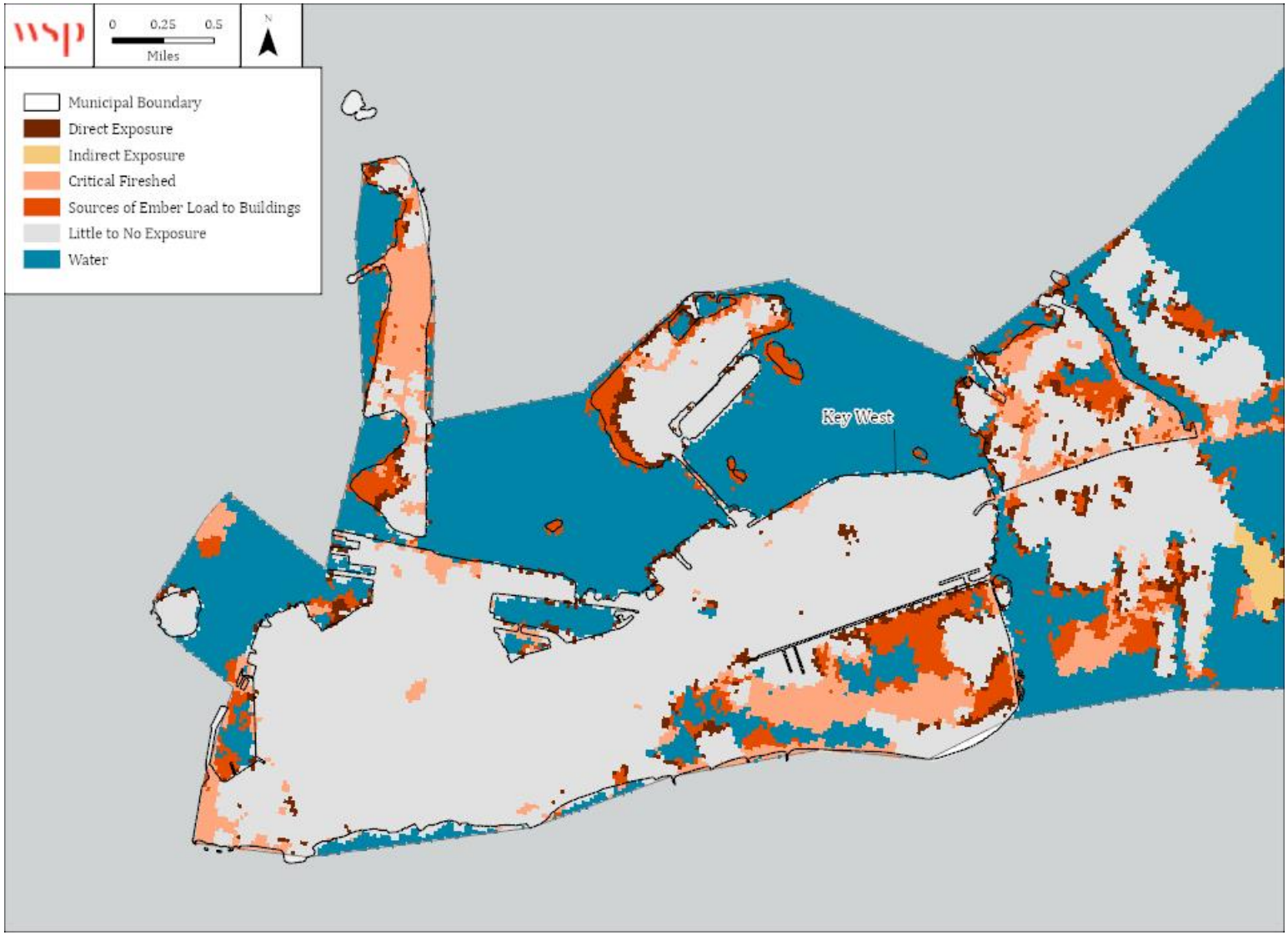
Table C.16 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to wildfire risk on the Functional WUI scale.

Table C.16 – Critical Facilities Exposed to Wildfire, City of Key West

Type	Critical Facility Count	Structure Value
Communications	0	$0
Energy	0	$0
Food, Hydration, Shelter	0	$0
Hazardous Materials	0	$0
Health and Medical	0	$0
Safety and Security	0	$0
Transportation	0	$0
Water Systems	1	$24,684.77
Total	**1**	**$24,684.77**

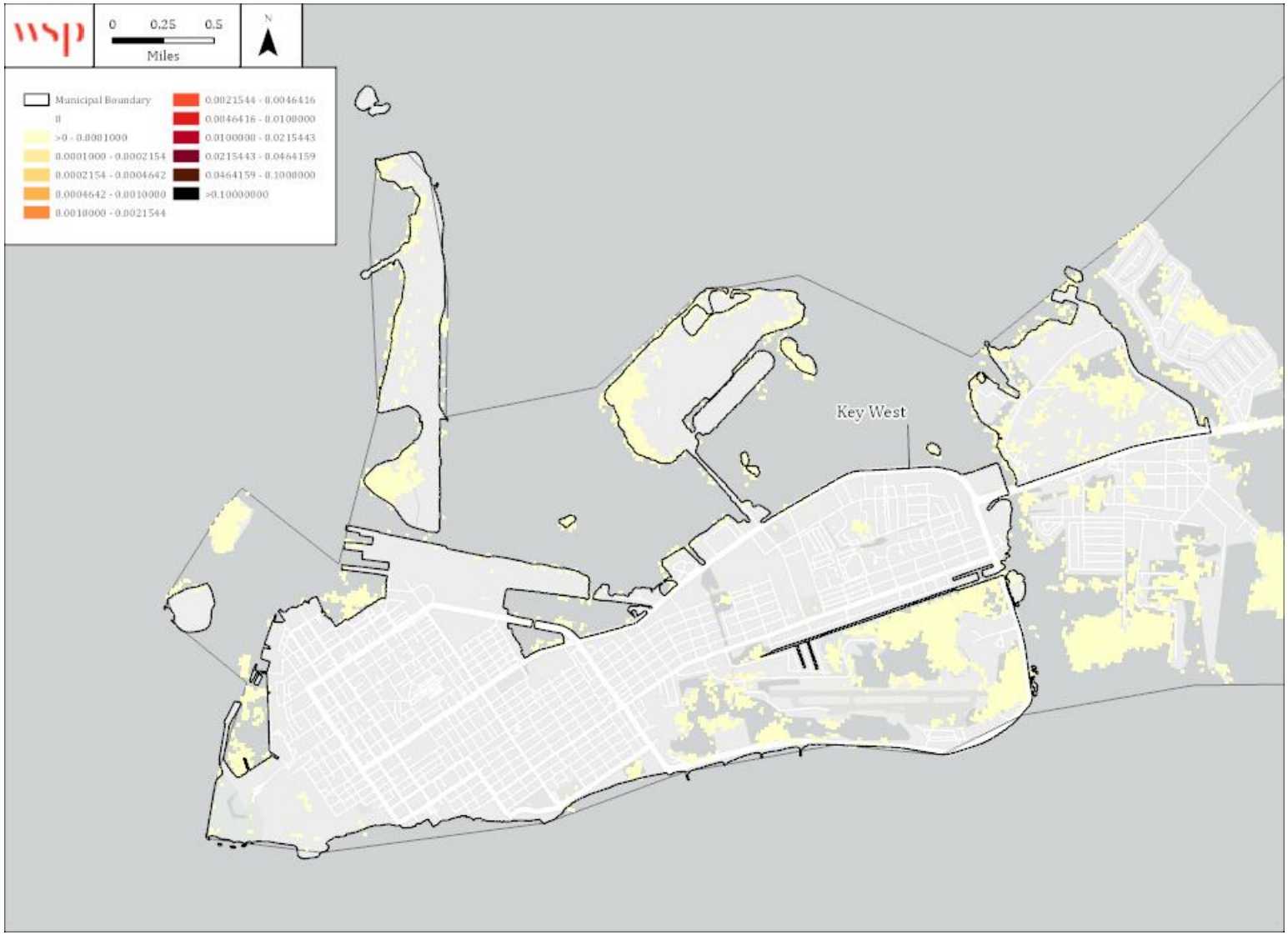
Source: Southern Wildfire Risk Assessment, Monroe County LMS Working Group

Figure C-11 – Functional Wildland Urban Interface, City of Key West



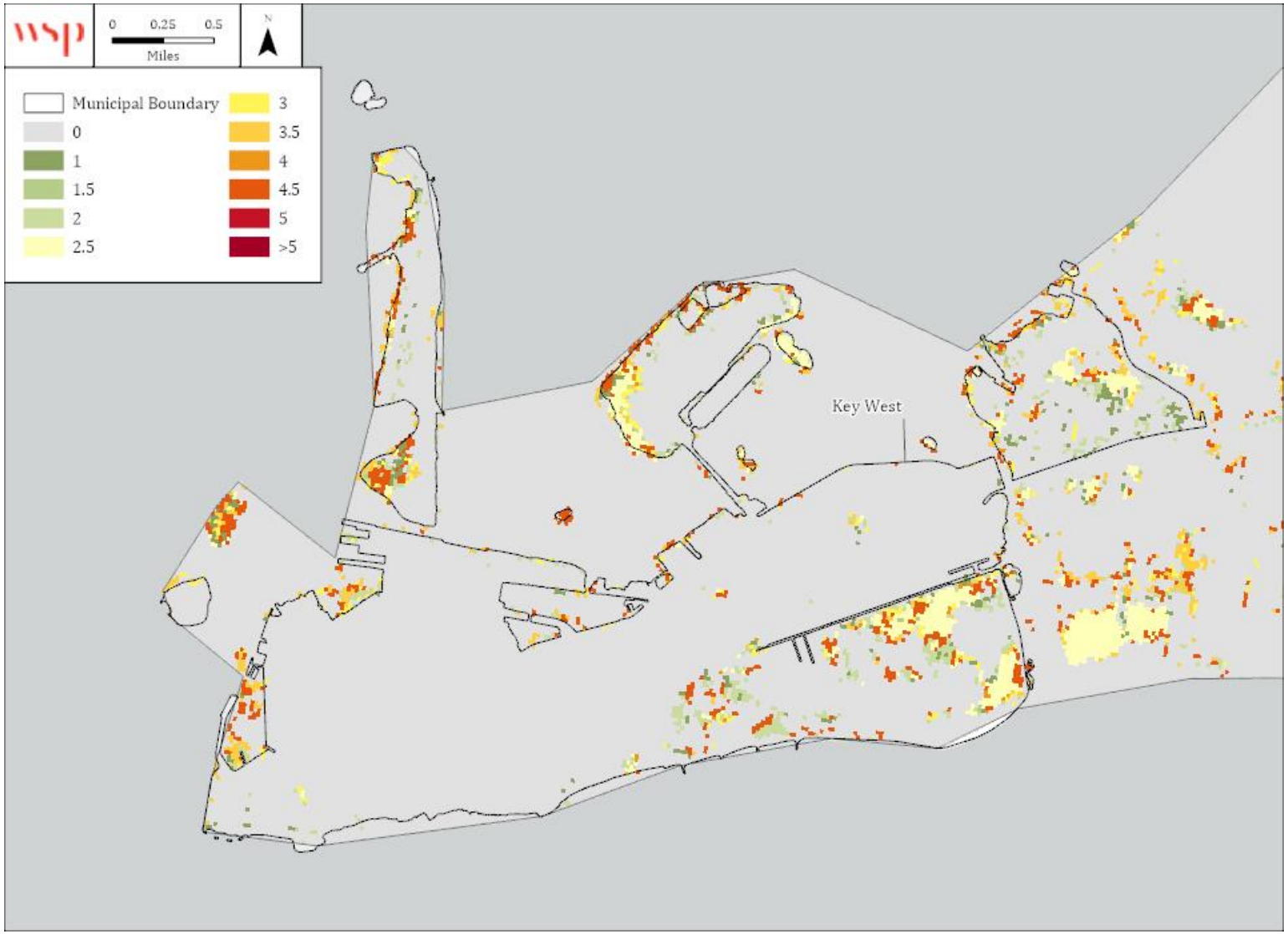
Source: Southern Wildfire Risk Assessment

Figure C-12 – Burn Probability, City of Key West



Source: Southern Wildfire Risk Assessment

Figure C-13 – Potential Fire Intensity, City of Key West



Source: Southern Wildfire Risk Assessment

C.3 MITIGATION STRATEGY

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
1	Monroe County and Municipalities	Support efforts in Monroe County to address the potential negative impacts related to climate change, including sea level rise. Monroe County is the most vulnerable partner that participates in the SE FL Compact with respect to climate change induced sea level increases. Critical resources like the primary source of drinking water as well as homes, businesses, and infrastructure are directly at risk. The LMS should actively support its own Climate Change action plans (Monroe County and Key West) and support the implementation of a Regional Collaborative Climate Action Plan with the neighboring counties through the Southeast Florida Regional Climate Compact to address the impacts of sea level rise and other related climate change impacts	Sea Level Rise	3	H	Prevention	County/Jurisdictional Planning and Engineering Departments	Less than $10,000	Staff Time	2025 - 2030	Carry Forward (Provide Update)	This is an ongoing collaboration. This county and municipalities continue to participate in the SE FL Compact and Climate Change Planning by attending summits and supporting initiatives. This includes incorporating Sea Level Rise projections into this plan.
2	Monroe County and Municipalities	Verify Repetitive Loss Property Data - Monroe County and municipalities that participate in the CRS will verify the repetitive loss property data obtained	Flood	1, 2	H	Prevention, Public Education	County/Jurisdictional Floodplain Management	$10,000 to $50,000	Staff Time	2020-2025	Carry Forward (Provide Update)	This action is ongoing in the communities with identified repetitive loss properties. Data

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
		from FEMA. The NFIP maintains records of past flood insurance claims and tracks properties that have received multiple claims. These properties and similarly situated buildings present likely opportunities for mitigation. Verifying the data serves two purposes: it helps the NFIP improve its records, and it helps identify Repetitive Loss Areas. Prepare Repetitive Loss Area Maps - Monroe County and municipalities that prepare Repetitive Loss Area Analyses will identify repetitive loss areas within their jurisdiction using the methods described in FEMA/CRS guidance. Identification of Repetitive Loss Areas helps identify property owners who may be interested in reducing their exposure and working with the communities to seek mitigation funds.										verification occurs annually and repetitive loss area maps are updated upon request.
3	Monroe County and Municipalities	Elevate Buildings Located within Floodprone Areas	Tropical Cyclones, Flood, Sea Level Rise	2	M	Property Protection	County Emergency Management Department with Jurisdictional Representatives	$5,225,000	HMGP, BRIC, FMA, CDBG-DR	5 years	Carry Forward (Provide Update)	Residential elevation projects are now covered under the Elevate Florida Program. Continue to pursue other elevation projects.

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
4	Monroe County and Municipalities	Wind Retrofit of County Facilities	Severe Storms and Tornadoes, Tropical Cyclones	2	M	Property Protection	Monroe County Public Works	$8,837,280	HMGP, BRIC, HLMP	1 - 5 years	Carry Forward (Provide Update)	On going upgrades to apartments. Final project will be to build new apartment buildings by 2028
5	Monroe County and Municipalities	County-wide Road Elevation and Drainage Improvements (Phase 1 of 2)	Tropical Cyclones, Flood, Sea Level Rise	2	M	Structural Projects	Monroe County Roads and Bridges ; Monroe County Public Works	$367,200,000	HMGP, BRIC, FMA, CDBG-MIT	5 years	Carry Forward (Provide Update)	Road Elevation projects in progress
6	Monroe County and Municipalities	Natural Resources Adaptation Plan	Flood, Sea Level Rise, Tropical Cyclones	2, 3	H	Prevention, Natural Resource Protection	Monroe County Planning and Environmental Resources	$142,000	BRIC, HMPG	3 Years	Carry Forward (Provide Update)	80% complete
7	Monroe County and Municipalities	Engine generators at Water Treatment Plant	All	2	M	Structural Projects	FKAA	$1,500,000	HMGP, BRIC, HLMP, CDBG	1 - 3 years	Carry Forward (Provide Update)	This project is currently in the bidding phase.
8	Monroe County and Municipalities	Hospital Hardening: Evaluate/identify necessary improvements needed to retrofit hospital facilities and perform needed retrofits to mitigate storm damages. Facilities include: Lower Keys Health Systems, De Poo Hospital, Fisherman's Hospital, Mariners' Hospital, Nursing Homes (including Bayshore Manor)	All	2	M	Property Protection	LKMC/Baptist Health/Monroe County	Over $1,000,000	HMGP, BRIC, CDBG-MIT, HLMP	5 - 10 years	Carry Forward (Provide Update)	No progress
9	Monroe County and Municipalities	Marathon Potable Water Pump Station Mitigation	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$3,000,000.00	DEP - Resilient Florida	2 years	New	
10	Monroe County and Municipalities	Decentralized Wastewater Treatment Project	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$450,000.00	DEP - Water Quality Improvements	2 years	New	

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
11	Monroe County and Municipalities	Plantation Key Transmission Main	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$1,750,000.00	DEP - Rep Gimenez Request	2 years	New	
22	Monroe County and Key West	Backup Generators for Critical Facilities	All	2	M	Property Protection	KEYS Energy Services	$200,000	HMGP, BRIC, CDBG-DR, CDBG-MIT	1 - 5 years	Carry Forward (Provide Update)	Some work completed. May pursue funding for substation generators
23	Monroe County and Key West	Harden Critical Facilities	All	2, 3	H	Structural Projects	KEYS Energy Services	$650,000	HMGP, BRIC, CDBG	1 - 2 years	New	Submitted HMGP application and budgeted for match to harden employee building that houses generation control center and vehicle mechanic shop
24	Monroe County and Key West	Improve System Redundancy	All	2, 3	H	Structural Projects	KEYS Energy Services	$5,000,000	HMGP, BRIC, CDBG	1 - 4 years	New	
25	Monroe County and Key West	Storm Hardening of Electrical Service - Undergrounding of electric service	All	2, 3	H	Structural Projects	KEYS Energy Services	$20,000,000	HMGP, BRIC, CDBG	1 - 10 years	New	
26	Monroe County and Key West	Storm Hardening of Electrical Service - Pole Strengthening	All	2, 3	H	Structural Projects	KEYS Energy Services	$10,000,000	HMGP, BRIC, CDBG	1 - 10 years	New	
34	Islamorada, Key Colony Beach, Key West, Layton, Marathon	Evaluate protective measures for critical infrastructure and facilities to protect against dynamic hazards including flood, wind, sea level rise, and strong storms. Critical facilities provide services that the whole community depends on for basic	All	2	M	Property Protection, Prevention	Jurisdiction Engineering/Public Works	$10,000 to $50,000	Staff Time	1 - 5 years	Carry Forward (Provide Update)	Completed flood protection project - elevated breakwater, protected marina office. Continue to pursue additional

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
		functioning. The communities will evaluate the need for protecting critical facilities and infrastructure and address as needed.										projects. Adaptation action Plan is underway and will identify new opportunities.
35	Key West	Planning/Development of Sister City EOC: Develop a plan and implement a Sister City Emergency Operations Center for large scale pre & post disaster situations	All	1, 3	M	Emergency Services; Prevention	Department of Emergency Management	$40,000	EMPG, HMGP, BRIC, FMA	1 - 5 years	Carry Forward (Provide Update)	No progress
36	Key West	Emergency warning signal: install a siren or message device to be heard all across the city.	All	1	M	Emergency Services	Key West Information Technology Dept; General Services Department	$200,000	HMGP, BRIC, FMA, CDBG-MIT	1 - 3 years	Carry Forward (Provide Update)	No progress
37	Key West	Hazard Mitigation Strategies Planning Support	All	1, 2	H	Prevention	Key West Floodplain Management	$75,000	BRIC, HMGP	1 - 2 years	Carry Forward (Provide Update)	Vulnerability Assessment is complete. Adaptation Plan will be complete by August 2025
38	Key West	Post-Disaster (Flood) Recovery Plan	Flood	3	H	Prevention	Key West Engineering	$40,000	BRIC;FMA	1 - 5 years	Carry Forward (Provide Update)	Attempting to fulfil a couple of recommended actions each year.
39	Key West	Repetitive Loss Property Mitigation Planning Support	Tropical Cyclones, Flood, Sea Level Rise	1, 3	H	Prevention	Key West Floodplain Management	$45,000	HMGP, BRIC, FMA, CDBG-DR	1 - 2 years	Carry Forward (Provide Update)	Vulnerability Assessment is complete. Adaptation Plan is in progress and will identify potential opportunities.
40	Key West	Reconstruction of Key Plaza Site B: Demolition	Tropical Cyclones, Flood, Severe Storms	1, 2	M	Property Protection	Housing Authority of Key West	$6,775,000	BRIC, HMGP	5 - 10 years	Carry Forward	No progress

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
		and Reconstruction of 50 affordable apartment units.	and Tornadoes, Sea Level Rise								(Provide Update)	
41	Key West	Rehabilitation and Retrofit of George Allen Apartments: Rehabilitation, Window replacement, & retrofit shutters to Dade County approved wind resistance for 117 public housing project units	Tropical Cyclones, Severe Storms and Tornadoes	2	H	Property Protection	Housing Authority of Key West	$550,000	BRIC, HMGP, HLMP	1 - 5 years	Carry Forward (Provide Update)	No progress; Key West is following up with the Housing Authority
42	Key West	Wind-Retrofit(s) of First Responder Facilities	All	2, 3	H	Property Protection	Key West Engineering	$1,092,194	HMGP, BRIC	1 - 5 years	Carry Forward (Provide Update)	Project scope has been expanded.
43	Key West	Fire Station 3	All	1, 2	H	Property Protection, Emergency Services	Key West Engineering	$10,000,000	HMGP, BRIC, FMA	1 - 5 years	Carry Forward (Provide Update)	Awarded design funding through FEMA BRIC. Continuing to apply for implementation grants.
44	Key West	Residential Floodproofing Program	Tropical Cyclones, Flood, Sea Level Rise	1, 2	H	Property Protection, Public Education	Key West Engineering	$236,000	HMGP, BRIC, FMA, CDBG-DR,	1 - 5 years	Carry Forward (Provide Update)	No progress
45	Key West	Elevation of Floodprone Residential Properties	Tropical Cyclones, Flood, Sea Level Rise	1, 2	H	Property Protection	Key West Engineering	$1,800,000	HMGP, BRIC, FMA, CDBG-DR, HLMP	1 -5 years	Carry Forward (Provide Update)	Partnered with County on Education Outreach and FMA applications.
46	Key West	Shutter Bayview Park Scorebox	Tropical Cyclones, Severe Storms and Tornadoes	2	H	Property Protection	Key West General Services/City Engineer	$4,000	HMGP, BRIC, HLMP	1 -5 years	Carry Forward (Provide Update)	No progress
47	Key West	Shutter Fire Station Museum: Install Dade county approved shutter system on structure.	Tropical Cyclones, Severe Storms and Tornadoes	1, 2	H	Property Protection	Key West General Services/City Engineer	$30,000	HMGP, BRIC, HLMP	1 -5 years	Carry Forward (Provide Update)	No progress

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
48	Key West	Shutter Park-n-Ride: Shutter the parking garage for storage of City Emergency vehicles and equipment.	Tropical Cyclones, Flood, Severe Storms and Tornadoes	1, 2	H	Property Protection	Key West General Services/City Engineer	$250,000	HMGP, BRIC, HLMP	1 -5 years	Carry Forward (Provide Update)	No progress
49	Key West	Wind Retrofit of Homes: The City will manage a project to examine homes and provide recommendations to homeowners for wind retrofit and fund the structural retrofit.	Tropical Cyclones, Severe Storms and Tornadoes	1, 2	H	Property Protection, Public Education	Key West Information Technology Dept; General Services Department	$100,000	HMGP, BRIC, HLMP	1 -5 years	Carry Forward (Provide Update)	MySafeFLHome - concept is in the early stages and will be included in the City's developing Adaptation Plan for further consideration.
50	Key West	1010 Windsor Lane: Structural retrofitting of existing auditorium building	Tropical Cyclones, Severe Storms and Tornadoes	2	H	Property Protection	St. Mary's Start of the Sea Parish	$100,000 to $500,000	HMGP, BRIC, HLMP, CDBG-DR	1 -5 years	Carry Forward (Provide Update)	No progress
51	Key West	Wind-Retrofit(s) of Historically and Culturally Significant Facilities	Tropical Cyclones, Severe Storms and Tornadoes	2	H	Property Protection	Key West Engineering	$4,500,000	HMGP, PDM, HLMP, CDBG-DR, CDBG-MIT	1 -5 years	Carry Forward (Provide Update)	Pursuing funding opportunities for building mitigation
52	Key West	Wind-Retrofits of Public Service Facilities	Tropical Cyclones, Severe Storms and Tornadoes	2	H	Property Protection	Key West Engineering	3,500,000	HMGP; BRIC; HLMP	1 - 5 years	Carry Forward (Provide Update)	Project scope has been expanded.
53	Key West	Affordable Rentals, Phase III; New construction of affordable housing units. This is a continuation of project funded under prior Unmet Needs Funding. New construction of 14 affordable rental unit elderly persons.	All	1, 2	H	Property Protection	Monroe County Housing Authority	$2,000,000	BRIC, CDBG-DR, CDBG-MIT	1 - 5 years	Carry Forward (Provide Update)	Grand View complete. 3.2 acres is still being built.
54	Key West	Elevation of Public Works Facility: Raise the Public Works Office, equipment	Tropical Cyclones, Flood, Sea Level Rise	2, 3	M	Property Protection	Key West General Services/City Engineer	$373,000	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward (Provide Update)	No progress

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
		storage, and repair facilities. Tow Structures.										
55	Key West	United St./Jose Marti drainage improvements	Tropical Cyclones, Flood, Sea Level Rise	2	M	Structural Projects	Key West General Services/City Engineer	$2,300,000	HGMP, BRIC, FMA, CDBG	1 - 3 years	Carry Forward (Provide Update)	In design phase with FDOT
56	Key West	Force Main Relocation Project (Infrastructure Hardening)	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$2,330,000	HMGP, BRIC, FMA	FY26	Carry Forward (Provide Update)	In progress. Will complete in FY26.
57	Key West	Staples Avenue exfiltration trench	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$638,471	HMGP, BRIC, FMA	1 - 5 years	Carry Forward (Provide Update)	No progress
58	Key West	Tide Valves and Outfall Improvements (Drainage)	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$4,658,082	HMGP, BRIC, FMA	1 -3 years	Carry Forward (Provide Update)	Design completed. Construction begins soon.
59	Key West	Fogarty and 3rd Street Pump Station	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$6,800,000	HMGP, BRIC, FMA, CDBG-DR, CDBG-MIT	1 -3 years	Carry Forward (Provide Update)	Design completed. Construction begins soon.
60	Key West	Harris and 10th street expanded project: installation of new outfall at Harris & 10th street with a pollution control box near the outfall to improve drainage in the low elevation area	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$5,625,000	HMGP, BRIC, FMA, CDBG-DR, CDBG-MIT	1 - 5 years	Carry Forward (Provide Update)	Design phase completed. Looking for implementation funding.
61	Key West	White and Petronia Street Gravity Well	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$450,000	HMGP, BRIC, FMA, CDBG-DR, CDBG-MIT	1 - 5 years	Carry Forward (Provide Update)	Project put on hold due to lack of funding
62	Key West	3rd street Well or Exfiltration Trench	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$396,316	HMGP, BRIC, FMA, CDBG-MIT	1 - 3 years	Carry Forward (Provide Update)	Part of Fogarty & 3rd pump station construction begins soon

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
63	Key West	4th street Well or Exfiltration Trench	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$396,316	HMGP, BRIC, FMA, CDBG-MIT	1 - 3 years	Carry Forward (Provide Update)	Part of Fogarty & 3rd pump station construction begins soon
64	Key West	Cindy & 19th Street Outfall	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$2,825,692	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward (Provide Update)	Project put on hold due to lack of funding
65	Key West	Additional Well for Patricia/Ashby Pump Station	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$150,000	HMGP; BRIC;FMA	1 - 5 years	Carry Forward (Provide Update)	Project put on hold due to lack of funding
66	Key West	Duck Avenue & 19th Street Gravity Well	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$530,577	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward (Provide Update)	Project put on hold due to lack of funding
67	Key West	Eagle and 20th outfall	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$1,705,914	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward (Provide Update)	Project put on hold due to lack of funding
68	Key West	Eagle Avenue Between 16th and 17th street trench	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$406,550	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward (Provide Update)	Project put on hold due to lack of funding
69	Key West	Eisenhower Drive Twin 24" Pipeline	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$548,554	BRIC, FMA, HMGP	1 - 5 years	Carry Forward (Provide Update)	Project put on hold due to lack of funding
70	Key West	Flood Control Flagler Avenue: Install nine wells to intercept water from Flagler Avenue and put tide valves to stop storm surge.	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West General Services/City Engineer	$560,000	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward (Provide Update)	County has put out and RFP for project design
71	Key West	Florida & Olivia Street Gravity Well	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$396,316	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward (Provide Update)	Project put on hold due to lack of funding

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72	Key West	Olivia Street at Phalski & at Francis Gravity Well	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	530577	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward (Provide Update)	Project put on hold due to lack of funding
73	Key West	Packer Street at Olivia - trench and well	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$396,316	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward (Provide Update)	Project put on hold due to lack of funding
74	Key West	Hazard Mitigation Community Revolving Loan Fund	All	1	H	Prevention	Key West Sustainability; Engineering Department	$100,000 to $500,000	HLMP, BRIC, HMGP	1 - 5 years	Carry Forward (Provide Update)	No progress
75	Key West	Hazard Mitigation Policies Upgrade	All	1, 2	H	Prevention	Key West Planning	Less than $10,000	Staff Time	1 - 2 years	Carry Forward (Provide Update)	Updates within PDRRP and upcoming Adaptation Plan
76	Key West	Comprehensive Pervious Program to decrease runoff. Tie to vertical (cistern) Stormwater Management options.	Flood	2	H	Natural Resource Protection	Key West Engineering	$10,000 to $50,000	FMA, BRIC, HMGP	2027	Carry Forward (Provide Update)	Have a task order, but not funded yet.
77	Key West	Erosion Program, to track, disclose & utilize living shorelines when possible.	Coastal Erosion	2, 3	H	Natural Resource Protection	Key West Engineering	$50,000 to $100,000	BRIC, HMGP	1 - 5 years	Carry Forward (Provide Update)	Will be addressed in ongoing Key West Adaptation Plan.
78	Key West	Living Shoreline Plan to protect our island from erosion.	Flood, Coastal Erosion	2, 3	H	Natural Resource Protection, Prevention	Key West Engineering	$50,000 to $100,000	HMGP, BRIC	1 - 5 years	Carry Forward (Provide Update)	Will be addressed in ongoing Key West Adaptation Plan.
79	Key West	Neighborhood Flood Protection Plan	Flood	1, 2	H	Prevention, Public Education	Key West Engineering	$50,000 to $100,000	BRIC, HMPG	1 - 5 years	Carry Forward (Provide Update)	Will be addressed in ongoing Key West Adaptation Plan.
80	Key West	Turf Replacement with Synthetic options	Drought	2	M	Prevention	Key West Public Works	$100,000 to $500,000	HMGP, BRIC, FMA	1 - 5 years	Carry Forward (Provide Update)	City has replaced many fields with fake turf and will

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												pursue other locations
81	Key West	CRS Group to work together on Beyond Minimum requirements	Tropical Cyclones, Severe Storms and Tornadoes, Flood, Sea Level Rise	1, 2	H	Prevention	County/Jurisdictional Floodplain Management	Less than $10,000	Staff Time	1 - 3 years	Carry Forward (Provide Update)	No progress. Hope to achieve via Adaptation Plan
82	Key West	Research using New Town alleyways to protect powerlines or for stormwater	Tropical Cyclones, Flood, Severe Storms and Tornadoes	2	M	Prevention	Key West Engineering	Less than $10,000	Staff Time	1 - 5 years	Carry Forward (Provide Update)	Will be addressed in ongoing Key West Adaptation Plan.
83	Key West	Survey all City owned buildings for Wind/Flood resiliency needs	Tropical Cyclones, Flood, Severe Storms and Tornadoes	2	H	Prevention	Key West Engineering	$10,000 to $50,000	Staff Time	1 - 3 years	Carry Forward (Provide Update)	Will be addressed in ongoing Key West Adaptation Plan.
84	Key West	Enforce existing irrigation regulations (sensors, timing)	Drought	2	M	Prevention	Key West Engineering	$10,000 to $50,000	Staff Time	1 - 3 years	Carry Forward (Provide Update)	No progress. Needs code officers
85	Key West	Feasibility study for greywater systems	Drought	2	M	Prevention	Key West Engineering	$10,000 to $50,000	BRIC, HMGP	1 - 3 years	Carry Forward (Provide Update)	No progress
86	Key West	Feasibility Study for WWTP Potable Water Treatment	Drought	2	M	Prevention	Key West Utility	$10,000 to $50,000	BRIC, HMGP	1 - 3 years	Carry Forward (Provide Update)	Received DOD Grant to study feasibility
87	Key West	Heat Island Program, to increase tree canopy, green/cool roofs & a community cooling center	Extreme Heat	1, 3	H	Prevention	Key West Engineering	$10,000 to $50,000	BRIC, HMGP	1 - 5 years	Carry Forward (Provide Update)	Will be addressed in ongoing Key West Adaptation Plan.
88	Key West	Map first floor elevation for all buildings	Flood	2	M	Prevention	Key West Floodplain Management	$50,000 to $100,000	Staff Time	1 - 3 years	Carry Forward (Provide Update)	Creating Asset Management Program.
89	Key West	Map subsidence areas	Coastal Erosion	2, 3	H	Prevention	Key West Floodplain Management	$50,000 to $100,000	Staff Time	1 - 3 years	Carry Forward	Completed LiDAR project in 2025 which will

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											(Provide Update)	help move forward with mapping.
90	Key West	Piling Replacement at KW Historic Seaport	Tropical Cyclones, Severe Storms	3	H	Property Protection	Key West Ports	$100,000 to $500,000	BRIC, FMA	1 year	Carry Forward (Provide Update)	Will complete end of 2025
91	Key West	Tarpon Finger Pier Extensions	Tropical Cyclones, Severe Storms	2	H	Property Protection	Key West Ports	$100,000 to $500,000	HGMP, BRIC, CDBG-MIT	1 - 5 years	Carry Forward (Provide Update)	No progress
92	Key West	Greene Street Redevelopment	Tropical Cyclones, Severe Storms and Tornadoes, Flood	2, 3	H	Property Protection	Key West Ports	$100,000 to $500,000	HMGP, BRIC, HLMP	1 - 3 years	Carry Forward (Provide Update)	Project has been included in CIP for FY 26 and 27
93	Key West	Expand Public Outreach: Mapping, outreach, floodproofing, windproofing, individual mitigation actions, disclosures, financing, etc.	All	2	H	Public Education	Key West Sustainability; Engineering Department	$10,000 to $50,000	Staff Time	1 - 5 years	Carry Forward (Provide Update)	The City has quadrupled it's hurricane preparedness outreach this year.
94	Key West	Cohost Public Workshops with FIRM (NFIP, mitigation, etc)	Tropical Cyclones, Severe Storms and Tornadoes	1, 2	H	Public Education	Key West Floodplain Management	Less than $10,000	Staff Time	1 - 5 years	Carry Forward (Provide Update)	City participated in an Elevation Workshop with FIRM and has had them speak at Commission meetings
95	Key West	Track High Water Marks	Flood	2	M	Prevention	Key West Floodplain Management	Less than $10,000	Staff Time	1 - 5 years	Carry Forward (Provide Update)	No progress
96	Key West	King Tide Educational Map	Flood	1	H	Public Education, Prevention	Key West Engineering	Less than $10,000	Staff Time	1 - 3 years	Carry Forward (Provide Update)	Will be addressed in ongoing Key West Adaptation Plan.
97	Key West	Minimum Recommended Residential Mitigations	Tropical Cyclones, Flood, Sea Level Rise	1	H	Public Education	Key West Engineering	Less than $10,000	Staff Time	1 - 2 years	Carry Forward	Will be addressed in ongoing Key

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											(Provide Update)	West Adaptation Plan.
98	Key West	Potable Water Treatment option for WWTP (Design and Build)	Drought	2	H	Structural Projects	Key West Utility	Over $1,000,000	BRIC, HMGP, CDBG-MIT	1 - 5 years	Carry Forward (Provide Update)	Received DOD Grant to study feasibility
99	Key West	Poincianna Housing: affordable housing for Police Dept	All	1, 2	H	Structural Projects	Key West Engineering	$500,000 to $1,000,000	BRIC, HMGP, EMPG	1 - 5 years	Carry Forward (Provide Update)	Pursuing funding opportunities
100	Key West	Cisterns for additional water supply during hurricanes	Drought, Tropical Cyclones, Severe Storms	2	H	Structural Projects	Key West Engineering	$100,000 to $500,000	HMGP, BRIC	1 - 5 years	Carry Forward (Provide Update)	Will be addressed in ongoing Key West Adaptation Plan.
101	Key West	Replace Sludge Conveyor	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Utility	$50,000 to $100,000	BRIC, HMGP	1 year	Carry Forward (Provide Update)	Implementation planned for 2026
102	Key West	Community Services Building: Remodel to raise equipment and staff above flood.	Tropical Cyclones, Flood, Sea Level Rise	2	H	Property Protection	Key West Engineering	$100,000 to $500,000	HMGP, BRIC, FMA, CDBG-DR	1 - 5 years	Carry Forward (Provide Update)	No progress. Maybe considered in upcoming CIP.
103	Key West	Atlantic Ave Rebuild: Raise and Protect	Tropical Cyclones, Flood, Sea Level Rise	2	H	Structural Projects	Key West Engineering	$100,000 to $500,000	HMGP, BRIC, FMA, CDBG-MIT	1 - 5 years	Carry Forward (Provide Update)	Waiting for funding to be approved.
104	Key West	Diesel Plant: Design & Construction to stabilize building of historical and cultural significance	Tropical Cyclones, Severe Storms and Tornadoes	2	H	Structural Projects	Key West Engineering	$100,000 to $500,000	BRIC, CDBG-MIT, HMGP	5 years	Carry Forward (Provide Update)	Applied for funding and will be notified soon.
105	Key West	Douglass Gym Expansion: Community Center	All	1, 2, 3	H	Structural Projects	Key West Engineering	$100,000 to $500,000	BRIC, CDBG, HMGP	2 years	Carry Forward (Provide Update)	Building is currently under construction
106	Key West	Duval Street Stormwater Revitalization: Raise road to reduce stormwater/SLR	Flood, Sea Level Rise	2, 3	H	Structural Projects	Key West Engineering	$100,000 to $500,000	HMGP, BRIC, FMA, CDBG-MIT	2 years	Carry Forward (Provide Update)	Plan is almost completed. Creating phasing and applying for funds.

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107	Key West	Elevate or floodproof essential public buildings	Flood	2, 3	H	Property Protection	Key West Engineering	Over $1,000,000	HMGP, BRIC, FMA, CDBG-MIT	5 - 7 years	Carry Forward (Provide Update)	Will be addressed in ongoing Key West Adaptation Plan.
108	Key West	Elevate or floodproof historically or culturally significant buildings	Flood	1, 2	H	Property Protection	Key West Engineering	Over $1,000,000	HMGP, BRIC, FMA, CDBG-MIT	5 years	Carry Forward (Provide Update)	Will be addressed in ongoing Key West Adaptation Plan. Have submitted project for grant funding
109	Key West	Govt Road Culverts	Tropical Cyclones, Flood, Sea Level Rise	2, 3	H	Structural Projects	Key West Utility	$100,000 to $500,000	HMGP, BRIC, FMA, CDBG-MIT	FY25	Carry Forward (Provide Update)	Due for completion FY25
110	Key West	KOTS: Construct/Develop new Keys Overnight Temporary Shelter for homeless	All	1, 3	H	Structural Projects, Emergency Services	Key West Engineering	Over $1,000,000	HMGP, BRIC	2 - 3 years	Carry Forward (Provide Update)	Building is currently under construction
111	Key West	Parking lot stormwater storage pilot	Flood	2, 3	H	Structural Projects	Key West Engineering	$50,000 to $100,000	FMA, BRIC	2 - 5 years	Carry Forward (Provide Update)	No progress
112	Key West	701 Palm Seawall: Seawall replacement	Flood, Sea Level Rise, Tropical Cyclones	2	M	Structural Projects	City of Key West	$2,000,000	City Funds	FY24-FY26	New	-
113	Key West	Southernmost Point Seawall Repairs: Seawall replacement	Flood, Sea Level Rise, Tropical Cyclones	2	M	Structural Projects	City of Key West	$2,000,000	City Funds & FEMA PA	FY24-FY26	New	-
114	Key West	Mallory T-Pier Extension and Improvements: Modification to better accommodate large ships	Flood, Sea Level Rise, Tropical Cyclones	2	L	Structural Projects	City of Key West	$2,000,000	City Funds & FL Stewardship Funds	FY24-FY27	New	-
115	Key West	Mallory Square Hardening: Seawall and Pier hardening, includes stormwater work and shading	Flood, Sea Level Rise, Tropical Cyclones	2	M	Structural Projects	City of Key West	$30,000,000	City funds and all possible grants	FY23-FY30	New	-

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116	Key West	Mallory Square Historic Buildings: Wind hardening and floodproofing for all city owned Mallory Square historic buildings.	Flood, Sea Level Rise, Tropical Cyclones, Severe Storms and Tornadoes	2	M	Structural Projects	City of Key West	$10,000,000	City Funds & FL Dept of Historic Resources grants	FY23-FY30	New	-
117	Key West	Martin Luther King Pool Replacement: Replacement of free, historic pool for community cooling and meeting spaces.	Extreme Heat	1, 3	M	Structural Projects	City of Key West	$10,000,000	City Funds & FL Recreation grants	FY25-FY28	New	-
118	Key West	Berg & Kitso Boardwalks: Hardening for hurricanes with concrete foundation, replace wood structures, wood deck, and pillars.	Flood, Sea Level Rise, Tropical Cyclones	2	M	Structural Projects	City of Key West	$250,000	City Funds	FY25	New	-
119	Key West	Indigenous Park Improvements: Create new, wind and flood resisted pavilions	Flood, Tropical Cyclones, Severe Storms and Tornadoes	2, 3	M	Property Protection	City of Key West	$1,600,000	City Funds	FY27	New	-
120	Key West	Lagerhead's Roof Replacement: Code Plus Hardening	Tropical Cyclone, Severe Storms and Tornadoes	2	M	Property Protection	City of Key West	$50,000	City Funds	FY25	New	-
121	Key West	Spotswood Park: Seawall replacement	Flood, Sea Level Rise, Tropical Cyclones	2	M	Structural Projects	City of Key West	$2,000,000	City Funds	FY6-FY27	New	-
122	Key West	402 Wall Street Hardening: Renovate building to preserve structural integrity and bring up to current code for leasehold occupancy. Work includes mold remediation, new roof, fire suppression, HVAC, storefront and spalling repair.	All	2	H	Property Protection	City of Key West	$800,000	City Funds & FL Dept of Historic Resources grants	FY24-FY26	New	-
123	Key West	Waterfront Playhouse Preservation and Hardening	All	2	L	Property Protection	City of Key West	$2,000,000	City Funds & FL Dept of Historic Resources grants	FY25-FY27	New	-

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124	Key West	White Street Pier Hardening: Redo rip rap retaining wall around pier.	Flood, Sea Level Rise, Tropical Cyclones	2	M	Structural Projects	City of Key West	$5,000,000	City Funds	FY26-27	New	-
125	Key West	Wickers Park Stormwater Project: Elevation of prime bike trail through City	Flood, Sea Level Rise	2	M	Structural Projects	City of Key West	$1,100,000	City Funds & FDOT LAP grant	FY24-28	New	-
126	Key West	Sewer Pump Station hardening: Pumps G, R, A, and F	Flood	2	M	Structural Projects	City of Key West	$10,000,000	City Funds	FY24-28	New	-
127	Key West	Sewer Sludge Pumps and Valve Hardening: Upgrades to the Return Activated Sludge and Waste Activated Sludge pumps and valves.	Flood	2	M	Structural Projects	City of Key West	$4,000,000	City Funds	FY25-27	New	-
128	Key West	Wastewater Treatment Plant Effluent Pump Hardening: New effluent pump.	Flood	2	M	Structural Projects	City of Key West	$2,500,000	City Funds	FY25-27	New	-
129	Key West	Dennis Street Stormwater, Phase 2: Upgrade pumps with a low flow pump for added capacity. Replace storm drains and inlets that currently allow inflow and infiltration into the overall drainage system.	Flood	2	M	Structural Projects	City of Key West	$1,200,000	City Funds & Mayfield Grant	FY24-30	New	-
130	Key West	Canal System Mitigative Clearing: Dredging, clearing of overgrown foliage and debris of open channel drainage conveyances (canals) throughout the city.	Flood	2	M	Prevention	City of Key West	$800,000	City Funds	Every 2 years	New	-
131	Key West	Historic Bight: Conch Republic Seafood Company Wind Hardening: Code plus mitigation in V Zone	Tropical Cyclones, Severe Storms and Tornadoes	2	M	Property Protection	City of Key West	$5,000,000	City Funds	FY24-27	New	-

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132	Key West	Historic Bight: Turtle Kraals historic preservation	Flood	2	M	Property Protection	City of Key West	$550,000	City Funds	FY24-26	New	-
133	Key West	Historic Bight: Electrical pedestal elevation	Flood	2	M	Property Protection	City of Key West	$500,000	City Funds	FY25-28	New	-
134	Key West	Duval Street Commercial Properties flood and wind proofing	Flood	1, 2	M	Property Protection	City of Key West	$60,000,000	City Funds	FY24-35	New	-
135	Key West	Historic Bight: Generator with Fuel Tank elevation & expansion.	Flood, Tropical Cyclones, Severe Storms and Tornadoes	2	M	Property Protection	City of Key West	$1,000,000	City Funds	FY25-27	New	-
136	Key West	Historic Bight: Common Area Wave Attenuators	Flood, Tropical Cyclones	2	M	Structural Projects	City of Key West	$5,000,000	City Funds	FY25-28	New	-
137	Key West	Historic Bight: Trumbo Shoreline Stabilization, Seawall & Pier Upgrades	Flood, Tropical Cyclones, Sea Level Rise, Coastal Erosion	2	M	Structural Projects	City of Key West	$6,000,000	City Funds	FY23-27	New	-
138	Key West	Garrison Bight: Charter Boat Row Seawall Upgrades	Flood, Sea Level Rise, Tropical Cyclones	2	M	Structural Projects	City of Key West	$5,000,000	City Funds	FY24-27	New	-
139	Key West	Garrison Bight: Angelfish & LAB Seawall Upgrades	Flood, Sea Level Rise, Tropical Cyclones	2	M	Structural Projects	City of Key West	$10,000,000	City Funds	FY24-27	New	-
140	Key West	Garrison Bight: Upgrade Docks for SLR	Flood, Sea Level Rise, Tropical Cyclones	2	M	Structural Projects	City of Key West	$1,000,000	City Funds	FY25-28	New	-
141	Key West	Parking Decks for Flood Protection	Flood, Sea Level Rise, Tropical Cyclones	1, 2	M	Structural Projects	City of Key West	$10,000,000	City Funds	FY24-30	New	-
142	Key West	Voluntary Residential Buy Outs for SRL properties	Flood, Sea Level Rise, Tropical Cyclones	1, 2, 3	H	Property Protection	City of Key West	$15,000,000	City Funds & FEMA Grants	FY26-30	New	-
143	Key West	Wind Harden and floodproof community critical facilities	Flood, Tropical Cyclones, Severe Storms and Tornadoes	2	H	Structural Projects	City of Key West	$5,000,000	City Funds & FEMA Grants	FY20-27	New	-
144	Key West	Training program for contractors to elevate homes. Base off of New Orleans curriculum.	Flood, Sea Level Rise, Tropical Cyclones	1, 2	H	Property Protection, Public Education	City of Key West	$1,000,000	City Funds	FY23-30	New	-
145	Key West	Increase safety and resiliency features in residential marinas and mooring fields	All	1, 3	M	Structural Projects	City of Key West	$8,000,000	City Funds	FY27-30	New	-

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146	Key West	Create more Resiliency Hubs to assist post storm	All	1, 3	H	Emergency Services	City of Key West	$25,000,000	City Funds	FY23-30	New	-
147	Key West	Create Code Plus Tiny Home / Accessory Unit Models to help increase safe, affordable housing.	All	2	H	Prevention	City of Key West	$6,000,000	City Funds	FY27-30	New	-
148	Key West	Create island wide Wi-Fi to increase affordable communications during storms or other disaster situations	All	1, 3	H	Emergency Services	City of Key West	$8,000,000	City Funds	FY27-30	New	-
149	Key West	Install Living Shoreline and other Nature Based / Green Infrastructure systems to attenuate waves and lessen erosion	Flood, Sea Level Rise, Tropical Cyclones	2	H	Natural Resource Protection	City of Key West	$5,000,000	City Funds	FY27-30	New	-
150	Key West	3D scan and develop interpretive materials for historic buildings with high cultural value.	All	2	L	Property Protection	City of Key West	$2,000,000	City Funds	FY27-30	New	-
151	Key West	Create Cemetery Mitigation Plan to reduce displacement	Flood, Sea Level Rise	2	L	Prevention	City of Key West	$600,000	City Funds	FY27-30	New	-
152	Key West	Create and enact below tide restoration plan of seagrass and corals to attenuate waves and lessen erosion	Coastal Erosion	2, 3	H	Prevention; Natural Resource Protection	City of Key West	$5,000,000	City Funds	FY27-30	New	-
153	Key West	Create and enact plan to elevate Key West Tropical Forest and Botanical Garden via soil augmentation to lengthen lifespan of habitat.	Flood, Sea Level Rise	2, 3	M	Natural Resource Protection, Prevention	City of Key West	$10,000,000	City Funds	FY27-30	New	-
154	Key West	Pilot floodable open space in public area to increase community acceptance and replication	Flood, Sea Level Rise, Tropical Cyclones	2, 3	H	Natural Resource Protection	City of Key West	$4,000,000	City Funds	FY27-30	New	-
155	Key West	Retrofit North and South Roosevelt with additional	Flood, Tropical Cyclones	2, 3	M	Structural Projects;	City of Key West	$25,000,000	City Funds	FY27-30	New	-

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		wave attenuating nature based systems.				Natural Resource Protection						
156	Key West	Purchase Conservation Easements to increase open space in SFHAs	Flood	2, 3	H	Natural Resource Protection; Prevention	City of Key West	$10,000,000	City Funds	FY27-30	New	-
157	Key West	Establish artificial buffer reefs to attenuate waves and reduce erosion.	Coastal Erosion, Tropical Cyclones	3	M	Natural Resource Protection, Structural Projects	City of Key West	$9,000,000	City Funds	FY27-30	New	-
158	Key West	Sewer Facilities & System: Flood proofing and wind hardening	Flood, Tropical Cyclones, Severe Storms and Tornadoes	2	M	Structural Projects	City of Key West	$45,000,000	City Funds	FY27-30	New	-
159	Key West	Stormwater Facilities & System: Flood proofing and wind hardening	Flood, Tropical Cyclones, Severe Storms and Tornadoes	2	M	Structural Projects	City of Key West	$30,000,000	City Funds	FY27-30	New	-
160	Key West	Potable Water Facilities & System: Flood proofing and wind hardening	Flood, Tropical Cyclones, Severe Storms and Tornadoes	2	M	Structural Projects	FKAA	$60,000,000	FKAA Funds	FY27-30	New	-
161	Key West	Diversify fuel sources for redundancy options post storm; prioritize critical facilities	All	3	M	Emergency Services	City of Key West	$3,000,000	City Funds	FY27-30	New	-
162	Key West	Diversify potable water sources for redundancy options post storm; prioritize critical facilities	All	3	M	Emergency Services	City of Key West	$5,000,000	City Funds	FY27-30	New	-
163	Key West	Diversify energy sources for redundancy options post storm; prioritize critical facilities	All	3	M	Emergency Services	City of Key West	$8,000,000	City Funds	FY27-30	New	-
164	Key West	Stormwater: 6th Street and Patterson Avenue Neighborhood Drainage	Flood	2	M	Structural Projects	City of Key West	$6,000,000	City Funds	FY27-30	New	-

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165	Key West	Stormwater: Tropical Street to George Street Neighborhood Drainage	Flood	2	M	Structural Projects	City of Key West	$35,000,000	City Funds	FY27-30	New	-
166	Key West	Stormwater: West Riviera Drive Improvements	Flood	2	M	Structural Projects	City of Key West	$27,000,000	City Funds	FY27-30	New	-
167	Key West	Stormwater: East End Resiliency Planning Zone	Flood	2	M	Structural Projects	City of Key West	$125,000,000	City Funds	FY27-30	New	-
168	Key West	Stormwater: White Street to Grinnell Street Neighborhood Drainage	Flood	2	M	Structural Projects	City of Key West	$28,000,000	City Funds	FY27-30	New	-
169	Key West	Stormwater: Harmonize neighborhood roads with Monroe County Flagler Project	Flood	2, 3	M	Structural Projects	City of Key West	$18,000,000	City Funds	FY27-30	New	-
170	Key West	Stormwater: Harmonize neighborhood roads with FDOT Jose Marti / Eaton Street Project	Flood	2, 3	M	Structural Projects	City of Key West	$7,000,000	City Funds	FY27-30	New	-
171	Key West	Stormwater: Partner with Navy and Monroe County on Palm Avenue solutions	Flood	2, 3	M	Structural Projects	City of Key West	$26,000,000	City Funds	FY27-30	New	-
172	Key West	Energy: Plan and enact how to use electric vehicle fleet as batteries post storm.	All	2, 3	M	Prevention, Emergency Services	City of Key West	$12,000,000	City Funds	FY27-30	New	-
173	Key West	Planning: Canopy Master Plan and Storm scaping.	Tropical Cyclones	2	M	Prevention	City of Key West	$600,000	City Funds	FY27-30	New	-
174	Key West	Affordable housing: Wind Harden, Flood proof, Weatherize and Solarize Housing Authority properties	Flood, Tropical Cyclone, Extreme Heat	1, 2, 3	M	Property Protection	City of Key West	$12,000,000	City Funds	FY27-30	New	-
175	Key West	Planning: Create post storm building permit manual, specifically addressing nonconformities, build back standards and disclosure notices	Flood Tropical Cyclones	1, 2, 3	H	Prevention	City of Key West	$800,000	City Funds	FY27-30	New	-

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
176	Key West	Planning: Develop a Coastal Defense Strategy and Design Guide based on the best practices of living shorelines and built infrastructure such as seawalls and levies to be used by local contractors.	Flood, Sea Level Rise, Coastal Erosion	2, 3	H	Prevention; Natural Resource Protection	City of Key West	$800,000	City Funds	FY27-30	New	-
177	Key West	Decrease saltwater intrusion into the wastewater system by lining collection lines	Sea Level Rise, Flood	2	M	Structural Projects	City of Key West	$16,000,000	City Funds	FY27-30	New	-
178	Key West	Planning: Create & disseminate continuity of operations program and mitigation guidebook for local businesses.	All	1, 2	M	Public Education	City of Key West	$600,000	City Funds	FY27-30	New	-

D CITY OF LAYTON

D.1 ASSET INVENTORY

The City of Layton and the LMS Working Group provided a local inventory of critical facilities and community lifelines, which are a priority for mitigation planning and emergency management. Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function. Table D.1 provides a count of critical facilities by FEMA lifeline category in the City of Layton. Figure D-1 shows the locations of all critical facilities in the City of Layton.

Table D.2 provides a detailed inventory of the critical facilities in the City of Layton, indicating each facility's FEMA lifeline category, flood zone, 1% annual chance flood depth, sea level rise, storm surge, and wildfire. More information on hazard vulnerability is provided in the hazard profiles.

Table D.1 – Critical Facilities, City of Layton

Facility Type	Count of Facility Type	Structure Value
Communications	1	$0
Energy	0	$0
Food, Hydration, Shelter	0	$0
Hazardous Materials	0	$0
Health and Medical	0	$0
Safety and Security	1	$337,480
Transportation	0	$0
Water Systems	3	$0
Total	**5**	**$337,480**

Source: LMS Working Group, GIS Analysis

Figure D-1 – Critical Facilities, City of Layton

Source: LMS Working Group, GIS Analysis

Table D.2 – Critical Facilities Inventory, City of Layton

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Safety and Security	Emergency Ops	68260 Overseas Highway	$337,480.00	4.6	AE	-	SS 100yr	-	0
Water Systems	Waste	-	-	5.5	AE	NIL	SS 100yr	-	0
Water Systems	Waste	-	-	6.2	AE	NIL	SS 100yr	-	0
Water Systems	Waste	-	-	6.2	AE	NIL	SS 100yr	-	0
Communications	Communications	Mile Marker 68 Us Highway 1	-	4.3	AE	NIH	SS 100yr	-	2.5

D.2 RISK ASSESSMENT

This section contains a summary of the City of Layton's asset inventory as well as hazard profile and vulnerability assessment for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Flood, Sea Level Rise, Storm Surge, and Wildfire.

D.2.1 FLOOD

Table D.3 details the acreage of Layton's total area by flood zone on the effective DFIRM; it also shows a comparison to the preliminary DFIRM released in December 2019. 100 percent of Layton falls within the mapped 1%-annual-chance floodplains; this would remain the same on the 2019 preliminary maps. The data in this risk assessment is based off FEMA's 2005 DFIRM. Figure D-2 reflects the effective mapped flood hazard zones for Layton while Figure D-3 displays the 2019 preliminary map.

Table D.3 – Flood Zone Acreage in Layton

Flood Zone	Effective DFIRM (2005)		Preliminary DFIRM (2019)		Change from Effective (acres)
	Acreage	Percent of Total (%)	Acreage	Percent of Total (%)	
A	0	0.0%	0	0.0%	
AE	123.2	86.0%	114.6	80.0%	8.6
AO	0.0	0.0%	0.0	0.0%	0.0
VE	20.0	14.0%	28.6	20.0%	-8.6
0.2% Annual Chance Flood Hazard	0.0	0.0%	0.0	0.0%	0.0
Unshaded X	0.0	0.0%	0.0	0.0%	0.0
Open Water	0.0	0.0%	0.0	0.0%	0.0
Total	44.5	100.0%	44.5	100.0%	0.0
SFHA Total	**143.2**	**100.0%**	**143.2**	**100.0%**	**0.0**

Source: FEMA Effective DFIRM

Note: The differences between the effective FIRM and the preliminary FIRM are significant will likely still change. These details are provided here only as a comparison – all further flood analysis is based in the 2005 Effective DFIRM.

Table D.4 and Table D.5 provide building counts and estimated damages by occupancy type for the 1% annual chance flood event using both the effective and preliminary DFIRM. Figure D-4 and Figure D-5 display the effective and preliminary depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

Table D.4 – Estimated Building Damage and Content Loss, 1% Annual Chance Flood Effective DFIRM, City of Layton

Occupancy Type	Total Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Agriculture	0	$0	$0	$0	$0	0%
Commercial	13	$18,183,056	$391,884	$1,139,479	$1,531,362	8%

Occupancy Type	Total Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Educational	0	$0	$0	$0	$0	0%
Government	10	$3,179,284	$163,886	$993,307	$1,157,193	36%
Industrial	0	$0	$0	$0	$0	0%
Religious	2	$828,760	$12,880	$95,999	$108,878	13%
Residential	143	$51,718,801	$16,078,231	$7,940,346	$24,018,577	46%
Total	**168**	**$73,909,902**	**$16,646,881**	**$10,169,130**	**$26,816,011**	**36%**

Source: HAZUS, FEMA Effective DFIRM

Table D.5 – Estimated Building Damage and Content Loss, 1% Annual Chance Flood Preliminary DFIRM, City of Layton

Occupancy Type	Total Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Agriculture	0	$0	$0	$0	$0	0%
Commercial	13	$18,183,056	$319,309	$986,368	$1,305,677	7%
Educational	0	$0	$0	$0	$0	0%
Government	10	$3,179,284	$99,210	$621,411	$720,621	23%
Industrial	0	$0	$0	$0	$0	0%
Religious	2	$828,760	$12,880	$95,999	$108,878	13%
Residential	143	$51,718,801	$14,420,901	$7,167,424	$21,588,325	42%
Total	**168**	**$73,909,902**	**$14,852,299**	**$8,871,202**	**$23,723,501**	**32%**

Source: HAZUS, FEMA Preliminary DFIRM

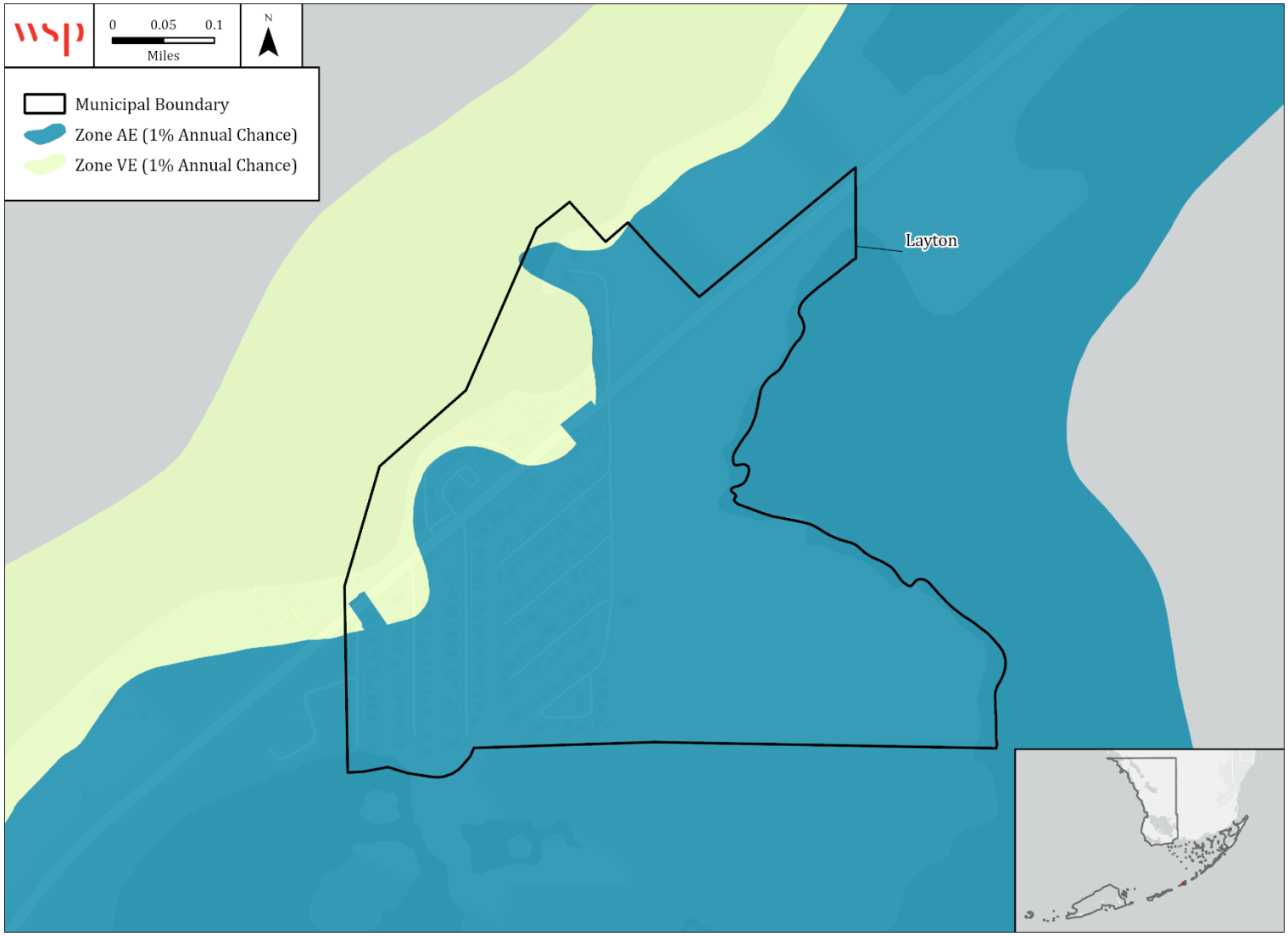
Table D.6 provides building counts and values for critical facilities by flood zone in the City of Layton.

Table D.6 – Critical Facilities Exposed to Flooding, City of Layton

Flood Zone	Critical Facility Count	Structure Value
Zone AE	5	$337,480.00
Zone X (500-year)	0	$0
Zone X Unshaded	0	$0
Total	**5**	**$337,480.00**

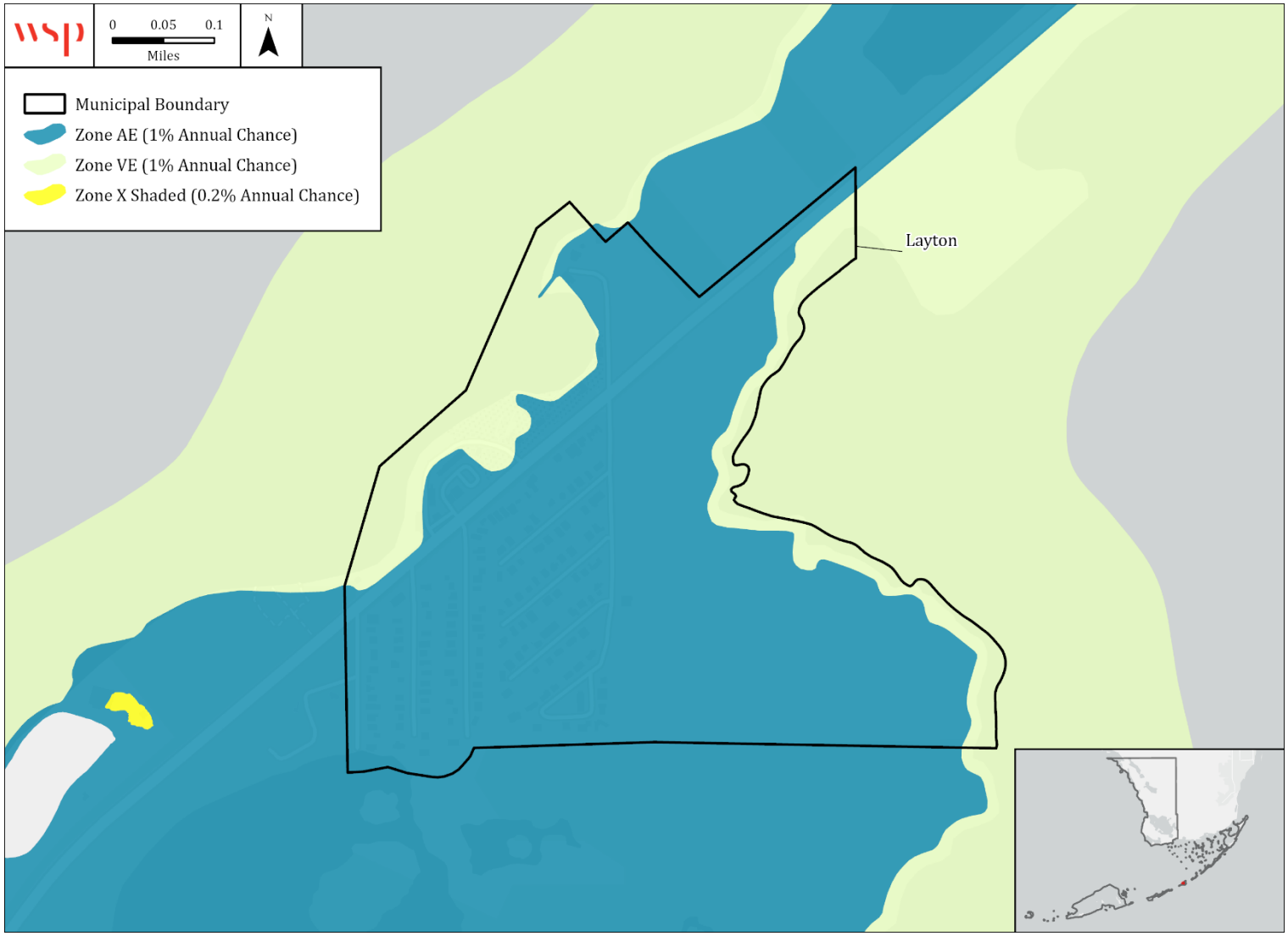
Source: FEMA Effective DFIRM, LMS Working Group

Figure D-2 – FEMA Flood Hazard Areas, Effective DFIRM, Layton



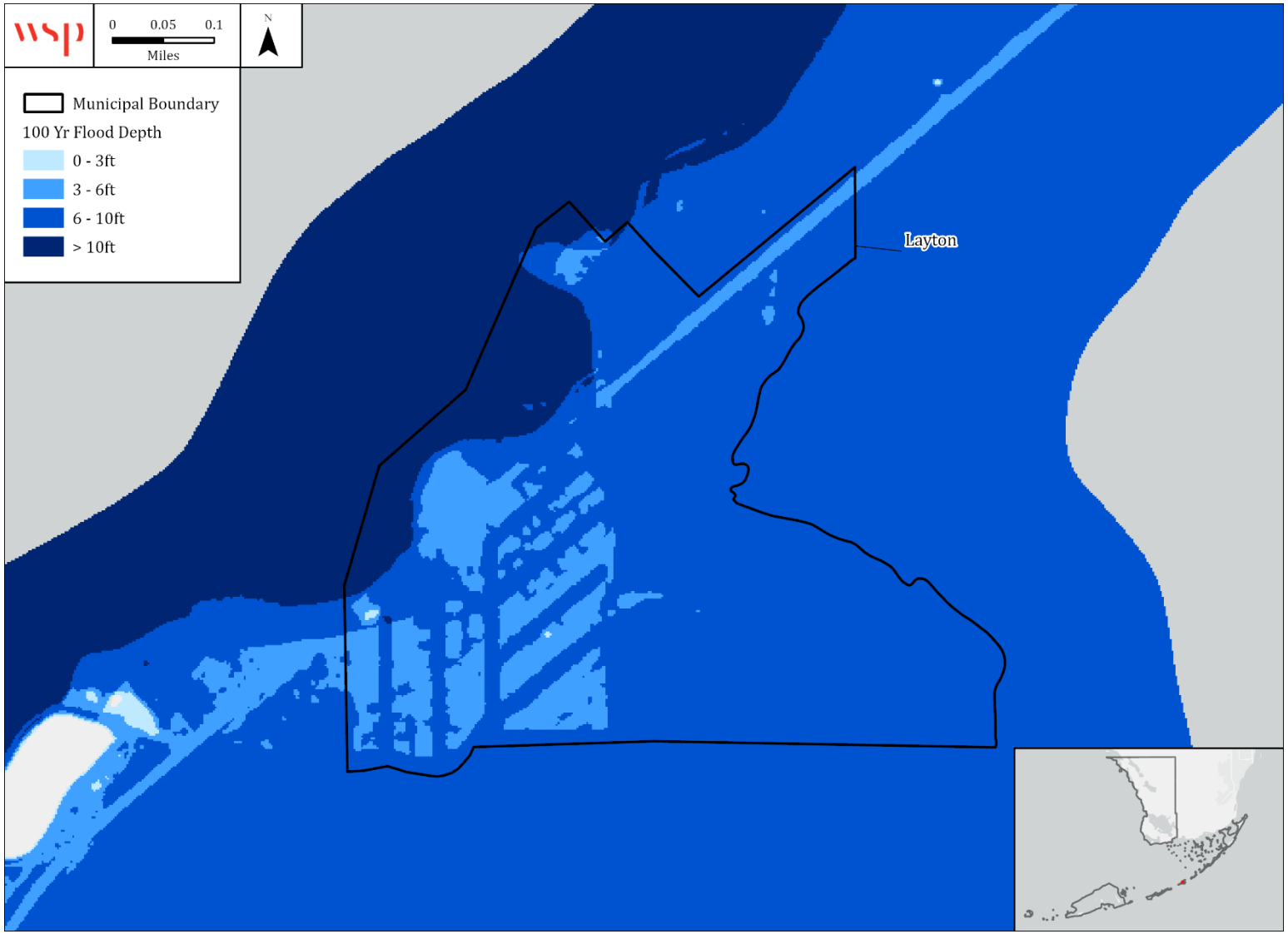
Source: FEMA Effective DFIRM

Figure D-3 – FEMA Flood Hazard Areas, Preliminary DFIRM, City of Layton



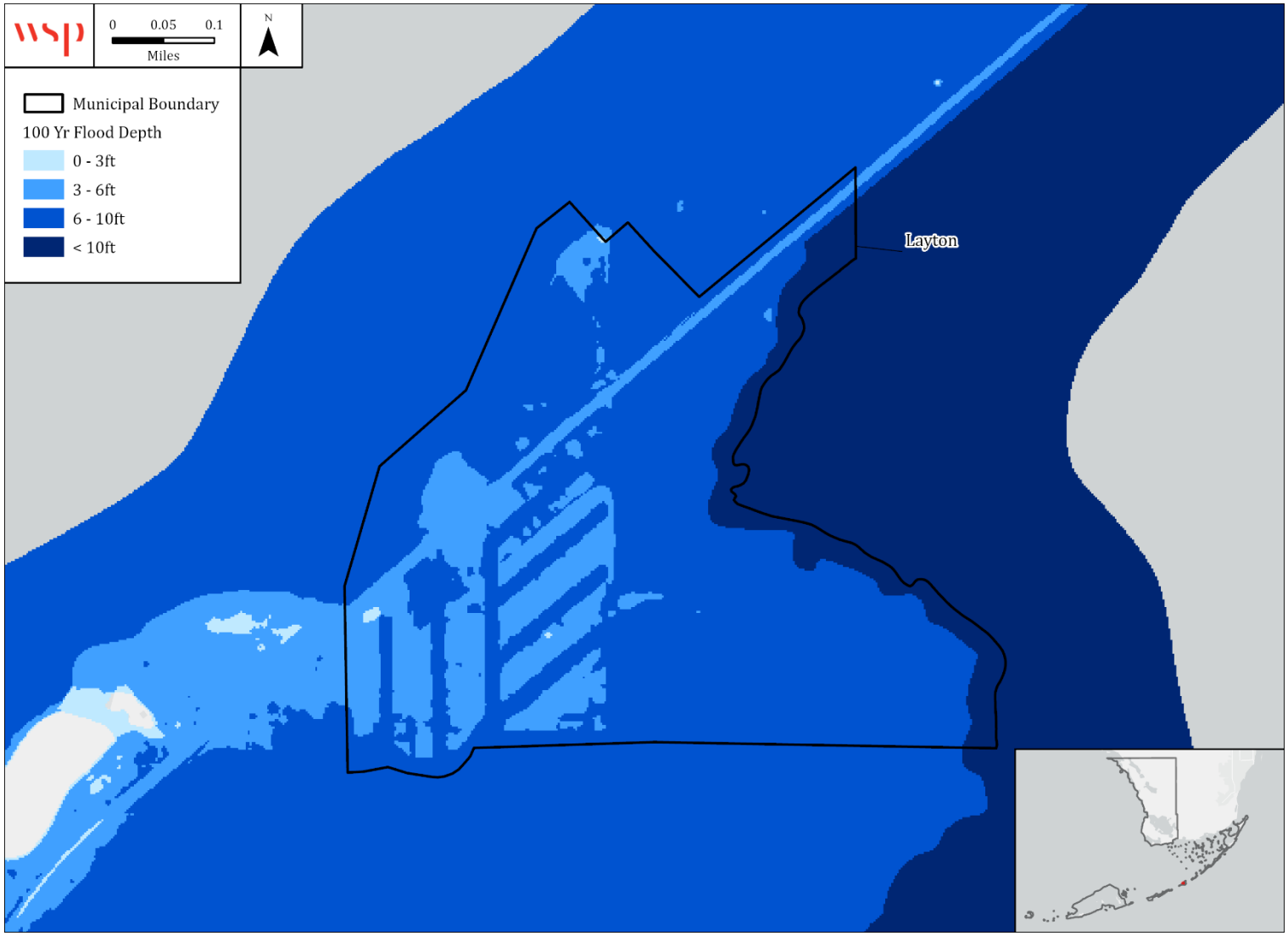
Source: FEMA Preliminary DFIRM

Figure D-4 – Flood Depth, 1%-Annual Chance Floodplain Effective DFIRM, City of Layton



Source: FEMA Effective DFIRM

Figure D-5 – Flood Depth, 1%-Annual Chance Floodplain Preliminary DFIRM, City of Layton



Source: FEMA Preliminary DFIRM

FLOODPLAIN MANAGEMENT

The City of Layton joined the NFIP emergency program in July 1971 and has been a regular participant since. The City is a participant in the Community Rating System and is a Class 5 community. The following tables reflect NFIP policy and claims data for the City categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table D.7 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	64	$103,110	$16,916,000	69	$1,780,963.67
2-4 Family	6	$3,962	$1,390,000	5	$330,795.82
All Other Residential	1	$2,574	$500,000	0	$0.00
Non-Residential	12	$62,312	$6,109,000	14	$1,568,618.52
Total	**83**	**$171,958**	**$24,915,000**	**88**	**$3,680,378.01**

Source: FEMA Community Information System, accessed May 2025

Table D.8 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	83	$171,958	$24,915,000	87	$3,680,378.01
V01-30 & VE Zones	0	$0	$0	1	$0.00
Total	**83**	**$171,958**	**$24,915,000**	**88**	**$3,680,378.01**

Source: FEMA Community Information System, accessed May 2025

Table D.9 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	27	$112,528	$7,281,000	56	$3,314,452.11
V01-30 & VE Zones	0	$0	$0	1	$0.00
Total	**27**	**$112,528**	**$7,281,000**	**57**	**$3,314,452.11**

Source: FEMA Community Information System, accessed May 2025

Table D.10 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	56	$59,430	$17,634,000	31	$365,925.90
Total	**56**	**$59,430**	**$17,634,000**	**31**	**$365,925.90**

Source: FEMA Community Information System, accessed May 2025

CONTINUED NFIP COMPLIANCE

The City entered the NFIP in 1971 by adoption of an ordinance that complies with the requirement of the program. To continue compliance with the NFIP, the City will:

- Enforce the adopted floodplain management ordinance, including reviewing all development proposals in any flood hazard area and enforcing the requirements of the ordinance, and inspecting both permitted development and unpermitted activities;
- Maintain records pertaining to floodplain development, including flood maps and Letters of Map Change, which shall be available for public inspection;
- Notify the public when there are proposed changes to the ordinance or FIRMs;
- Maintain a 3’ freeboard requirement;
- Limits size of accessory structures in the SFHA;
- Implement activities recognized by the NFIPs CRS; and
- Promote the purchase of NFIP flood insurance policies as financial protection.

D.2.2 SEA LEVEL RISE

Table D.11 details the number of all buildings affected by sea level rise in the City of Layton following the NOAA sea level rise projections of intermediate low and intermediate high scenarios.

Table D.11 – All Buildings Affected by Sea Level Rise, City of Layton

Occupancy	Estimated Building Count	Structure Value	Estimated Content Value	Total Value
2040 NIL	**127**	**32,100,227**	**19,486,261**	**48,663,286**
Agriculture	0	$0	$0	$0
Commercial	7	$4,868,273	$4,868,273	$9,736,546
Education	0	$0	$0	$0
Government	10	$1,589,642	$1,589,642	$3,039,206
Industrial	0	$0	$0	$0
Religious	2	$414,380	$414,380	$828,760
Residential	108	$25,227,932	$12,613,966	$35,058,774
2040 NIH	**143**	**38,085,839**	**23,427,465**	**58,465,366**
Agriculture	0	$0	$0	$0
Commercial	8	$6,765,068	$6,765,068	$13,530,136
Education	0	$0	$0	$0
Government	10	$1,589,642	$1,589,642	$3,039,206
Industrial	0	$0	$0	$0
Religious	2	$414,380	$414,380	$828,760
Residential	123	$29,316,749	$14,658,374	$41,067,264

Source: HAZUS, NOAA, Monroe County Parcel Data

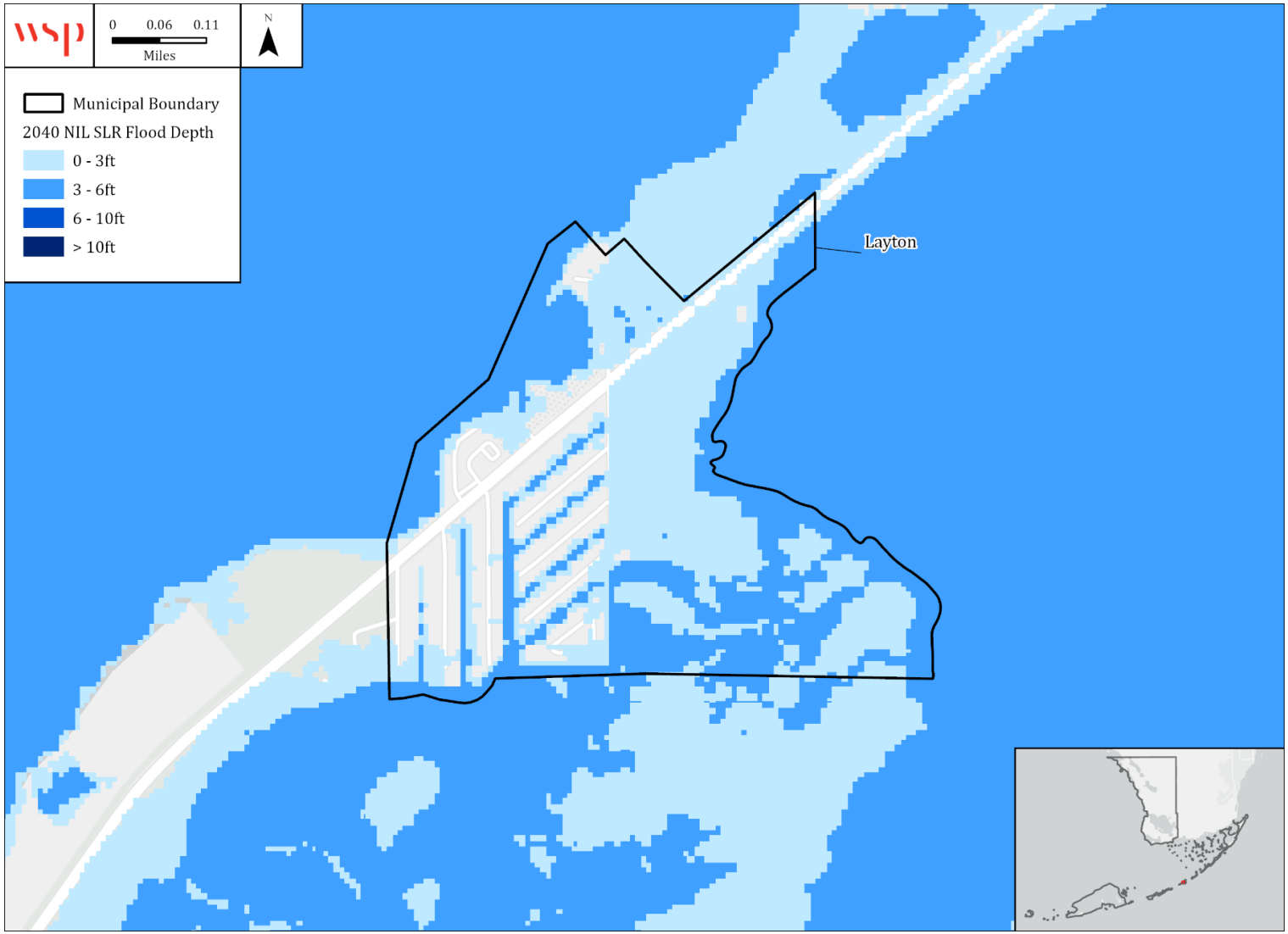
Figure D-6 and Figure D-7 display NOAA 2040 intermediate low and high sea level rise scenarios for the City of Layton. Table D.12 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to sea level rise based on NOAA intermediate low and high scenarios.

Table D.12 – Critical Facilities Exposed to Sea Level Rise, City of Layton

Highest Level of SLR	Critical Facility Count	Structure Value
2040 NIL	3	$0
NOAA 3ft	0	$0
2040 NIH	1	$0
Total	**4**	**$0**

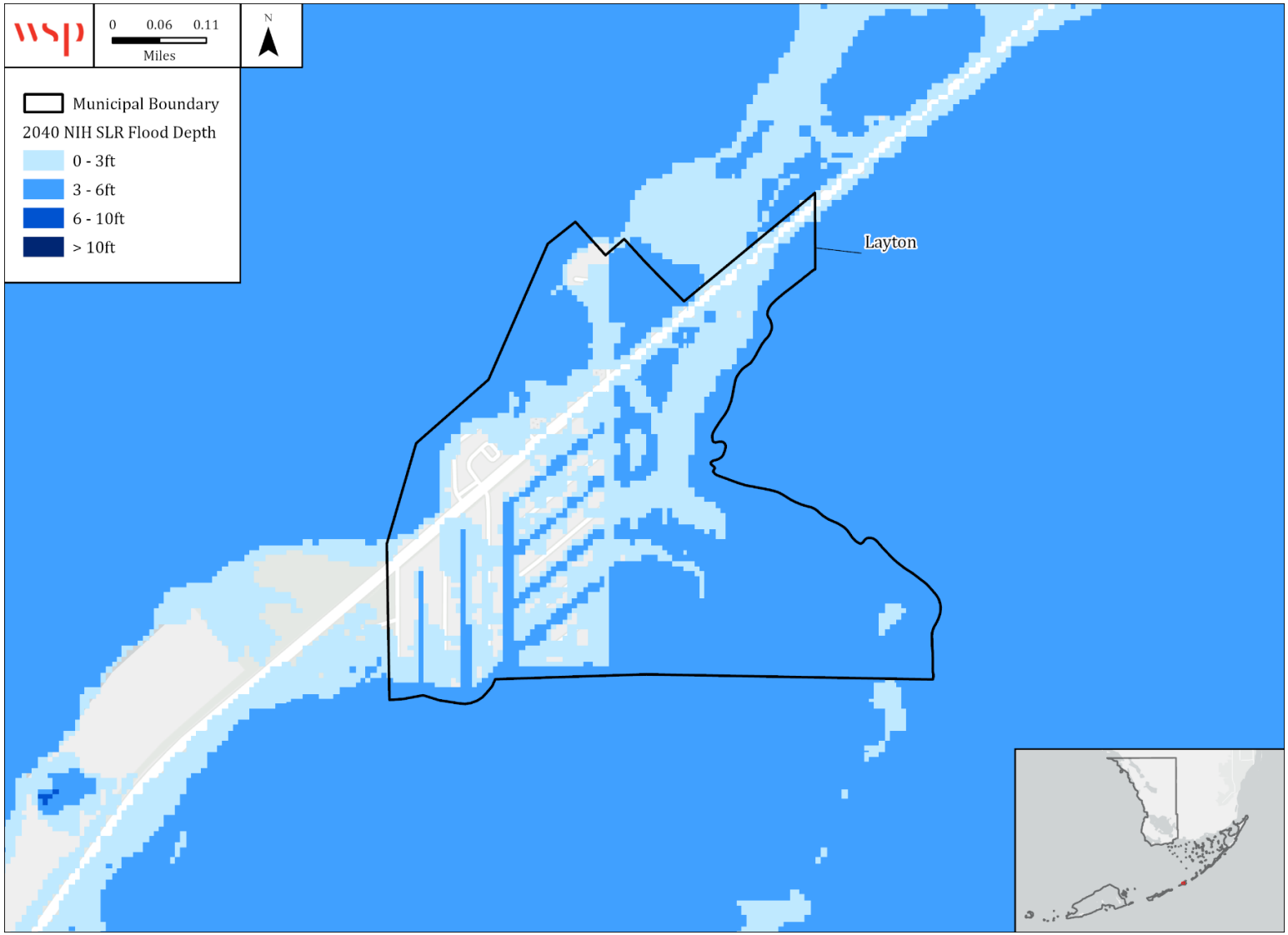
Source: NOAA, Monroe County LMS Working Group

Figure D-6 – NOAA 2040 Intermediate Low Sea Level Rise Scenario, City of Layton



Source: NOAA 2040 NIL, Monroe County Parcel Data

Figure D-7 – NOAA 2040 Intermediate High Sea Level Rise Scenario, City of Layton



Source: NOAA 2040 NIH, Monroe County Parcel Data

D.2.3 STORM SURGE

Table D.13 summarizes the number of buildings in the City of Layton that will be impacted by 100-yr and 500-yr storm surge events. Figure D-8 shows potential storm surge inundation for a 100-yr storm surge event and Figure D-9 shows inundation for the 500-yr storm surge event.

Table D.13 – Storm Surge Exposure by 100-yr and 500-yr Event, City of Layton

Occupancy	Estimated Building Count	Structure Value	Estimated Content Value	Total Value
100yr	**168**	**$45,574,751**	**$28,335,151**	**$73,909,902**
Agriculture	0	$0	$0	$0
Commercial	13	$9,091,528	$9,091,528	$18,183,056
Education	0	$0	$0	$0
Government	10	$1,589,642	$1,589,642	$3,179,284
Industrial	0	$0	$0	$0
Religious	2	$414,380	$414,380	$828,760
Residential	143	$34,479,201	$17,239,600	$51,718,801
500yr	**168**	**$45,574,751**	**$28,335,151**	**$73,909,902**
Agriculture	0	$0	$0	$0
Commercial	13	$9,091,528	$9,091,528	$18,183,056
Education	0	$0	$0	$0
Government	10	$1,589,642	$1,589,642	$3,179,284
Industrial	0	$0	$0	$0
Religious	2	$414,380	$414,380	$828,760
Residential	143	$34,479,201	$17,239,600	$51,718,801

Source: FEMA, NOAA, Monroe County Parcels

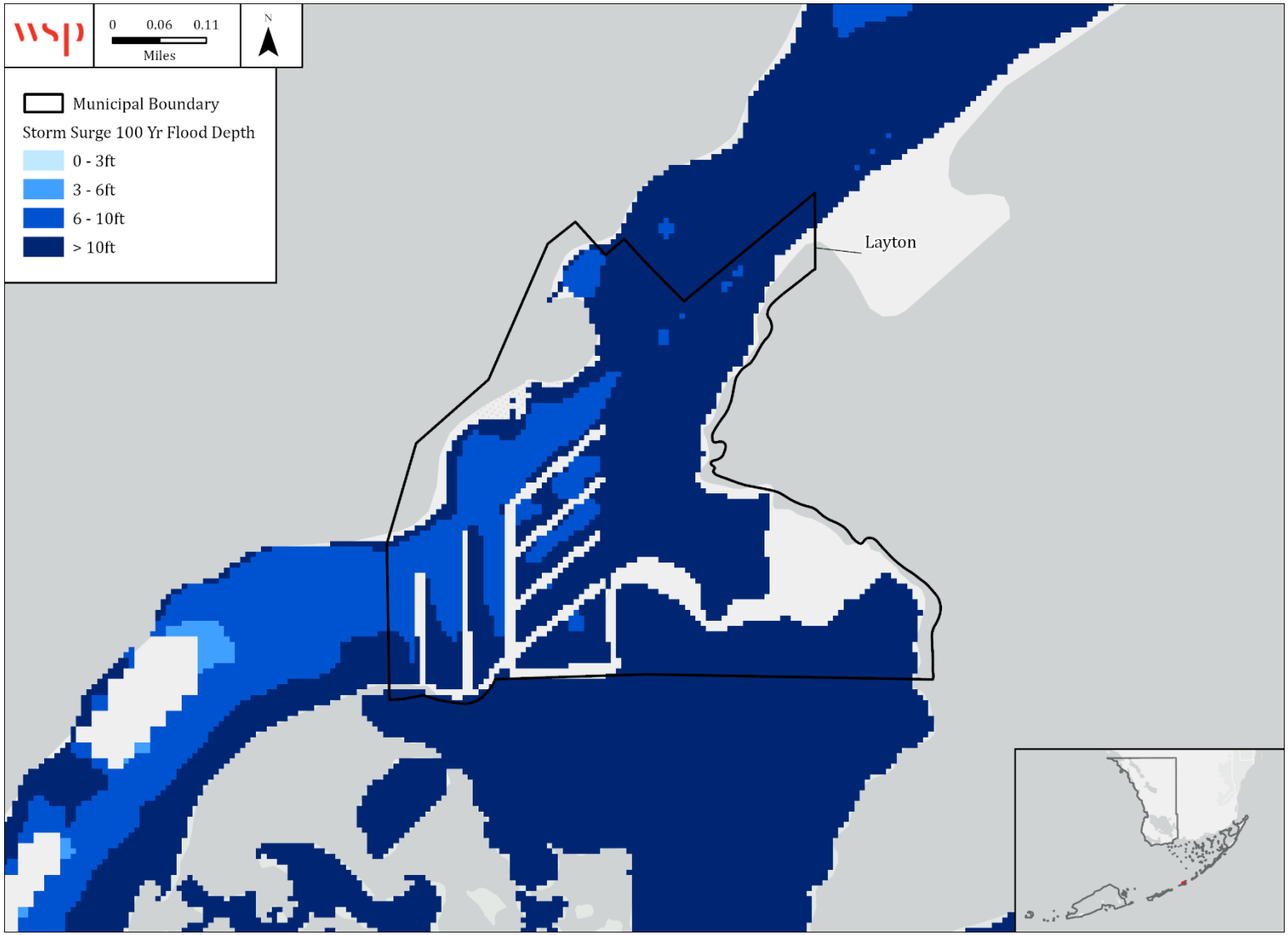
Table D.14 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to storm surge based on 100 and 500-year storm surge events.

Table D.14 – Critical Facilities Exposed to Storm Surge, City of Layton

Storm Surge Category	Critical Facility Count	Structure Value
100-Year	5	$337,480.00
500-Year	0	$0
Total	**5**	**$337,480.00**

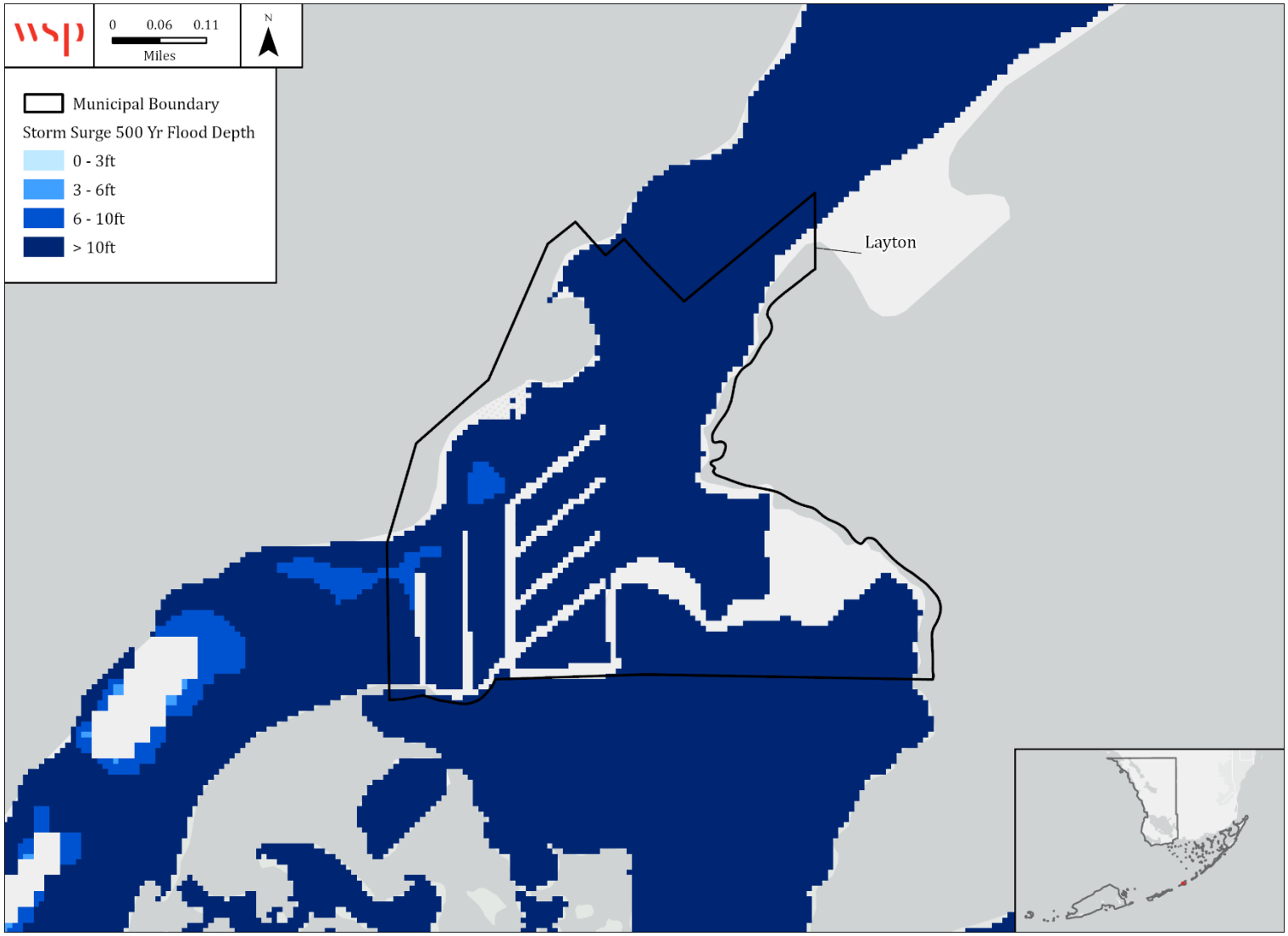
Source: FEMA, NOAA, Monroe County LMS Working Group

Figure D-8 – 100-Year Storm Surge Event Inundation, City of Layton



Source: NOAA

Figure D-9 – 500-Year Storm Surge Event Inundation, City of Layton



Source: NOAA

D.2.4 WILDFIRE

Table D.15 summarizes the acreage in the City of Layton that falls within the Functional Wildland Urban Interface (WUI), categorized into zones that describe the wildfire risk mitigation activities appropriate for each zone. Areas in the Functional WUI are those areas where development and building structures may intermix with burnable land cover. Approximately, 10 percent of the City of Layton is categorized as having direct exposure to wildfire risk within the Functional WUI.

Table D.15 – Functional Wildland Urban Interface, City of Layton

	Functional Wildland Urban Interface (WUI) Category	Acres	Percent
	Direct Exposure	14	10%
	Indirect Exposure	-	0%
	Critical Fireshed	20	14%
	Sources of Ember Load to Buildings	34	23%
	Little to No Exposure	51	36%
	Water	25	17%
	Total	**144**	**100%**

Source: Southern Wildfire Risk Assessment

Figure D-10 depicts the Functional WUI for Layton. Figure D-11 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts. Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors, is depicted in Figure D-12.

Almost all of the outer edge of the City of Layton is within the Functional WUI and rated with direct exposure to wildfire. The conservation half of the city is within the Function WUI and rated with primarily sources of ember load to buildings and critical fireshded. Where there is a rating for burn probability, mainly in the eastern half of the City, it is low; otherwise, much of the developed portion of the city is without a burn probability rating. There eastern half of the City has moderate characteristic fire intensity, but the developed half of the City has very few areas with any ratings on the characteristic fire intensity scale.

Table D.16 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to wildfire risk on the Functional WUI scale.

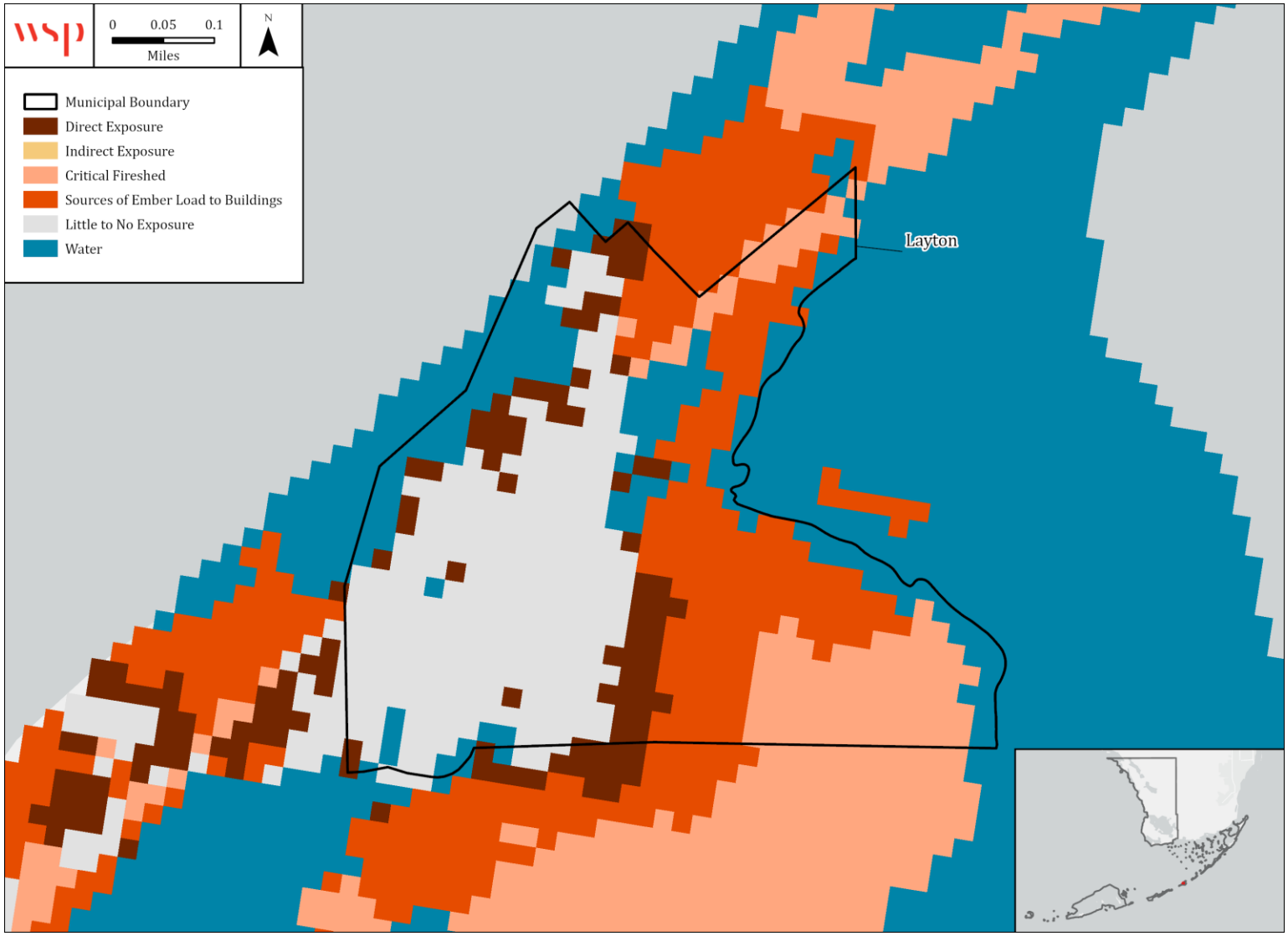
Table D.16 – Critical Facilities Exposed to Wildfire, City of Layton

Type	Critical Facility Count	Structure Value
Communications	0	$0
Energy	0	$0
Food, Hydration, Shelter	0	$0
Hazardous Materials	0	$0
Health and Medical	0	$0
Safety and Security	0	$0
Transportation	0	$0
Water Systems	0	$0

Type	Critical Facility Count	Structure Value
Total	**0**	**$0**

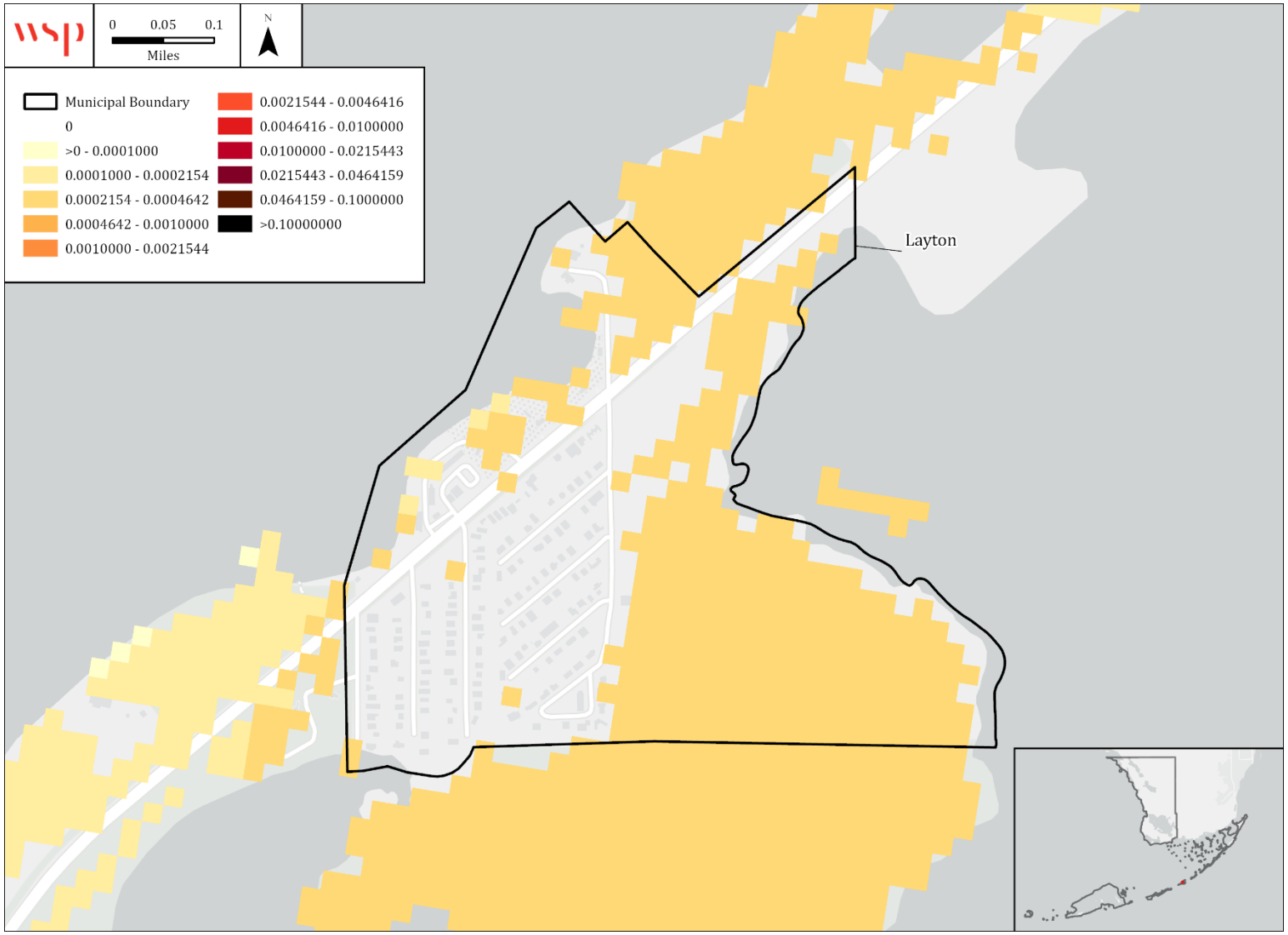
Source: Southern Wildfire Risk Assessment, Monroe County LMS Working Group

Figure D-10 – Functional Wildland Urban Interface, City of Layton



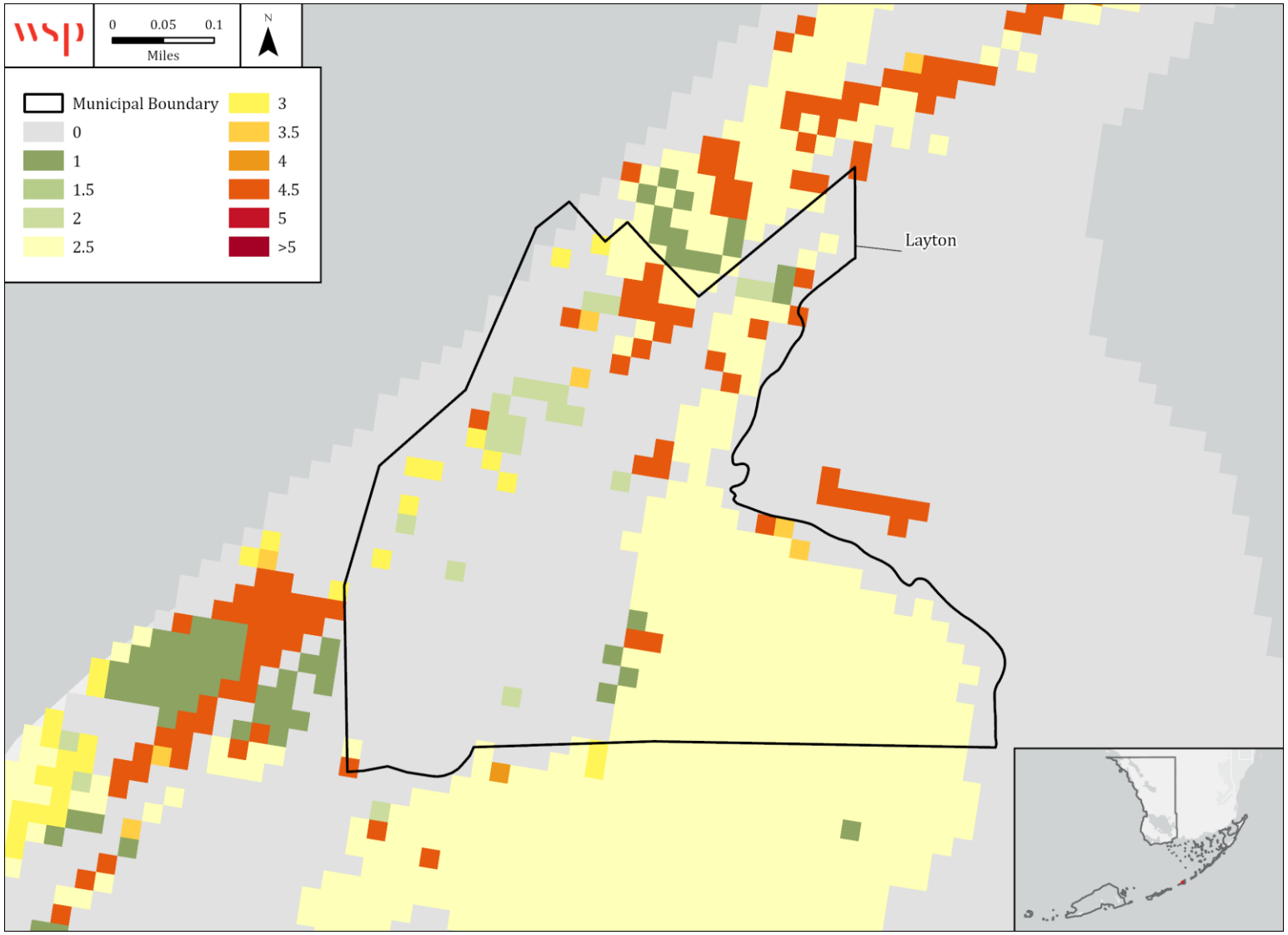
Source: Southern Wildfire Risk Assessment

Figure D-11 – Burn Probability, City of Layton



Source: Southern Wildfire Risk Assessment

Figure D-12 – Potential Fire Intensity, City of Layton



Source: Southern Wildfire Risk Assessment

D.3 MITIGATION STRATEGY

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
1	Monroe County and Municipalities	Support efforts in Monroe County to address the potential negative impacts related to climate change, including sea level rise. Monroe County is the most vulnerable partner that participates in the SE FL Compact with respect to climate change induced sea level increases. Critical resources like the primary source of drinking water as well as homes, businesses, and infrastructure are directly at risk. The LMS should actively support its own Climate Change action plans (Monroe County and Key West) and support the implementation of a Regional Collaborative Climate Action Plan with the neighboring counties through the Southeast Florida Regional Climate Compact to address the impacts of sea level rise and other related climate change impacts	Sea Level Rise	3	H	Prevention	County/Jurisdictional Planning and Engineering Departments	Less than $10,000	Staff Time	2025 - 2030	Carry Forward (Provide Update)	This is an ongoing collaboration. This county and municipalities continue to participate in the SE FL Compact and Climate Change Planning by attending summits and supporting initiatives. This includes incorporating Sea Level Rise projections into this plan.
2	Monroe County and Municipalities	Verify Repetitive Loss Property Data - Monroe County and municipalities that participate in the CRS will verify the repetitive loss property data obtained from FEMA. The NFIP	Flood	1, 2	H	Prevention, Public Education	County/Jurisdictional Floodplain Management	$10,000 to $50,000	Staff Time	2020-2025	Carry Forward (Provide Update)	This action is ongoing in the communities with identified repetitive loss properties. Data verification

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
		maintains records of past flood insurance claims and tracks properties that have received multiple claims. These properties and similarly situated buildings present likely opportunities for mitigation. Verifying the data serves two purposes: it helps the NFIP improve its records, and it helps identify Repetitive Loss Areas. Prepare Repetitive Loss Area Maps - Monroe County and municipalities that prepare Repetitive Loss Area Analyses will identify repetitive loss areas within their jurisdiction using the methods described in FEMA/CRS guidance. Identification of Repetitive Loss Areas helps identify property owners who may be interested in reducing their exposure and working with the communities to seek mitigation funds.										occurs annually and repetitive loss area maps are updated upon request.
3	Monroe County and Municipalities	Elevate Buildings Located within Floodprone Areas	Tropical Cyclones, Flood, Sea Level Rise	2	M	Property Protection	County Emergency Management Department with Jurisdictional Representatives	$5,225,000	HMGP, BRIC, FMA, CDBG-DR	5 years	Carry Forward (Provide Update)	Residential elevation projects are now covered under the Elevate Florida Program. Continue to pursue other elevation projects.

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
4	Monroe County and Municipalities	Wind Retrofit of County Facilities	Severe Storms and Tornadoes, Tropical Cyclones	2	M	Property Protection	Monroe County Public Works	$8,837,280	HMGP, BRIC, HLMP	1 - 5 years	Carry Forward (Provide Update)	On going upgrades to apartments. Final project will be to build new apartment buildings by 2028
5	Monroe County and Municipalities	County-wide Road Elevation and Drainage Improvements (Phase 1 of 2)	Tropical Cyclones, Flood, Sea Level Rise	2	M	Structural Projects	Monroe County Roads and Bridges ; Monroe County Public Works	$367,200,000	HMGP, BRIC, FMA, CDBG-MIT	5 years	Carry Forward (Provide Update)	Road Elevation projects in progress
6	Monroe County and Municipalities	Natural Resources Adaptation Plan	Flood, Sea Level Rise, Tropical Cyclones	2, 3	H	Prevention, Natural Resource Protection	Monroe County Planning and Environmental Resources	$142,000	BRIC, HMPG	3 Years	Carry Forward (Provide Update)	80% complete
7	Monroe County and Municipalities	Engine generators at Water Treatment Plant	All	2	M	Structural Projects	FKAA	$1,500,000	HMGP, BRIC, HLMP, CDBG	1 - 3 years	Carry Forward (Provide Update)	This project is currently in the bidding phase.
8	Monroe County and Municipalities	Hospital Hardening: Evaluate/identify necessary improvements needed to retrofit hospital facilities and perform needed retrofits to mitigate storm damages. Facilities include: Lower Keys Health Systems, De Poo Hospital, Fisherman's Hospital, Mariners' Hospital, Nursing Homes (including Bayshore Manor)	All	2	M	Property Protection	LKMC/Baptist Health/Monroe County	Over $1,000,000	HMGP, BRIC, CDBG-MIT, HLMP	5 - 10 years	Carry Forward (Provide Update)	No progress
9	Monroe County and Municipalities	Marathon Potable Water Pump Station Mitigation	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$3,000,000.00	DEP - Resilient Florida	2 years	New	
10	Monroe County and Municipalities	Decentralized Wastewater Treatment Project	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$450,000.00	DEP - Water Quality Improvements	2 years	New	

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
11	Monroe County and Municipalities	Plantation Key Transmission Main	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$1,750,000.00	DEP - Rep Gimenez Request	2 years	New	
21	Monroe County, Marathon, Islamorada, Key Colony Beach, Layton	Self-Supporting Transmission Poles	All	2	M	Structural Projects	FKEC	$6,000,000	HMGP, BRIC, FMA	1 - 5 years	Carry Forward (Provide Update)	Awaiting FDEM approval
34	Islamorada, Key Colony Beach, Key West, Layton, Marathon	Evaluate protective measures for critical infrastructure and facilities to protect against dynamic hazards including flood, wind, sea level rise, and strong storms. Critical facilities provide services that the whole community depends on for basic functioning. The communities will evaluate the need for protecting critical facilities and infrastructure and address as needed.	All	2	M	Property Protection, Prevention	Jurisdiction Engineering/Public Works	$10,000 to $50,000	Staff Time	1 - 5 years	Carry Forward (Provide Update)	Completed flood protection project - elevated breakwater, protected marina office. Continue to pursue additional projects. Adaptation action Plan is underway and will identify new opportunities.
179	Layton	Become Storm Ready Community	All	1, 3	H	Emergency Services, Public Information & Outreach	Layton Building Department	Less than $10,000	Staff Time	1 - 2 years	Carry Forward (Provide Update)	Not completed and would like to pursue
180	Layton	Add culverts to canals on the East side of the city to improve water flow and water quality	Flood, Tropical Cyclones, Drought, Sea Level Rise	2	M	Structural, Natural Resource Protection	Layton City Council & Building Department	$100,000 to $500,000	HMGP, BRIC, FMA, CDBG-MIT	5 years	Carry Forward (Provide Update)	Watershed Management Plan underway which will inform design of culverts
181	Layton	Partner with Monroe County Fire Rescue to rebuild fire house and administrative offices elevated or flood	Tropical Cyclones, Severe Storms and Tornadoes, Flood, Sea Level Rise	2, 3	M	Property protection	Monroe County Fire Rescue; City of Layton	$500,000 to $1,000,000	HMGP, BRIC,FMA	5-7 years	Carry Forward (Provide Update)	Renderings completed, still a priority

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
		proofed above BFE plus minimum 3' freeboard.										
182	Layton	Develop an Adaptation Action Plan based on the results of the Vulnerability Assessment and the Watershed Management Plan	Flood, Sea Level Rise, Tropical Cyclones, Coastal Erosion	1, 2, 3	M	Prevention	City of Layton	$100,000	FDEP	3 years	New	
183	Layton	Become a CRS Class 4 or better	Flood, Sea Level Rise, Tropical Cyclones	1, 2	M	Prevention	City of Layton	$45,000	Staff Time	3 years	New	
184	Layton	Develop and implement a Stormwater & Roads Plan to provide stormwater infrastructure for the City of Layton based on the results of the Vulnerability Assessment and Watershed Management Plan	Flood, Sea Level Rise, Tropical Cyclones	2, 3	M	Prevention	City of Layton	$100,000	FDEP, HMGP	5-7 years	New	

E CITY OF MARATHON

E.1 ASSET INVENTORY

The City of Marathon and the LMS Working Group provided a local inventory of critical facilities and community lifelines, which are a priority for mitigation planning and emergency management. Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function. Table E.1 provides a count of critical facilities by FEMA lifeline category in the City of Marathon. Figure E-1 shows the locations of all critical facilities in the City of Marathon.

Table E.2 provides a detailed inventory of the critical facilities in the City of Marathon, indicating each facility's FEMA lifeline category, flood zone, 1% annual chance flood depth, sea level rise, storm surge, and wildfire. More information on hazard vulnerability is provided in the hazard profiles.

Table E.1 – Critical Facilities, City of Marathon

Facility Type	Count of Facility Type	Structure Value
Communications	0	$0
Energy	3	$4,700,817
Food, Hydration, Shelter	6	$96,682,422
Hazardous Materials	0	$0
Health and Medical	6	$23,262,174
Safety and Security	22	$56,975,281
Transportation	1	$2,500,387
Water Systems	8	$3,802,861
Total	**46**	**$187,923,941**

Source: LMS Working Group, GIS Analysis

Figure E-1 – Critical Facilities, City of Marathon

Source: LMS Working Group, GIS Analysis

Table E.2 – Critical Facilities Inventory, City of Marathon

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Water Systems	Water	59255 Overseas Highway	$1,704,152.00	5.6	AE	-	SS 100yr	-	0
Safety and Security	Emergency Ops	59265 Overseas Highway	$1,704,152.00	2.5	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	5501-5585 Overseas Highway	$6,478,849.00	4.1	AE	-	SS 100yr	-	0
Transportation	Transportation	9400 Overseas Highway	$2,500,386.73	0.2	AE	-	SS 100yr	-	0
Safety and Security	Emergency Ops	9400 Overseas Highway	$9,104,808.00	2.8	AE	-	SS 100yr	-	0
Safety and Security	Emergency Ops	8900 Overseas Highway	$1,102,471.58	0.0	AE	-	SS 100yr	-	0
Safety and Security	Government	1800 Overseas Highway	$432,452.12	5.4	AE	NOAA 3ft	SS 100yr	-	0
Safety and Security	Emergency Ops	10600 Aviation Boulevard	$5,313,598.00	2.5	AE	-	SS 100yr	-	0
Safety and Security	Government	10600 Aviation Boulevard	$528,899.71	1.0	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	3400 Overseas Highway	$13,765,759.00	0.2	AE	-	SS 500yr	-	0
Energy	Energy	3421 Overseas Highway	$1,021,549.45	0.7	AE	-	SS 100yr	-	0
Safety and Security	Government	3100 Overseas Highway	$1,834,378.00	4.3	AE	-	SS 100yr	-	0
Health and Medical	Health	3301 Overseas Highway	$10,253,238.51	0.0	AE	-	SS 100yr	-	0
Health and Medical	Emergency Ops	3301 Overseas Highway	$10,253,238.51	0.0	AE	-	SS 100yr	-	0
Water Systems	Water	3200 Overseas Highway	$367,654.69	1.9	AE	-	SS 100yr	-	0
Water Systems	Water	3375 Overseas Highway	$283,823.66	3.0	AE	-	SS 100yr	-	0
Safety and Security	Government	2798 Overseas Highway	$2,925,367.77	1.2	AE	-	SS 100yr	-	0
Safety and Security	Government	2788 Overseas Highway	$6,798,116.95	2.9	AE	-	SS 100yr	-	0
Safety and Security	Emergency Ops	2798 Overseas Highway	$2,925,367.77	1.2	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	550 122Nd St - Ocean	$2,108,820.30	1.8	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	550 122Nd Street Ocean	$2,718,526.00	4.7	AE	-	SS 100yr	-	0
Safety and Security	Government	503 107Th Street	$6,071,438.95	0.4	AE	-	SS 100yr	-	0
Safety and Security	Emergency Ops	3299 Overseas Highway	$396,059.98	2.4	AE	-	SS 100yr	-	0
Safety and Security	Government	3251 Overseas Highway	$288,705.00	2.2	AE	-	SS 100yr	-	0
Energy	Government	3101 Overseas Highway	$3,062,780.22	1.0	AE	-	SS 100yr	-	0
Safety and Security	Government	3101 Overseas Highway	$3,062,780.22	1.5	AE	-	SS 100yr	-	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	Emergency Ops	1 Knights Key Boulevard	$53,869,991.00	5.6	AE	-	SS 100yr	-	0
Health and Medical	Health	320 Sombrero Beach Road	-	8.0	AE	NOAA 3ft	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	350 Sombrero Beach Road	$17,740,476.30	0.0	AE	-	SS 100yr	-	0
Health and Medical	Emergency Ops	56633 Overseas Highway	$1,548,250.00	0.7	AE	-	SS 100yr	-	0
Safety and Security	Government	56633 Overseas Hwy	$1,548,250.00	4.8	AE	NIH	SS 100yr	Direct Exposure	4.5
Safety and Security	Government	3981 Ocean Ter	$992,208.00	1.4	AE	-	SS 100yr	-	0
Safety and Security	Government		$23,706.00	0.0	AE	-	SS 100yr	-	0
Water Systems	Water	4095 Overseas Highway	$315,105.00	3.8	AE	-	SS 100yr	-	0
Safety and Security	Government	3103 OVERSEAS HIGHWAY	$3,062,780.22	2.4	AE	-	SS 100yr	-	0
Safety and Security	Government	3380 OVERSEAS HIGHWAY	$706,010.00	0.0	AE	-	SS 100yr	-	0
Safety and Security	Emergency Ops	490 63rd Street Ocean East	$209,951.00	6.0	AE	NOAA 3ft	SS 100yr	-	0
Health and Medical	Emergency Ops	8900 OVERSEAS HIGHWAY	$1,102,471.58	0.0	AE	-	SS 100yr	-	0
Health and Medical	Emergency Ops	490 63RD STREET OCEAN EAST	$209,951.00	5.9	AE	NIH	SS 100yr	-	0
Safety and Security	Emergency Ops	2798 OVERSEAS HIGHWAY	$6,798,116.95	3.3	AE	-	SS 100yr	-	0
Safety and Security	Emergency Ops	490 63RD STREET OCEAN	$1,250,638.00	3.1	AE	-	SS 100yr	-	0
Energy	Energy	56631 Overseas Hwy, Marathon, FL 33050	$105,713.00	4.7	AE	NIH	SS 100yr	-	0
Water Systems	Waste	10685 Overseas Hwy	$90,892.09	4.2	AE	-	SS 100yr	-	0
Water Systems	Waste	100 Avenue I	$118,015.00	4.6	AE	NIL	SS 100yr	Direct Exposure	1
Water Systems	Waste	140 Sombrero Beach Rd	$324,448.00	1.7	AE	-	SS 100yr	-	0
Water Systems	Waste	7280 Overseas Hwy	$273,031.00	1.2	AE	-	SS 100yr	-	0

E.2 RISK ASSESSMENT

This section contains a summary of the City of Marathon's asset inventory as well as hazard profile and vulnerability assessment for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Flood, Sea Level Rise, Storm Surge, and Wildfire.

E.2.1 FLOOD

Table E.3 details the acreage of Marathon's total area by flood zone on the effective DFIRM; it also shows a comparison to the preliminary DFIRM released in December 2019. 100 percent of Marathon falls within the mapped 1%-annual-chance floodplains; this would drop to 99.6 percent on the 2019 preliminary maps. The data in this risk assessment is based off FEMA's 2005 DFIRM. Figure E-2 reflects the effective mapped flood hazard zones for Marathon while Figure E-3 displays the 2019 preliminary map.

Table E.3 – Flood Zone Acreage in Marathon

Flood Zone	Effective DFIRM (2005)		Preliminary DFIRM (2019)		Change from Effective (acres)
	Acreage	Percent of Total (%)	Acreage	Percent of Total (%)	
AE	4,857.5	87.6%	4,664.8	84.1%	-192.7
VE	686.9	12.4%	860.3	15.5%	173.4
AO	0.0	0.0%	0.0	0.0%	0.0
0.2% Annual Chance Flood Hazard	0.3	0.0%	18.4	0.3%	18.1
Unshaded X	0.0	0.0%	1.3	0.0%	1.3
Open Water	0.0	0.0%	0.0	0.0%	0.0
Total	5,544.7	100.0%	5,544.7	100.0%	0.0
SFHA Total	**5,544.4**	**100.0%**	**5,525.1**	**99.6%**	**-19.3**

Source: FEMA Effective DFIRM

Note: The differences between the effective FIRM and the preliminary FIRM are significant will likely still change. These details are provided here only as a comparison – all further flood analysis is based in the 2005 Effective DFIRM.

Table E.4 and Table E.5 provide building counts and estimated damages by occupancy type for the 1% annual chance flood event using both the effective and preliminary DFIRM. Figure E-4 and Figure E-5 display the effective and preliminary depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

Table E.4 – Estimated Building Damage and Content Loss, 1% Annual Chance Flood Effective DFIRM, City of Marathon

Occupancy Type	Total Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Agriculture	0	$0	$0	$0	$0	0%
Commercial	758	$869,428,472	$29,487,582	$100,851,165	$130,338,747	15%
Educational	12	$5,922,994	$230,417	$1,475,593	$1,706,010	29%
Government	124	$259,360,140	$526,201	$3,303,194	$3,829,394	1%
Industrial	118	$61,538,466	$1,067,323	$3,263,081	$4,330,404	7%
Religious	25	$20,601,826	$114,051	$732,345	$846,396	4%
Residential	5,151	$2,727,540,614	$489,333,939	$242,928,441	$732,262,380	27%
Total	**6,188**	**$3,944,392,514**	**$520,759,513**	**$352,553,818**	**$873,313,331**	**22%**

Source: HAZUS, FEMA Effective DFIRM

Table E.5 – Estimated Building Damage and Content Loss, 1% Annual Chance Flood Preliminary DFIRM, City of Marathon

Occupancy Type	Total Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Agriculture	0	$0	$0	$0	$0	0%
Commercial	758	$869,428,472	$34,578,072	$118,673,109	$153,251,181	18%
Educational	12	$5,922,994	$229,001	$1,474,146	$1,703,146	29%
Government	124	$259,360,140	$1,014,307	$6,277,122	$7,291,429	3%
Industrial	118	$61,538,466	$1,400,440	$4,342,163	$5,742,603	9%
Religious	25	$20,601,826	$137,610	$1,112,229	$1,249,839	6%
Residential	5,079	$2,680,775,404	$639,200,660	$318,045,297	$957,245,957	36%
Total	**6,116**	**$3,897,627,303**	**$676,560,090**	**$449,924,066**	**$1,126,484,156**	**29%**

Source: HAZUS, FEMA Preliminary

Table E.6 provides building counts and values for critical facilities by flood zone in the City of Marathon.

Table E.6 – Critical Facilities Exposed to Flooding, City of Marathon

Flood Zone	Critical Facility Count	Structure Value
Zone AE	46	$187,297,378.29
Zone X (500-year)	0	$0
Zone X Unshaded	0	$0
Total	**46**	**$187,297,378.29**

Source: FEMA Effective DFIRM, LMS Working Group

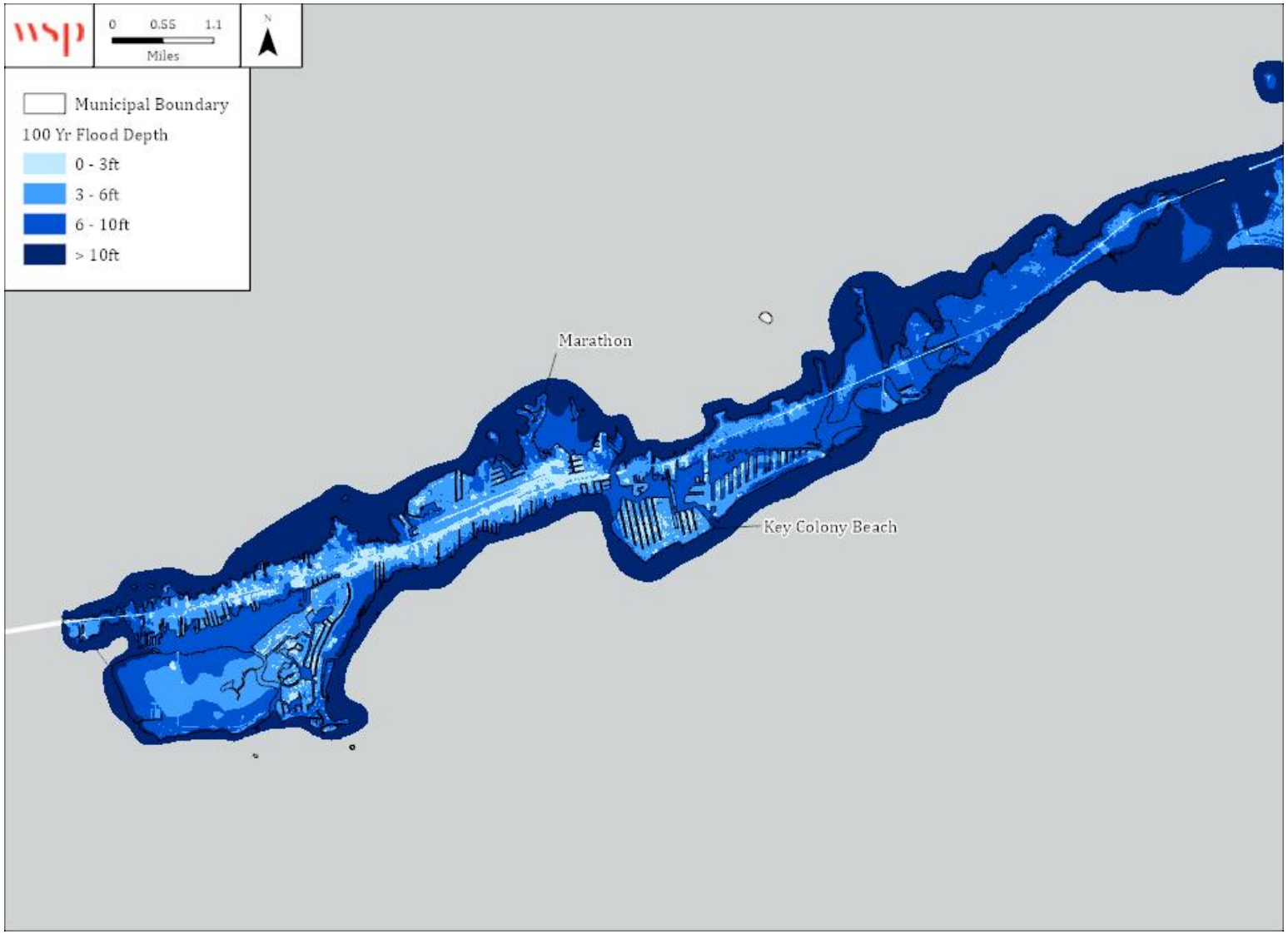
Figure E-2 – FEMA Flood Hazard Areas, Effective DFIRM, City of Marathon

Source: FEMA Effective DFIRM

Figure E-3 – FEMA Flood Hazard Areas, Preliminary DFIRM, City of Marathon

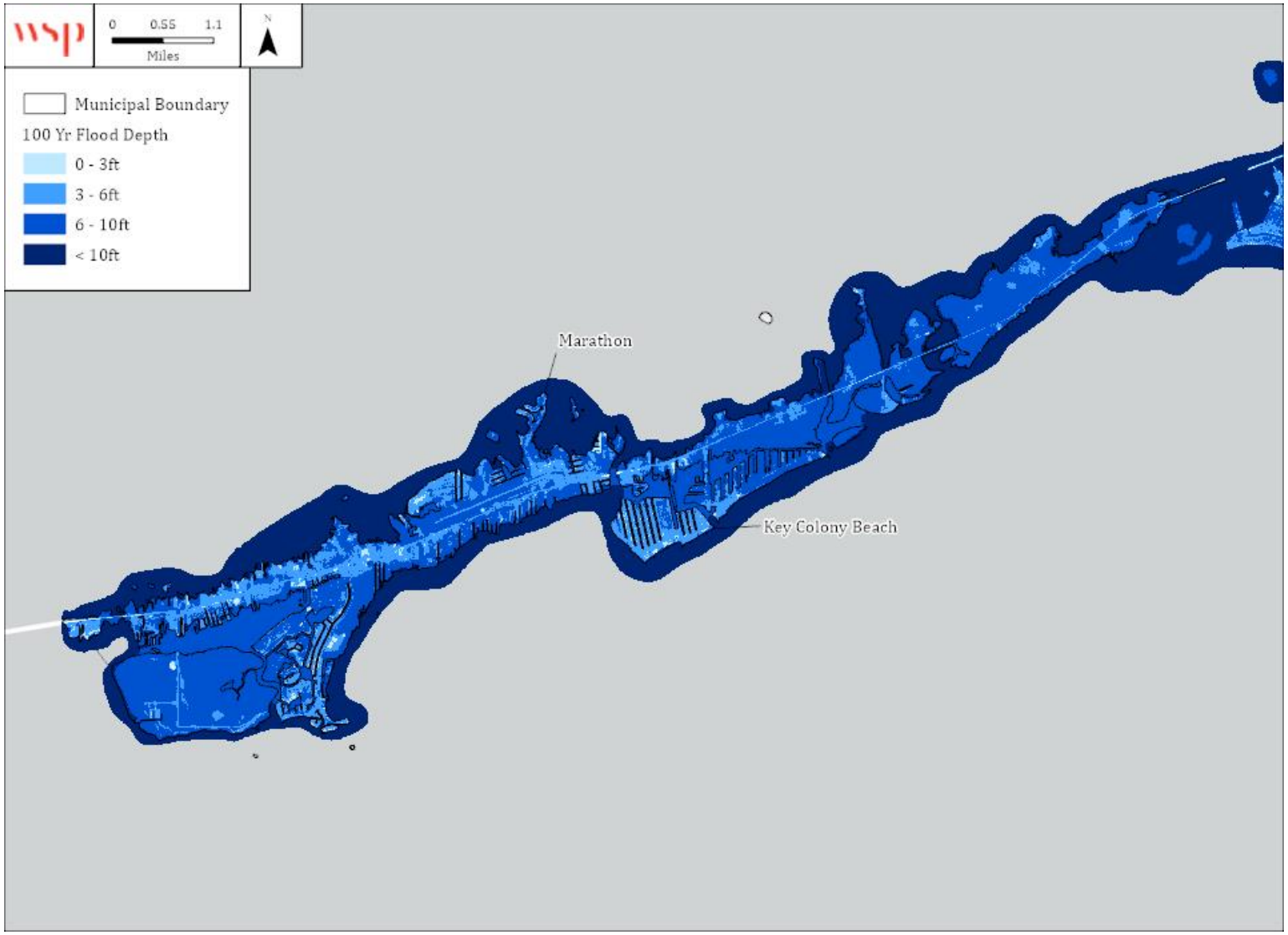
Source: FEMA Preliminary DFIRM

Figure E-4 – Flood Depth, 1%-Annual Chance Floodplain Effective DFIRM, City of Marathon



Source: FEMA Effective DFIRM

Figure E-5 – Flood Depth, 1%-Annual Chance Floodplain Preliminary DFIRM, City of Marathon



Source: FEMA Preliminary DFIRM

FLOODPLAIN MANAGEMENT

The City of Marathon joined the NFIP through regular entry in October 2000. The City is a participant in the Community Rating System and is a Class 6 community. The following tables reflect NFIP policy and claims data for the City categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table E.7 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	1,623	$2,903,588	$450,686,000	1,957	$68,393,049.00
2-4 Family	167	$271,460	$42,503,000	266	$12,136,739.03
All Other Residential	735	$653,254	$159,348,000	143	$13,864,399.33
Non-Residential	238	$1,110,114	$105,717,000	359	$18,332,687.28
Total	**2,763**	**$4,938,416**	**$758,254,000**	**2,725**	**$112,726,874.64**

Source: FEMA Community Information System, accessed May 2025

Table E.8 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	2,666	$4,525,798	$733,221,000	2,566	$104,796,731.64
V01-30 & VE Zones	96	$411,123	$24,783,000	159	$7,930,143.00
B, C & X Zone					
Standard	1	$1,495	$250,000	0	$0.00
Total	**2,763**	**$4,938,416**	**$758,254,000**	**2,725**	**$112,726,874.64**

Source: FEMA Community Information System, accessed May 2025

Table E.9 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	1,103	$2,788,627	$264,900,000	1,654	$94,297,144.12
V01-30 & VE Zones	42	$196,128	$10,537,000	109	$7,070,900.18
Total	**1,145**	**$2,984,755**	**$275,437,000**	**1,763**	**$101,368,044.30**

Source: FEMA Community Information System, accessed May 2025

Table E.10 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	1,563	$1,737,171	$468,321,000	912	$10,499,587.52
V01-30 & VE Zones	54	$214,995	$14,246,000	50	$859,242.82

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
B, C & X Zone	1	$1,495	$250,000	0	$0.00
Standard	1	$1,495	$250,000	0	$0.00
Total	**1,618**	**$1,953,661**	**$482,817,000**	**962**	**$11,358,830.34**

Source: FEMA Community Information System, accessed May 2025

CONTINUED NFIP COMPLIANCE

The City entered the NFIP when it incorporated in 2000 by adoption of an ordinance that complies with the requirement of the program. To continue compliance with the NFIP, the City will:

- Enforce the adopted floodplain management ordinance, including reviewing all development proposals in any flood hazard area and enforcing the requirements of the ordinance, and inspecting both permitted development and unpermitted activities;
- Maintain records pertaining to floodplain development, including flood maps and Letters of Map Change, which shall be available for public inspection;
- Notify the public when there are proposed changes to the ordinance or FIRMs;
- Implement activities recognized by the NFIPs; and
- Promote the purchase of NFIP flood insurance policies as financial protection;

E.2.2 SEA LEVEL RISE

Table E.11 details the number of all buildings affected by sea level rise in the City of Marathon following the NOAA sea level rise projections of intermediate low and intermediate high scenarios.

Table E.11 – All Buildings Affected by Sea Level Rise, City of Marathon

Occupancy	Estimated Building Count	Structure Value	Estimated Content Value	Total Value
2040 NIL	**2,725**	**1,041,764,486**	**602,575,349**	**1,413,372,770**
Agriculture	0	$0	$0	$0
Commercial	254	$137,211,467	$137,211,467	$243,893,516
Education	2	$421,401	$421,401	$842,802
Government	27	$15,228,649	$15,228,649	$30,457,297
Industrial	22	$4,319,827	$6,479,741	$10,799,569
Religious	6	$1,885,040	$1,885,040	$3,770,080
Residential	2414	$882,698,102	$441,349,051	$1,123,609,506
2040 NIH	**3,859**	**1,449,731,265**	**859,486,387**	**1,965,590,897**
Agriculture	0	$0	$0	$0
Commercial	358	$181,892,197	$181,892,197	$324,704,952
Education	7	$2,241,358	$2,241,358	$2,047,110
Government	58	$66,098,197	$66,098,197	$132,196,395
Industrial	35	$6,819,033	$10,228,550	$16,868,760
Religious	10	$5,371,690	$5,371,690	$10,743,381
Residential	3391	$1,187,308,789	$593,654,395	$1,479,030,299

Source: HAZUS, NOAA, Monroe County Parcel Data

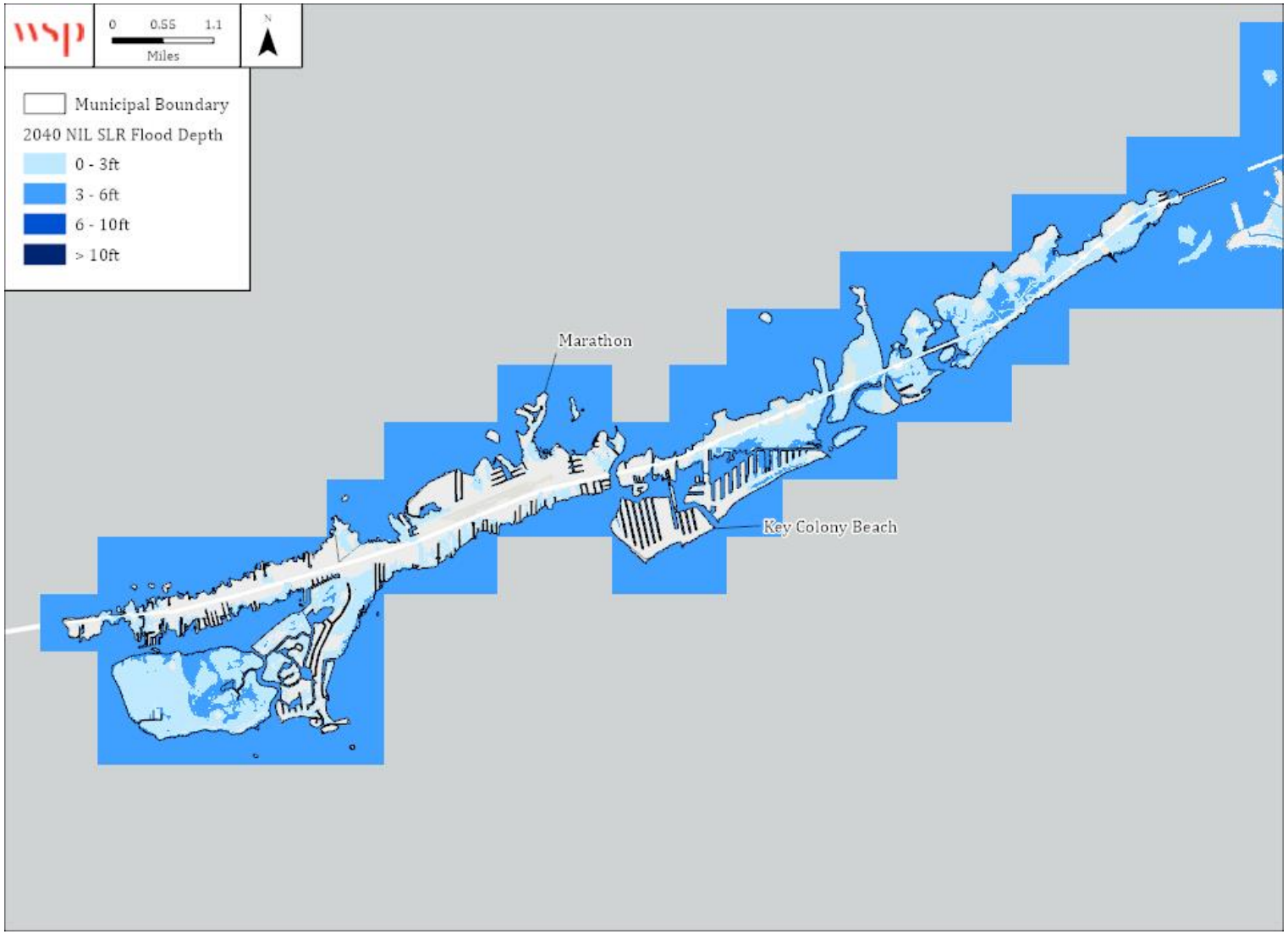
Figure E-6 and Figure E-7 display NOAA 2040 intermediate low and high sea level rise scenarios for the City of Marathon. Table E.12 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to sea level rise based on NOAA intermediate low and high scenarios.

Table E.12 – Critical Facilities Exposed to Sea Level Rise, City of Marathon

Highest Level of SLR	Critical Facility Count	Structure Value
2040 NIL	1	$118,015.00
NOAA 3ft	3	$642,403.12
2040 NIH	3	$1,863,914.00
Total	**7**	**$2,624,332.12**

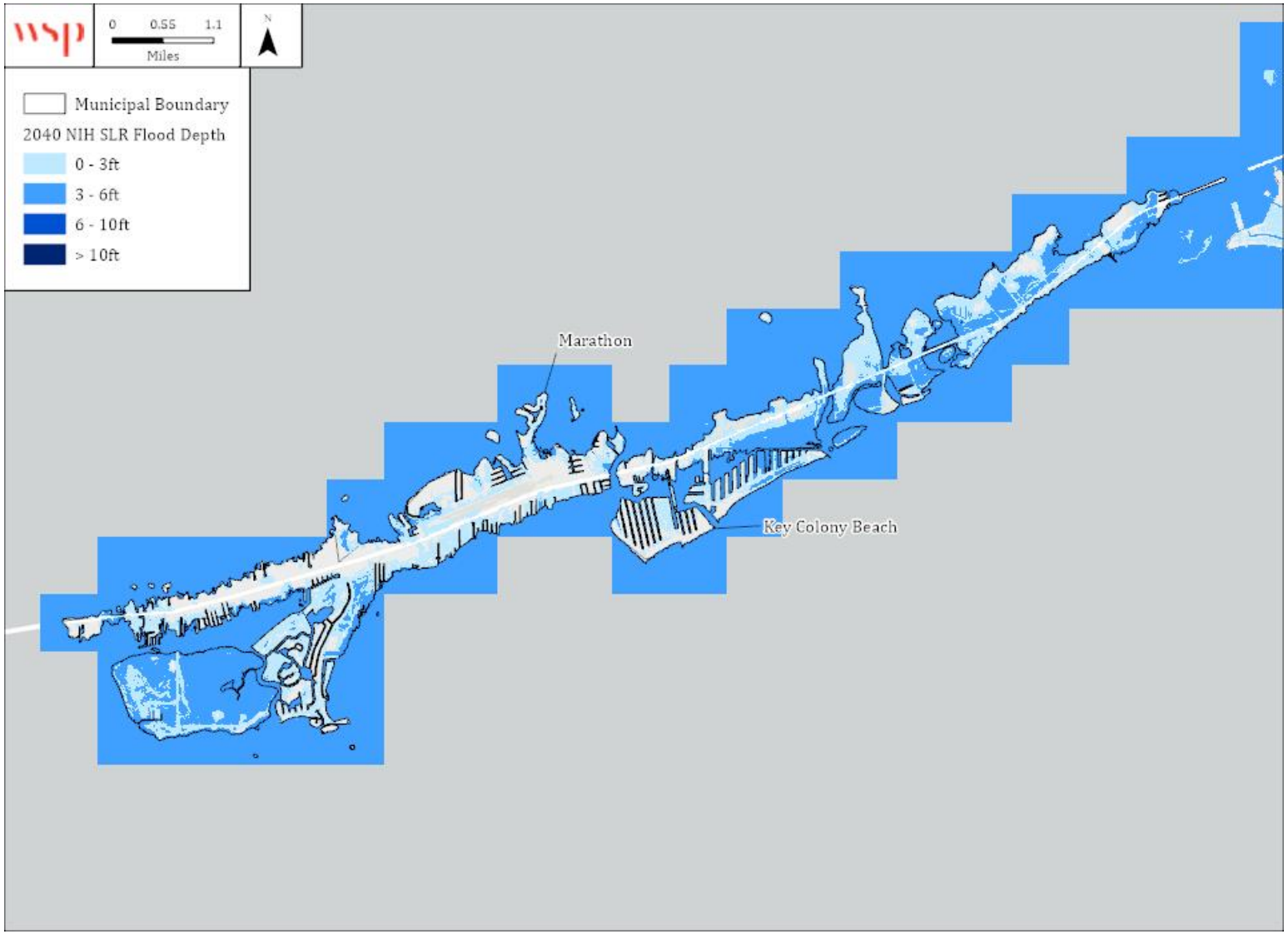
Source: NOAA, Monroe County LMS Working Group

Figure E-6 – NOAA 2040 Intermediate Low Sea Level Rise Scenario, City of Marathon



Source: NOAA 2040 NIL, Monroe County Parcel Data

Figure E-7 – NOAA 2040 Intermediate High Sea Level Rise Scenario, City of Marathon



Source: NOAA 2040 NIH, Monroe County Parcel Data

E.2.3 STORM SURGE

Table E.13 summarizes the number of buildings in the City of Marathon that will be impacted by 100-yr and 500-yr storm surge events. Figure E-8 shows potential storm surge inundation for a 100-yr storm surge event and Figure E-9 shows inundation for the 500-yr storm surge event.

Table E.13 – Storm Surge Exposure by 100-yr and 500-yr Event, City of Marathon

Occupancy	Estimated Building Count	Structure Value	Estimated Content Value	Total Value
100yr	**5,989**	**$2,354,625,316**	**$1,490,267,792**	**$3,844,893,108**
Agriculture	0	$0	$0	$0
Commercial	756	$434,226,459	$434,226,459	$868,452,918
Education	12	$2,961,497	$2,961,497	$5,922,994
Government	122	$129,190,625	$129,190,625	$258,381,250
Industrial	118	$24,615,386	$36,923,080	$61,538,466
Religious	25	$10,300,913	$10,300,913	$20,601,826
Residential	4,956	$1,753,330,435	$876,665,217	$2,629,995,652
500yr	**5,991**	**$2,355,113,093**	**$1,490,755,569**	**$3,845,868,662**
Agriculture	0	$0	$0	$0
Commercial	758	$434,714,236	$434,714,236	$869,428,472
Education	12	$2,961,497	$2,961,497	$5,922,994
Government	122	$129,190,625	$129,190,625	$258,381,250
Industrial	118	$24,615,386	$36,923,080	$61,538,466
Religious	25	$10,300,913	$10,300,913	$20,601,826
Residential	4,956	$1,753,330,435	$876,665,217	$2,629,995,652

Source: FEMA, NOAA, Monroe County Parcels

Table E.14 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to storm surge based on 100 and 500-year storm surge events.

Table E.14 – Critical Facilities Exposed to Storm Surge, City of Marathon

Storm Surge Category	Critical Facility Count	Structure Value
100-Year	45	$173,531,619.29
500-Year	1	$13,765,759.00
Total	**46**	**$187,297,378.29**

Source: FEMA, NOAA, Monroe County LMS Working Group

Figure E-8 – 100-Year Storm Surge Event Inundation, City of Marathon

Source: NOAA

Figure E-9 – 500-Year Storm Surge Event Inundation, City of Marathon

Source: NOAA

E.2.4 WILDFIRE

Table E.15 summarizes the acreage in the City of Marathon that falls within the Functional Wildland Urban Interface (WUI), categorized into zones that describe the wildfire risk mitigation activities appropriate for each zone. Areas in the Functional WUI are those areas where development and building structures may intermix with burnable land cover. Approximately, 9 percent of the City of Marathon is categorized as having direct exposure to wildfire risk within the Functional WUI.

Table E.15 – Functional Wildland Urban Interface, City of Marathon

	Functional Wildland Urban Interface (WUI) Category	Acres	Percent
	Direct Exposure	507	9%
	Indirect Exposure		0%
	Critical Fireshed	1,803	33%
	Sources of Ember Load to Buildings	697	13%
	Little to No Exposure	2,124	39%
	Water	265	5%
	Total	**5,397**	**100%**

Source: Southern Wildfire Risk Assessment

Figure E-10 depicts the Functional WUI for Marathon. Figure E-11 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts. Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors, is depicted in Figure E-12.

Much of the City of Marathon is within the Functional WUI; small areas of direct exposure are found along the outer edge of the City with larger groups of critical fire shed being found on Fat Deer Key, Long Point Key, and Boot Key. Where there is a rating for burn probability, scattered throughout the City, it is low; however, there are some larger groupings of moderate to high burn probability located on the eastern and western sides of the City. There are small areas of higher characteristic fire intensity particularly in northeastern Marathon, but large swaths of the City are not rated on the characteristic fire intensity scale. Areas outside of the Functional WUI are the largest areas rated for characteristic fire intensity.

Table E.16 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to wildfire risk on the Functional WUI scale.

Table E.16 – Critical Facilities Exposed to Wildfire, City of Marathon

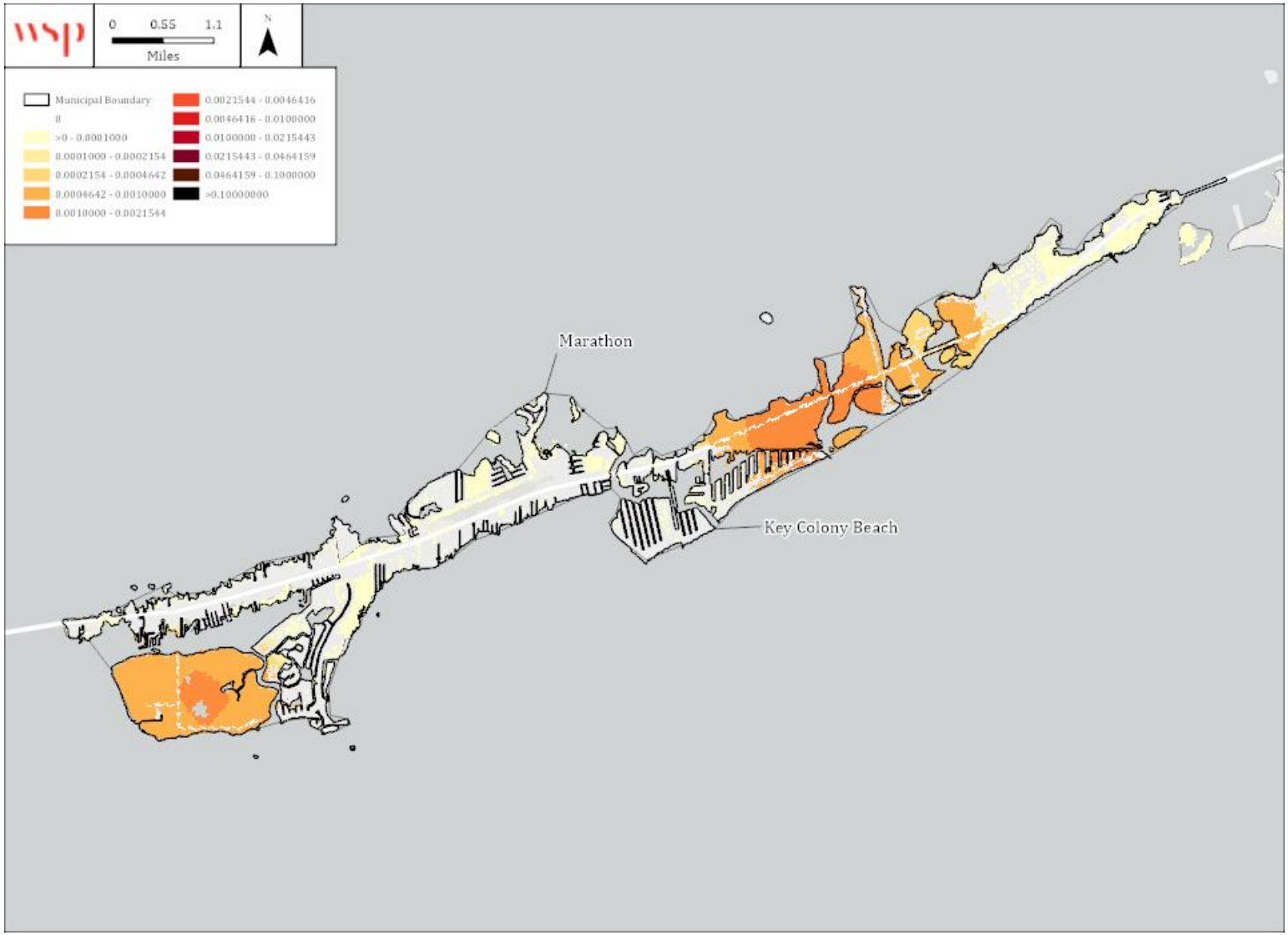
Type	Critical Facility Count	Structure Value
Communications	0	$0
Energy	0	$0
Food, Hydration, Shelter	0	$0
Hazardous Materials	0	$0
Health and Medical	0	$0
Safety and Security	1	$1,548,250.00
Transportation	0	$0
Water Systems	1	$118,015.00
Total	**2**	**$1,666,265.00**

Source: Southern Wildfire Risk Assessment, Monroe County LMS Working Group

Figure E-10 – Functional Wildland Urban Interface, City of Marathon

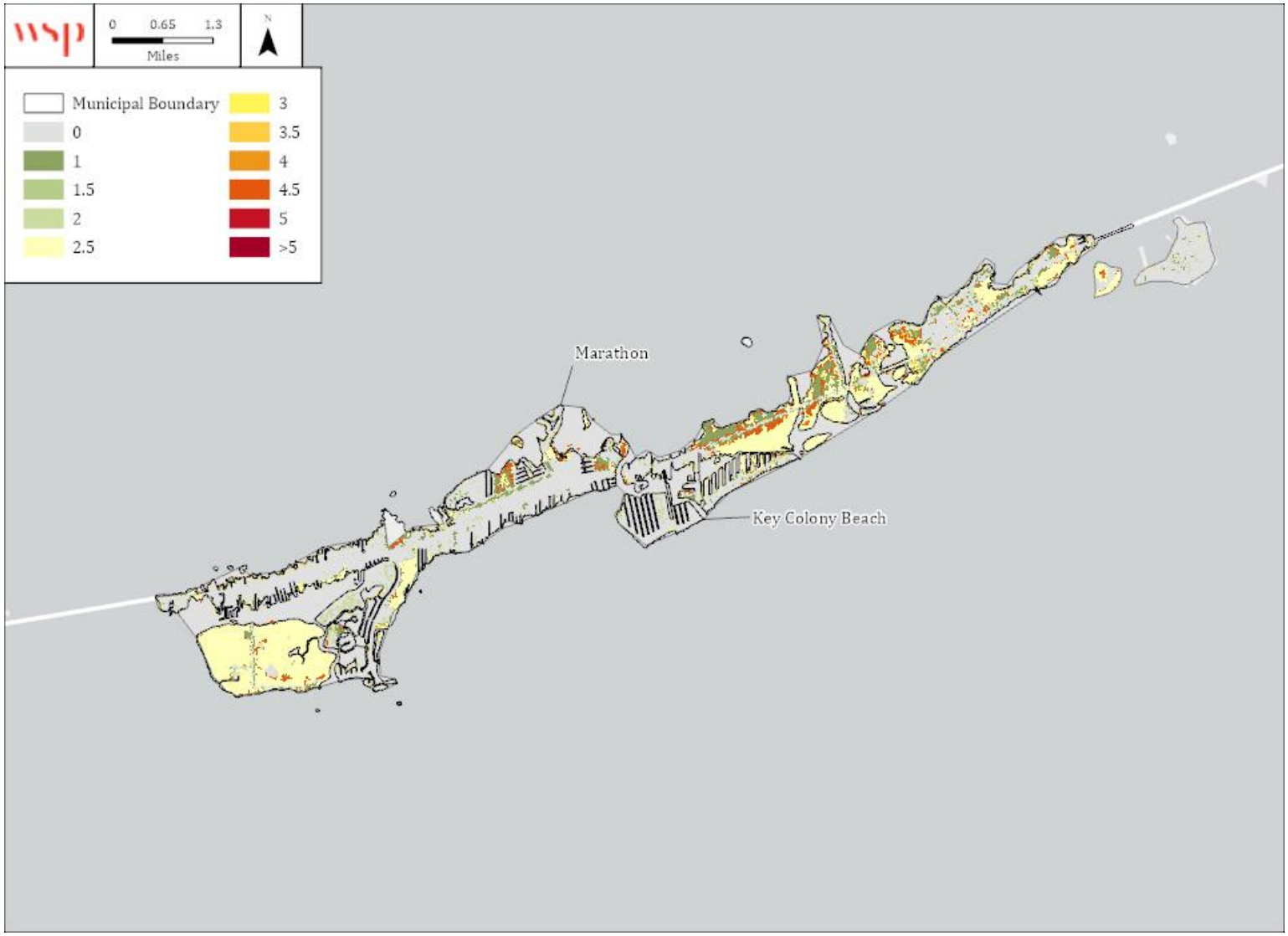
Source: Southern Wildfire Risk Assessment

Figure E-11 – Burn Probability, City of Marathon



Source: Southern Wildfire Risk Assessment

Figure E-12 – Potential Fire Intensity, City of Marathon



Source: Southern Wildfire Risk Assessment

E.3 MITIGATION STRATEGY

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
1	Monroe County and Municipalities	Support efforts in Monroe County to address the potential negative impacts related to climate change, including sea level rise. Monroe County is the most vulnerable partner that participates in the SE FL Compact with respect to climate change induced sea level increases. Critical resources like the primary source of drinking water as well as homes, businesses, and infrastructure are directly at risk. The LMS should actively support its own Climate Change action plans (Monroe County and Key West) and support the implementation of a Regional Collaborative Climate Action Plan with the neighboring counties through the Southeast Florida Regional Climate Compact to address the impacts of sea level rise and other related climate change impacts	Sea Level Rise	3	H	Prevention	County/Jurisdictional Planning and Engineering Departments	Less than $10,000	Staff Time	2025 - 2030	Carry Forward (Provide Update)	This is an ongoing collaboration. This county and municipalities continue to participate in the SE FL Compact and Climate Change Planning by attending summits and supporting initiatives. This includes incorporating Sea Level Rise projections into this plan.
2	Monroe County and Municipalities	Verify Repetitive Loss Property Data - Monroe County and municipalities that participate in the CRS will verify the repetitive loss property data obtained from FEMA. The NFIP maintains records of past flood insurance claims and tracks properties that have	Flood	1, 2	H	Prevention, Public Education	County/Jurisdictional Floodplain Management	$10,000 to $50,000	Staff Time	2020-2025	Carry Forward (Provide Update)	This action is ongoing in the communities with identified repetitive loss properties. Data verification occurs annually and repetitive

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
		received multiple claims. These properties and similarly situated buildings present likely opportunities for mitigation. Verifying the data serves two purposes: it helps the NFIP improve its records, and it helps identify Repetitive Loss Areas. Prepare Repetitive Loss Area Maps - Monroe County and municipalities that prepare Repetitive Loss Area Analyses will identify repetitive loss areas within their jurisdiction using the methods described in FEMA/CRS guidance. Identification of Repetitive Loss Areas helps identify property owners who may be interested in reducing their exposure and working with the communities to seek mitigation funds.										loss area maps are updated upon request.
3	Monroe County and Municipalities	Elevate Buildings Located within Floodprone Areas	Tropical Cyclones, Flood, Sea Level Rise	2	M	Property Protection	County Emergency Management Department with Jurisdictional Representatives	$5,225,000	HMGP, BRIC, FMA, CDBG-DR	5 years	Carry Forward (Provide Update)	Residential elevation projects are now covered under the Elevate Florida Program. Continue to pursue other elevation projects.
4	Monroe County and Municipalities	Wind Retrofit of County Facilities	Severe Storms and Tornadoes, Tropical Cyclones	2	M	Property Protection	Monroe County Public Works	$8,837,280	HMGP, BRIC, HLMP	1 - 5 years	Carry Forward (Provide Update)	On going upgrades to apartments. Final project will be to build new apartment buildings by 2028

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
5	Monroe County and Municipalities	County-wide Road Elevation and Drainage Improvements (Phase 1 of 2)	Tropical Cyclones, Flood, Sea Level Rise	2	M	Structural Projects	Monroe County Roads and Bridges ; Monroe County Public Works	$367,200,000	HMGP, BRIC, FMA, CDBG-MIT	5 years	Carry Forward (Provide Update)	Road Elevation projects in progress
6	Monroe County and Municipalities	Natural Resources Adaptation Plan	Flood, Sea Level Rise, Tropical Cyclones	2, 3	H	Prevention, Natural Resource Protection	Monroe County Planning and Environmental Resources	$142,000	BRIC, HMPG	3 Years	Carry Forward (Provide Update)	80% complete
7	Monroe County and Municipalities	Engine generators at Water Treatment Plant	All	2	M	Structural Projects	FKAA	$1,500,000	HMGP, BRIC, HLMP, CDBG	1 - 3 years	Carry Forward (Provide Update)	This project is currently in the bidding phase.
8	Monroe County and Municipalities	Hospital Hardening: Evaluate/identify necessary improvements needed to retrofit hospital facilities and perform needed retrofits to mitigate storm damages. Facilities include: Lower Keys Health Systems, De Poo Hospital, Fisherman's Hospital, Mariners' Hospital, Nursing Homes (including Bayshore Manor)	All	2	M	Property Protection	LKMC/Baptist Health/Monroe County	Over $1,000,000	HMGP, BRIC, CDBG-MIT, HLMP	5 - 10 years	Carry Forward (Provide Update)	No progress
9	Monroe County and Municipalities	Marathon Potable Water Pump Station Mitigation	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$3,000,000.00	DEP - Resilient Florida	2 years	New	
10	Monroe County and Municipalities	Decentralized Wastewater Treatment Project	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$450,000.00	DEP - Water Quality Improvements	2 years	New	
11	Monroe County and Municipalities	Plantation Key Transmission Main	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$1,750,000.00	DEP - Rep Gimenez Request	2 years	New	
21	Monroe County, Marathon, Islamorada, Key Colony Beach, Layton	Self-Supporting Transmission Poles	All	2	M	Structural Projects	FKEC	$6,000,000	HMGP, BRIC, FMA	1 - 5 years	Carry Forward (Provide Update)	Awaiting FDEM approval

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
34	Islamorada, Key Colony Beach, Key West, Layton, Marathon	Evaluate protective measures for critical infrastructure and facilities to protect against dynamic hazards including flood, wind, sea level rise, and strong storms. Critical facilities provide services that the whole community depends on for basic functioning. The communities will evaluate the need for protecting critical facilities and infrastructure and address as needed.	All	2	M	Property Protection, Prevention	Jurisdiction Engineering/Public Works	$10,000 to $50,000	Staff Time	1 - 5 years	Carry Forward (Provide Update)	Completed flood protection project - elevated breakwater, protected marina office. Continue to pursue additional projects. Adaptation action Plan is underway and will identify new opportunities.
185	Marathon	City-wide communications network	All	3	M	Emergency Services	Marathon Fire Rescue; Marathon Administration	$150,000	BRIC, HMGP	2025	Carried Forward	No progress has been made on this action to date.
186	Marathon	Critical Facility Hardening	All	2	H	Structural Projects	Marathon Public Works	$290,000	HGMP, BRIC, CDBG-DR, CDBG-MIT	2024	Carried Forward	Partial Progress; Further hardening work remains
187	Marathon	Emergency Generators and Fuel Trailers for Critical Facilities	All	2, 3	H	Property Protection	Marathon Public Works	$175,000	HMGP, BRIC	2023	Carried Forward	Generators project installation have been completed for both the City Marina and Fire Station 14. Will pursue upgrades for other facilities
188	Marathon	Marathon Coastal Hardening and Resiliency	Tropical Cyclones, Flood, Sea Level Rise, Coastal Erosion	2, 3	H	Structural Projects	Marathon Public Works; Marathon Planning	$1,200,000	HMGP, BRIC, FMA	2024	Carried Forward	92nd Street Road elevation. Grant has been awarded for design, and are in the process of negotiations with selected consultant.

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
												Projected to begin in 2026. Completion of Coco Plum Beach Area Adaptation Action Plan completed in 4-15-21
189	Marathon	Wastewater Treatment Facilities and Area 6 Flood Wall	All	2	H	Structural Projects	Marathon Utilities	$3,155,528	HMGP, BRIC, FMA, CDBG-MIT	2023	Carried Forward	Engineering completed and submitted for external agency permitting. Still awaiting permit approval from FDEP. Marathon Area 3 WWTP expansion has been delayed due to FDEP permitting.

F ISLAMORADA VILLAGE OF ISLANDS

F.1 ASSET INVENTORY

The Islamorada Village of Islands and the LMS Working Group provided a local inventory of critical facilities and community lifelines, which are a priority for mitigation planning and emergency management. Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function. Table F.1 provides a count of critical facilities by FEMA lifeline category in the Islamorada Village of Islands. Figure F-1 shows the locations of all critical facilities in Islamorada.

Table F.2 provides a detailed inventory of the critical facilities in Islamorada, indicating each facility's FEMA lifeline category, flood zone, 1% annual chance flood depth, sea level rise, storm surge, and wildfire. More information on hazard vulnerability is provided in the hazard profiles.

Table F.1 – Critical Facilities, Islamorada Village of Islands

Facility Type	Count of Facility Type	Structure Value
Communications	0	$0
Energy	2	$17,839,784
Food, Hydration, Shelter	8	$89,810,667
Hazardous Materials	0	$0
Health and Medical	3	$1,877,977
Safety and Security	12	$57,334,259
Transportation	0	$0
Water Systems	7	$ 2,086,707
Total	**32**	**$ 169,899,327**

Source: LMS Working Group, GIS Analysis

Figure F-1 – Critical Facilities, Islamorada Village of Islands

Source: LMS Working Group, GIS Analysis

Table F.2 – Critical Facilities Inventory, Islamorada Village of Islands

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Safety and Security	Emergency Ops	82100 Overseas Highway	$20,857,424.00	5.4	AE	NOAA 3ft	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	Plantation Yacht Harbor	$1,613,267.00	7.5	AE	NIL	SS 100yr	-	0
Safety and Security	Emergency Ops	86800 Overseas Highway	$3,314,699.00	-	X (Unshaded)	-	SS 500yr	-	2
Food, Hydration, Shelter	Emergency Ops	89951 Overseas Highway	$34,533,314.72	-	X (Unshaded)	-	-	-	0
Energy	Energy	80571 Old Highway	$41,842.00	0.0	AE	-	SS 500yr	-	0
Food, Hydration, Shelter	Emergency Ops	83400 Overseas Highway	$4,186,011.00	3.5	AE	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	83400 Overseas Highway	$1,004,360.88	1.1	AE	-	SS 100yr	-	0
Safety and Security	Emergency Ops	83400 Overseas Highway	$2,659,012.13	0.8	AE	-	SS 100yr	-	0
Safety and Security	Government	53 Highpoint Road	$6,432,000.38	0.0	AE	-	SS 500yr	-	0
Food, Hydration, Shelter	Health	73 High Point Road	$4,089,291.83	0.1	AE	-	SS 100yr	-	0
Safety and Security	Government	88770 Overseas Highway	$17,777,021.00	0.7	AE	-	SS 100yr	-	0
Safety and Security	Emergency Ops		-	-	X (Unshaded)	-		-	0
Safety and Security	Government	183 Palermo Drive	$1,154,633.00	3.4	AE	-	SS 100yr	-	0
Safety and Security	Government		$187,118.00	-	X (Unshaded)	-	SS 500yr	-	0
Energy	Government	88770 Overseas Highway	$17,777,021.00	-	X (Shaded)	-	SS 100yr	-	0
Food, Hydration, Shelter	Emergency Ops	89901 Old Highway	$34,848,196.00	0.0	AE	-	SS 500yr	-	0
Food, Hydration, Shelter	Emergency Ops	100 Lake Road	$9,028,418.00	0.0	AE	-	SS 500yr	Direct Exposure	3
Food, Hydration, Shelter	Emergency Ops	87500 Overseas Highway	$507,807.46	-	X (Shaded)	-	SS 100yr	-	0
Health and Medical	Health	48 Highpoint Road	$1,941,709.22	3.4	AE	-	SS 100yr	-	0
Water Systems	Water	81830 Overseas Highway	$331,345.53	-	X (Unshaded)	-	SS 500yr	-	0
Safety and Security	Government	81830 Overseas Highway	$803,007.78	-	X (Shaded)	-	SS 500yr	-	0
Safety and Security	Emergency Ops	81850 Overseas Highway	$643,440.36	-	X (Unshaded)	-	-	-	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	Min Sea Level Rise	Min Storm Surge Cat.	High WUI Exposure	Fire Intensity
Safety and Security	Emergency Ops	86800 Overseas Highway	$3,314,699.00	-	X (Unshaded)	-	SS 500yr	-	0
Safety and Security	Emergency Ops	74070 Overseas Highway	$191,204.00	4.6	AE	NIH	SS 100yr	-	0
Health and Medical	Emergency Ops	89990 Overseas Highway	$263,682.00	2.2	AE	-	SS 100yr	-	0
Health and Medical	Emergency Ops	81850 Overseas Highway	$643,440.36	-	X (Unshaded)	-	-	-	0
Water Systems	Waste	142 Sunshine Blvd	-	4.6	AE	-	SS 100yr	Direct Exposure	2
Water Systems	Waste	286 Gardenia St	$64,920.05	3.4	AE	-	SS 100yr	-	0
Water Systems	Waste	103 Key Heights Dr	-	-	X (Unshaded)	-	SS 500yr	-	0
Water Systems	Waste	86800 Overseas Hwy	$906,051.24	-	AE	-	SS 500yr	-	0
Water Systems	Waste	81953 Old Hwy	-	-	AE	-	SS 100yr	-	0
Water Systems	Waste	70 White Marlin Blvd	$784,391.00	2.7	AE	-	SS 100yr	-	0

F.2 RISK ASSESSMENT

This section contains a summary of Islamorada's asset inventory as well as hazard profile and vulnerability assessment for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Flood, Sea Level Rise, Storm Surge, and Wildfire.

F.2.1 FLOOD

Table F.3 details the acreage of Islamorada's total area by flood zone on the effective DFIRM; it also shows a comparison to the preliminary DFIRM released in December 2019. Nearly 93 percent of Islamorada falls within the mapped 1%-annual-chance floodplains; this would drop to approximately 90 percent on the 2019 preliminary maps. The data in this risk assessment is based off FEMA's 2005 DFIRM. Figure F-2 reflects the effective mapped flood hazard zones for Islamorada while Figure F-3 displays the 2019 preliminary map.

Table F.3 – Flood Zone Acreage in Islamorada

Flood Zone	Effective DFIRM (2005)		Preliminary DFIRM (2019)		Change from Effective (acres)
	Acreage	Percent of Total (%)	Acreage	Percent of Total (%)	
AE	3,412.5	75.7%	3,538.3	78.5%	125.8
VE	755.6	16.8%	503.4	11.2%	-252.2
AO	0.0	0.0%	0.0	0.0%	0.0
0.2% Annual Chance Flood Hazard	144.1	3.2%	357.0	7.9%	212.9
Unshaded X	194.4	4.3%	107.9	2.4%	-86.5
Open Water	0.0	0.0%	0.0	0.0%	0.0
Total	4,506.6	100.0%	4,506.6	100.0%	0.0
SFHA Total	**4,168.1**	**92.5%**	**4,041.8**	**89.7%**	**-126.3**

Source: FEMA Effective DFIRM

Note: The differences between the effective FIRM and the preliminary FIRM are significant will likely still change. These details are provided here only as a comparison – all further flood analysis is based in the 2005 Effective DFIRM.

Table F.4 and Table F.5 provide building counts and estimated damages by occupancy type for the 1% annual chance flood event using both the effective and preliminary DFIRM. Figure F-4 and Figure F-5 display the effective and preliminary depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

Table F.4 – Estimated Building Damage and Content Loss, 1% Annual Chance Flood Effective DFIRM, Islamorada Village of Islands

Occupancy Type	Total Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Agriculture	0	$0	$0	$0	$0	0%
Commercial	600	$737,500,997	$14,927,694	$49,892,178	$64,819,872	9%
Educational	7	$11,854,160	$51,584	$311,423	$363,007	3%
Government	40	$138,199,770	$165,698	$1,009,905	$1,175,603	1%
Industrial	29	$23,295,509	$130,815	$378,057	$508,873	2%
Religious	13	$16,410,732	$23,214	$175,326	$198,539	1%
Residential	4,865	$3,478,873,862	$582,951,224	$289,259,509	$872,210,733	25%
Total	**5,554**	**$4,406,135,030**	**$598,250,229**	**$341,026,397**	**$939,276,627**	**21%**

Source: HAZUS, FEMA Effective DFIRM

Table F.5 – Estimated Building Damage and Content Loss, 1% Annual Chance Flood Preliminary DFIRM, Islamorada Village of Islands

Occupancy Type	Total Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Agriculture	0	$0	$0	$0	$0	0%
Commercial	10	$27,492,958	$102,883	$301,117	$404,001	1%
Educational	0	$0	$0	$0	$0	0%
Government	8	$5,092,002	$40,712	$250,685	$291,397	6%
Industrial	0	$0	$0	$0	$0	0%
Religious	0	$0	$0	$0	$0	0%
Residential	1,381	$982,326,817	$188,595,751	$94,362,208	$282,957,959	29%
Total	**1,399**	**$1,014,911,777**	**$188,739,347**	**$94,914,010**	**$283,653,357**	**28%**

Source: HAZUS, FEMA Preliminary

Table F.6 provides building counts and values for critical facilities by flood zone in the Islamorada Village of Islands.

Table F.6 – Critical Facilities Exposed to Flooding, Islamorada Village of Islands

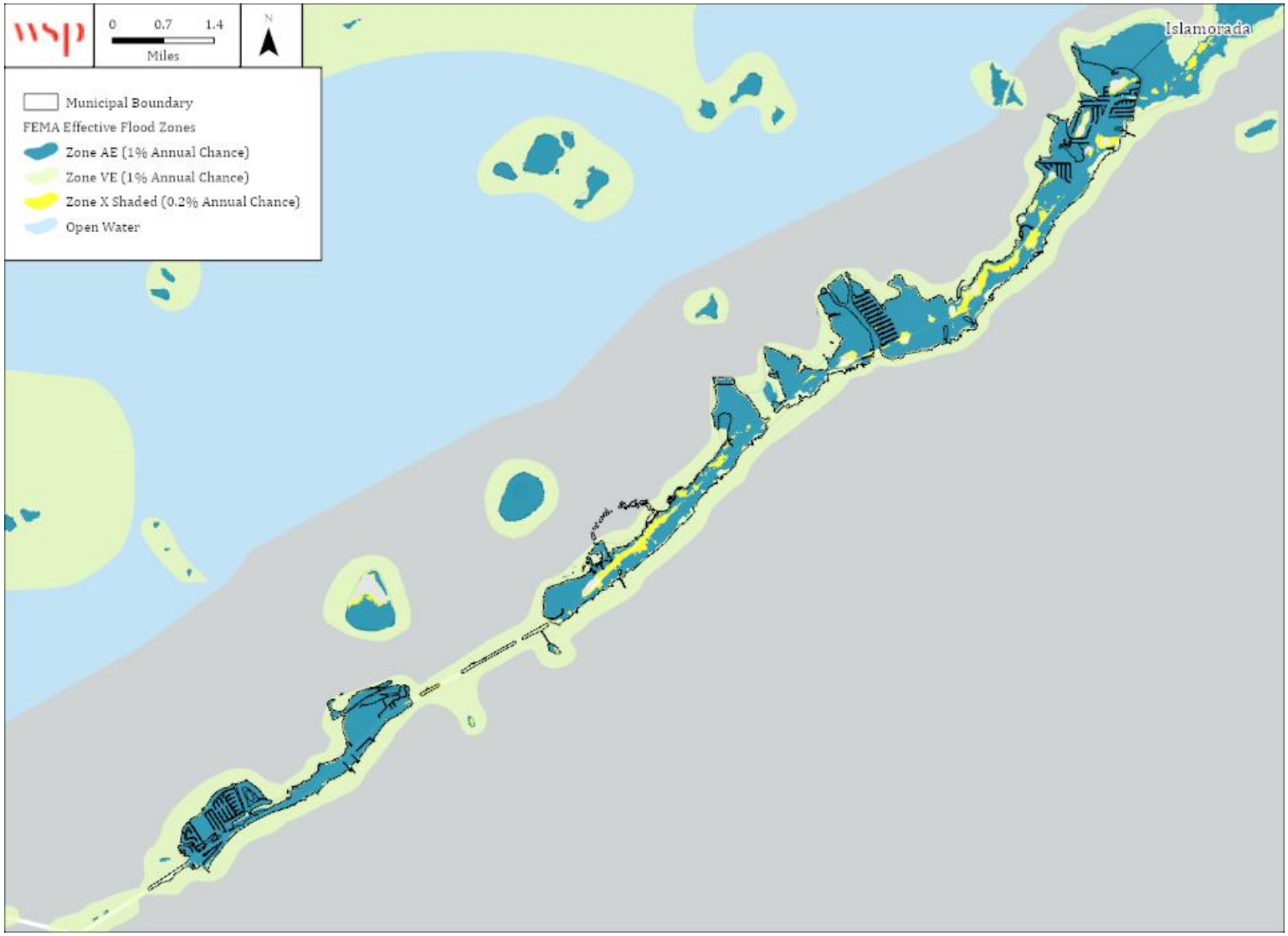
Flood Zone	Critical Facility Count	Structure Value
Zone AE	20	$ 107,843,434.72
Zone X (500-year)	3	$19,087,836.24
Zone X Unshaded	8	$42,968,056.98
Total	**31**	**$ 169,899,327.95**

Source: FEMA Effective DFIRM, LMS Working Group

Figure F-2 – FEMA Flood Hazard Areas, Effective DFIRM, Islamorada Village of Islands

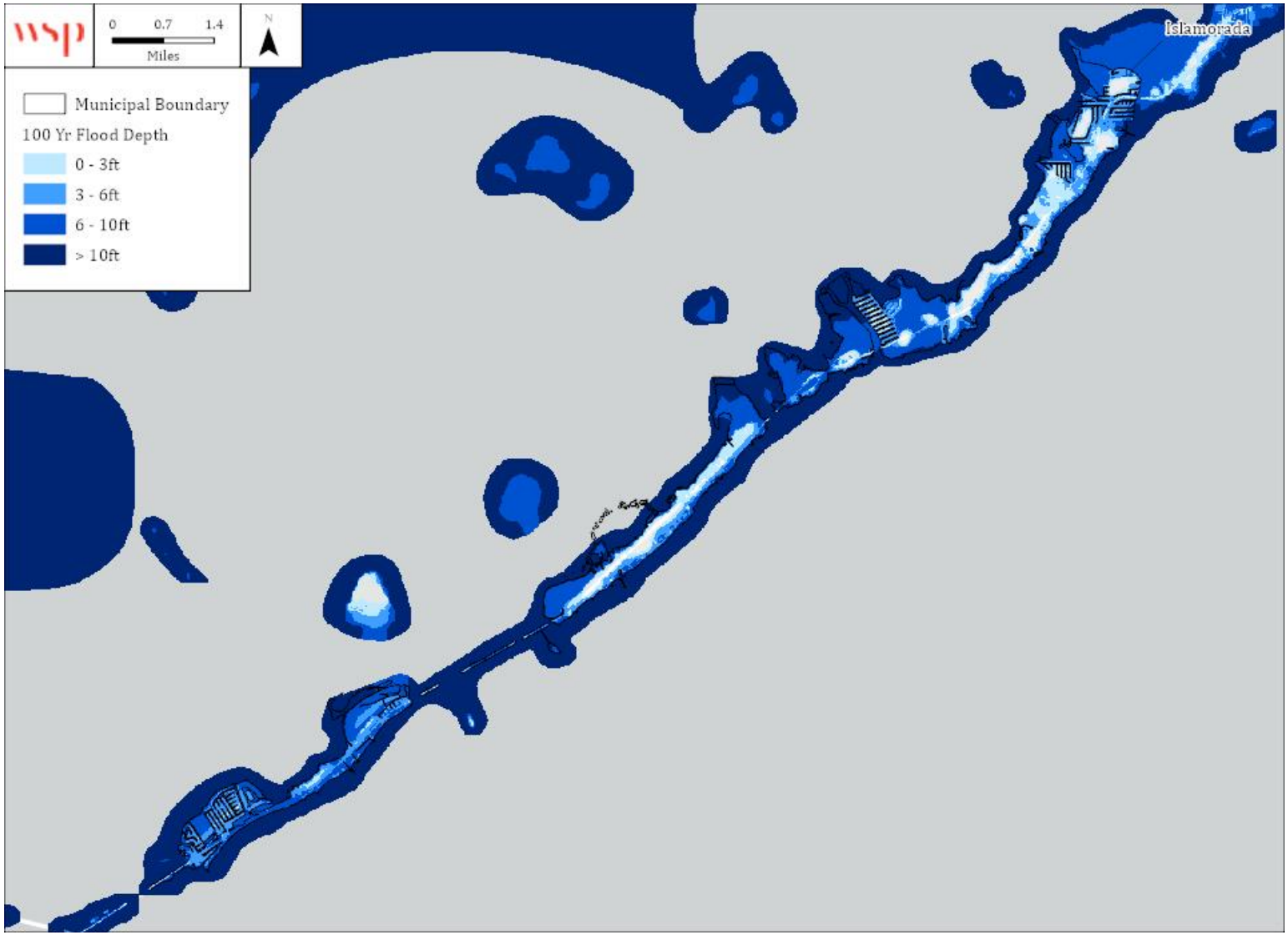
Source: FEMA Effective DFIRM

Figure F-3 – FEMA Flood Hazard Areas, Preliminary DFIRM, Islamorada Village of Islands



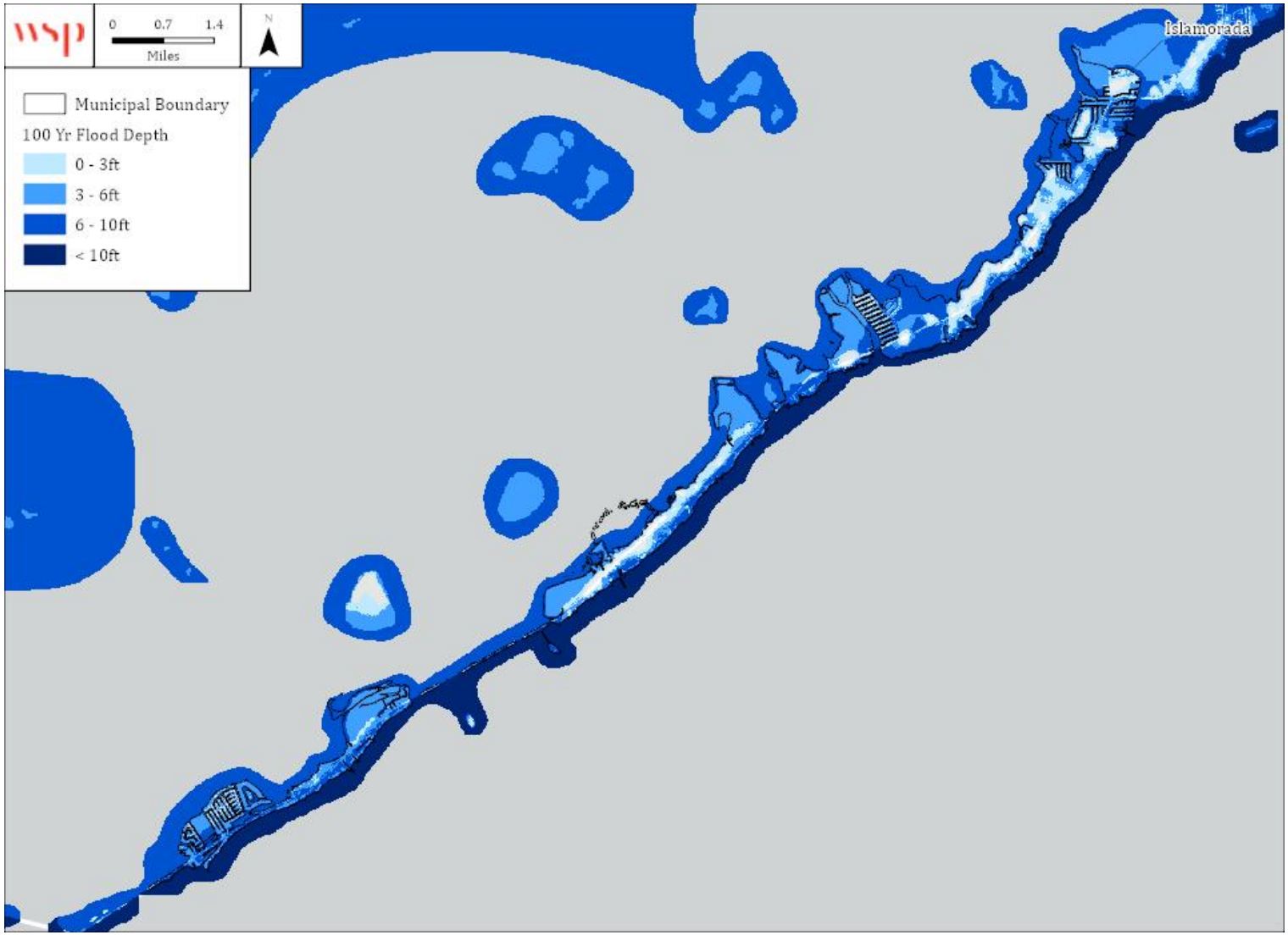
Source: FEMA Preliminary DFIRM

Figure F-4 – Flood Depth, 1%-Annual Chance Floodplain Effective DFIRM, Islamorada Village of Islands



Source: FEMA Effective DFIRM

Figure F-5 – Flood Depth, 1%-Annual Chance Floodplain Preliminary DFIRM, Islamorada Village of Islands



Source: FEMA Preliminary DFIRM

FLOODPLAIN MANAGEMENT

Islamorada Village of Islands joined the NFIP through regular entry in October 1998. The City is a participant in the Community Rating System and is a Class 6 community. The following tables reflect NFIP policy and claims data for the City categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table F.7 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	1,602	$2,585,928	$485,538,000	703	$20,072,802.70
2-4 Family	125	$145,102	$29,856,000	40	$959,902.14
All Other Residential	1,062	$563,258	$243,383,000	85	$7,040,870.20
Non-Residential	256	$1,426,280	$122,993,000	253	$22,267,927.12
Total	**3,045**	**$4,720,568**	**$881,770,000**	**1,081**	**$50,341,502.16**

Source: FEMA Community Information System, accessed May 2025

Table F.8 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	2,730	$4,022,397	$787,930,000	934	$43,244,463.24
V01-30 & VE Zones	159	$471,875	$40,626,000	122	$6,569,007.93
B, C & X Zone					
Standard	156	$226,296	$53,214,000	12	$427,791.74
Preferred	0	$0	$0	13	$100,239.25
Total	**3,045**	**$4,720,568**	**$881,770,000**	**1,081**	**$50,341,502.16**

Source: FEMA Community Information System, accessed May 2025

Table F.9 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	635	$2,047,386	$185,003,000	579	$37,677,610.42
V01-30 & VE Zones	27	$158,698	$7,678,000	71	$4,195,599.48
B, C & X Zone	36	$63,930	$12,843,000	14	$275,984.56
Standard	36	$63,930	$12,843,000	9	$207,063.71
Preferred	0	$0	$0	5	$68,920.85
Total	**698**	**$2,270,014**	**$205,524,000**	**664**	**$42,149,194.46**

Source: FEMA Community Information System, accessed May 2025

Table F.10 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	2,095	$1,975,011	$602,927,000	355	$5,566,852.82
V01-30 & VE Zones	132	$313,177	$32,948,000	51	$2,373,408.45
B, C & X Zone	120	$162,366	$40,371,000	11	$252,046.43
Standard	120	$162,366	$40,371,000	3	$220,728.03
Preferred	0	$0	$0	8	$31,318.40
Total	**2,347**	**$2,450,554**	**$676,246,000**	**417**	**$8,192,307.70**

Source: FEMA Community Information System, accessed May 2025

CONTINUED NFIP COMPLIANCE

Islamorada entered the NFIP when it incorporated in 1997 by adoption of an ordinance that complies with the requirement of the program. To continue compliance with the NFIP, the Village will:

- Enforce the adopted floodplain management ordinance, including reviewing all development proposals in the SFHA and enforcing the requirements of the ordinance, and inspecting both permitted development and unpermitted activities;
- Maintain records pertaining to floodplain development, including flood maps and Letters of Map Change, which shall be available for public inspection;
- Notify the public when there are proposed changes to the ordinance or FIRMs;
- Implement activities recognized by the NFIPs CRS; and
- Promote the purchase of NFIP flood insurance policies as financial protection;

F.2.2 SEA LEVEL RISE

Table F.11 details the number of all buildings affected by sea level rise in the Islamorada Village of Islands following the NOAA sea level rise projections of intermediate low and intermediate high scenarios.

Table F.11 – All Buildings Affected by Sea Level Rise, Islamorada Village of Islands

Occupancy	Estimated Building Count	Structure Value	Estimated Content Value	Total Value
2040 NIL	**2,057**	**1,087,285,617**	**605,981,179**	**1,495,980,796**
Agriculture	0	$0	$0	$0
Commercial	139	$111,194,875	$111,194,875	$218,337,005
Education	0	$0	$0	$0
Government	7	$2,237,700	$2,237,700	$4,475,399
Industrial	9	$4,512,392	$6,768,587	$11,280,979
Religious	2	$2,219,383	$2,219,383	$4,438,766
Residential	1900	$967,121,267	$483,560,634	$1,257,448,646
2040 NIH	**3,021**	**1,579,159,152**	**899,882,199**	**2,107,998,210**
Agriculture	0	$0	$0	$0
Commercial	290	$204,316,757	$204,316,757	$346,912,272
Education	2	$1,487,904	$1,487,904	$2,975,807
Government	8	$2,321,746	$2,321,746	$4,643,491
Industrial	12	$4,721,989	$7,082,984	$11,804,973
Religious	5	$3,034,861	$3,034,861	$6,069,722
Residential	2704	$1,363,275,895	$681,637,948	$1,735,591,944

Source: HAZUS, NOAA, Monroe County Parcel Data

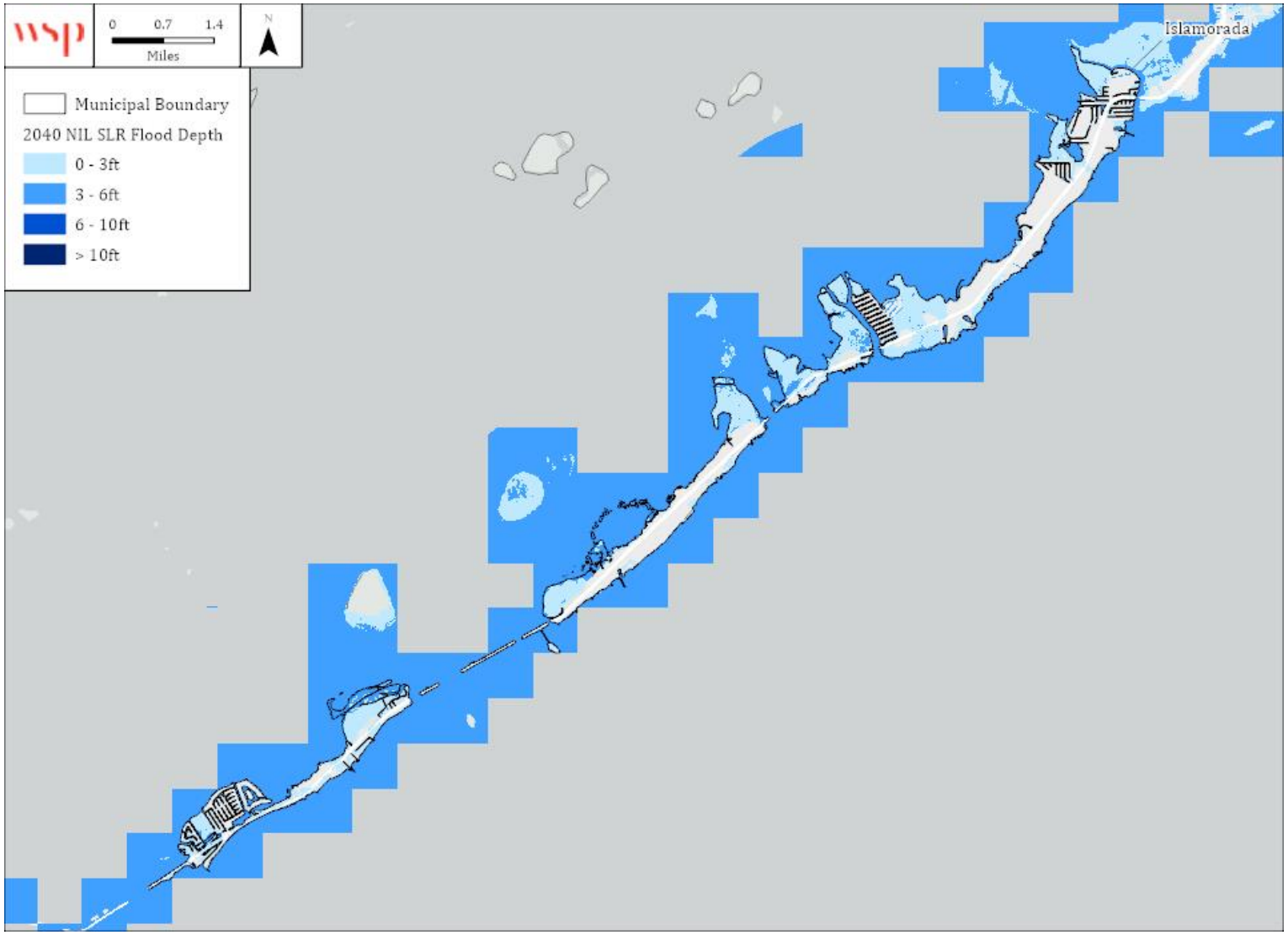
Figure F-6 and Figure F-7 display NOAA 2040 intermediate low and high sea level rise scenarios for the Islamorada Village of Islands. Table F.12 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to sea level rise based on NOAA intermediate low and high scenarios.

Table F.12 – Critical Facilities Exposed to Sea Level Rise, Islamorada Village of Islands

Highest Level of SLR	Critical Facility Count	Structure Value
2040 NIL	1	$1,613,267.00
NOAA 3ft	1	$20,857,424.00
2040 NIH	2	$191,204.00
Total	**4**	**$22,661,895.00**

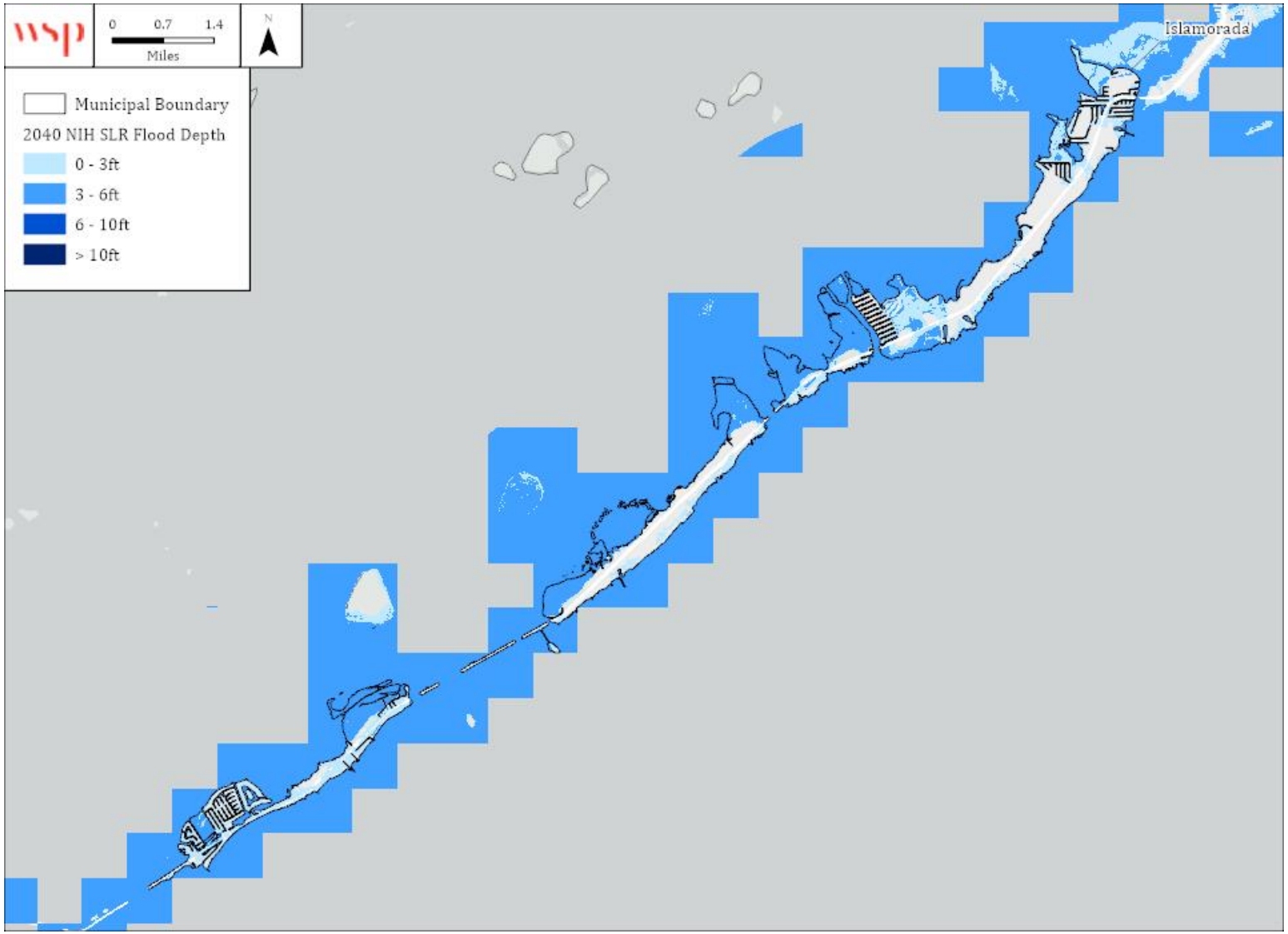
Source: NOAA, Monroe County LMS Working Group

Figure F-6 – NOAA 2040 Intermediate Low Sea Level Rise Scenario, Islamorada Village of Islands



Source: NOAA 2040 NIL, Monroe County Parcel Data

Figure F-7 – NOAA 2040 Intermediate High Sea Level Rise Scenario, Islamorada Village of Islands



Source: NOAA 2040 NIH, Monroe County Parcel Data

F.2.3 STORM SURGE

Table F.13 summarizes the number of buildings in Islamorada Village of Islands that will be impacted by 100-yr and 500-yr storm surge events. Figure F-8 shows potential storm surge inundation for a 100-yr storm surge event and Figure F-9 shows inundation for the 500-yr storm surge event.

Table F.13 – Storm Surge Exposure by 100-yr and 500-yr Event, Islamorada Village of Islands

Occupancy	Estimated Building Count	Structure Value	Estimated Content Value	Total Value
100yr	**5,620**	**$2,760,303,061**	**$1,605,849,956**	**$4,366,153,017**
Agriculture	0	$0	$0	$0
Commercial	629	$382,233,262	$382,233,262	$764,466,523
Education	7	$5,927,080	$5,927,080	$11,854,160
Government	37	$34,468,736	$34,468,736	$68,937,473
Industrial	30	$9,444,577	$14,166,865	$23,611,441
Religious	18	$9,878,619	$9,878,619	$19,757,238
Residential	4,899	$2,318,350,788	$1,159,175,394	$3,477,526,182
500yr	**5,850**	**$2,874,455,468**	**$1,688,542,374**	**$4,562,997,842**
Agriculture	0	$0	$0	$0
Commercial	664	$391,945,667	$391,945,667	$783,891,334
Education	7	$5,927,080	$5,927,080	$11,854,160
Government	49	$75,988,762	$75,988,762	$151,977,524
Industrial	30	$9,444,577	$14,166,865	$23,611,441
Religious	18	$9,878,619	$9,878,619	$19,757,238
Residential	5,082	$2,381,270,764	$1,190,635,382	$3,571,906,146

Source: FEMA, NOAA, Monroe County Parcels

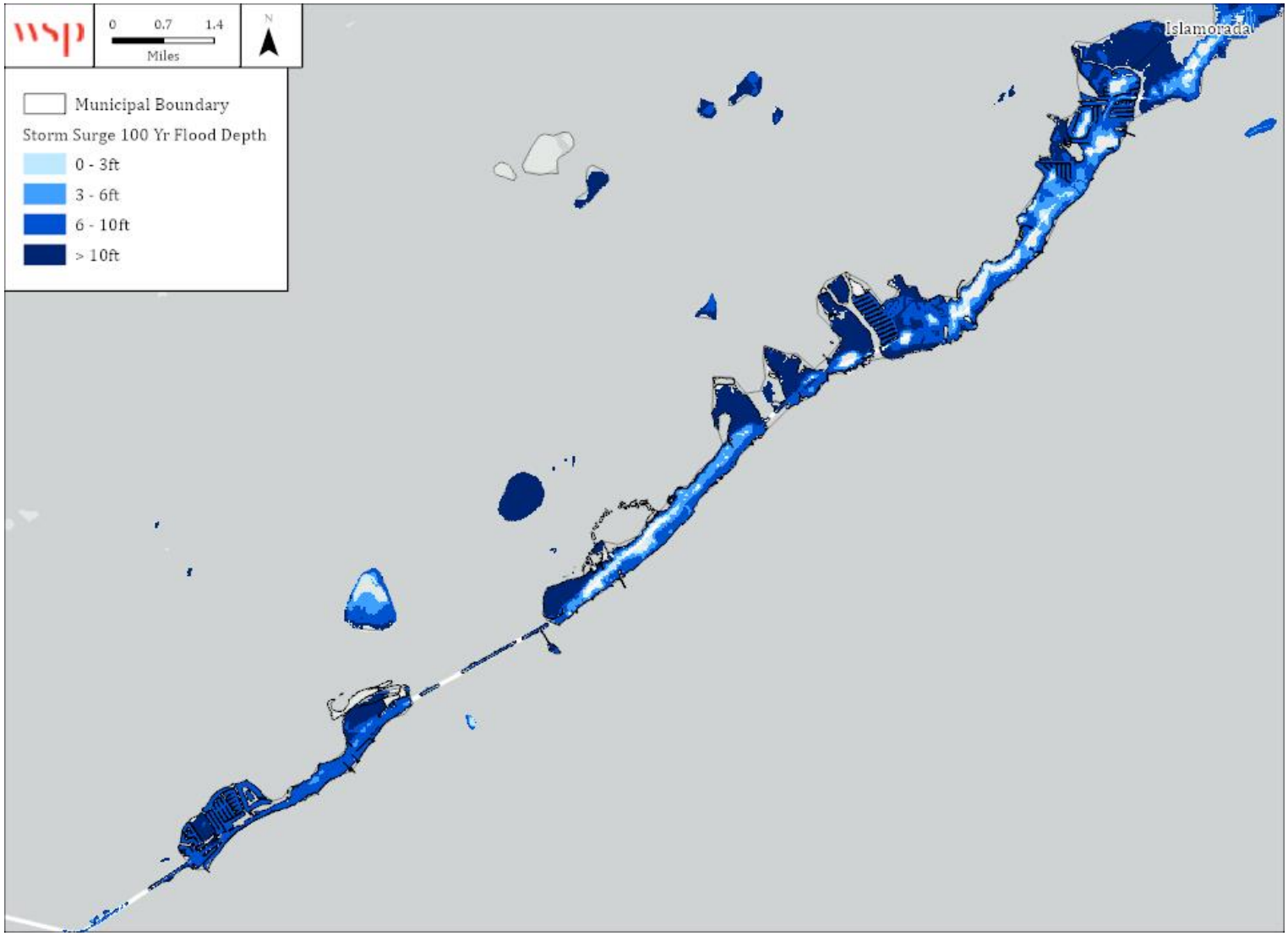
Table F.14 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to storm surge based on 100 and 500-year storm surge events.

Table F.14 – Critical Facilities Exposed to Storm Surge, Islamorada Village of Islands

Storm Surge Category	Critical Facility Count	Structure Value
100-Year	17	$74,871,755.56
500-Year	10	$58,301,325.70
Total	**27**	**$133,173,081.26**

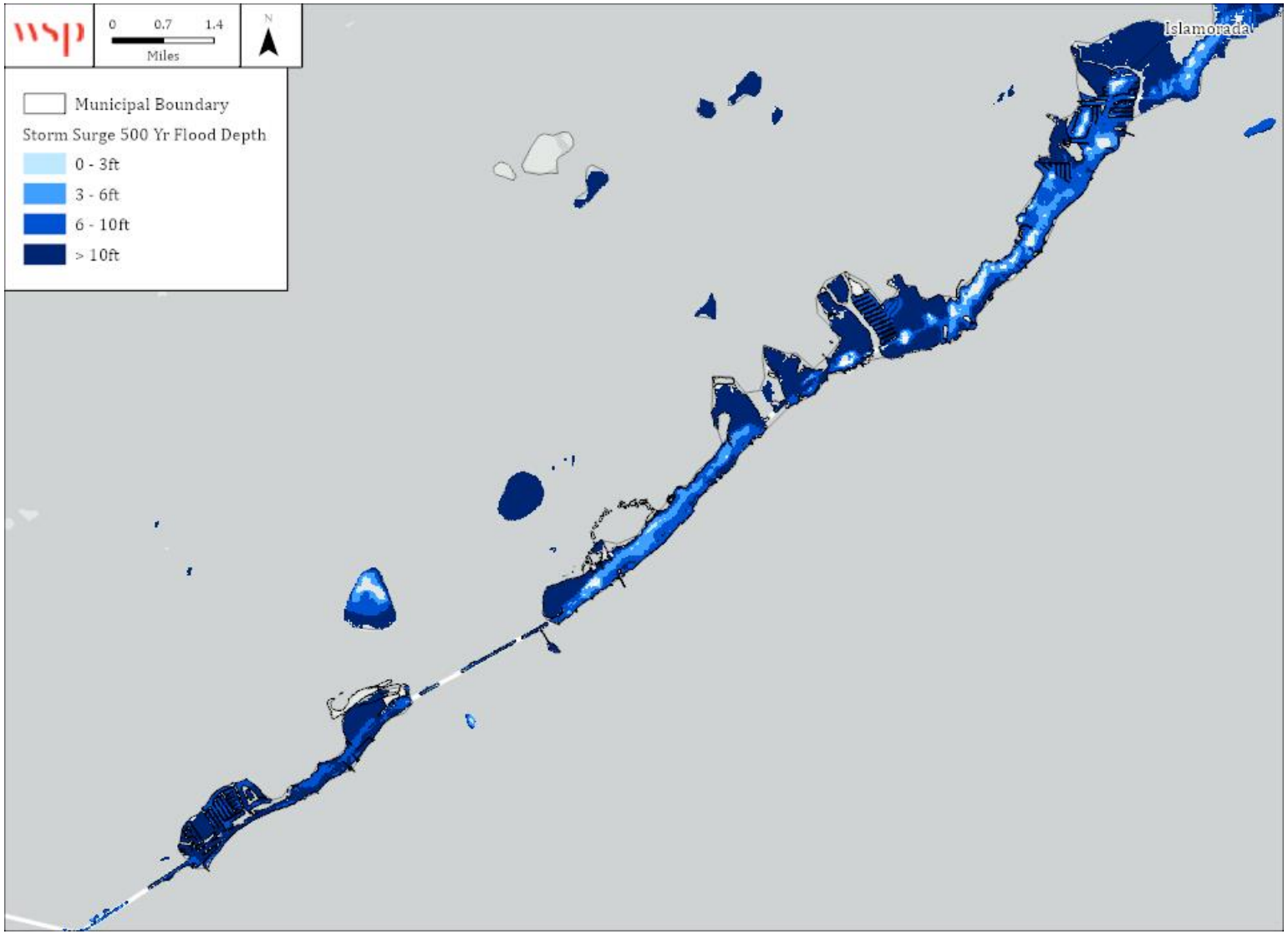
Source: FEMA, NOAA, Monroe County LMS Working Group

Figure F-8 – 100-Year Storm Surge Event Inundation, Islamorada Village of Islands



Source: NOAA

Figure F-9 - 500-Year Storm Surge Event Inundation, Islamorada Village of Islands



Source: NOAA

F.2.4 WILDFIRE

Table F.15 summarizes the acreage in the Islamorada Village of Islands that falls within the Functional Wildland Urban Interface (WUI), categorized into zones that describe the wildfire risk mitigation activities appropriate for each zone. Areas in the Functional WUI are those areas where development and building structures may intermix with burnable land cover. Approximately, 14 percent of Islamorada is categorized as having direct exposure to wildfire risk within the Functional WUI.

Table F.15 – Functional Wildland Urban Interface, Islamorada Village of Islands

	Functional Wildland Urban Interface (WUI) Category	Acres	Percent
	Direct Exposure	586	14%
	Indirect Exposure		
	Critical Fireshed	848	20%
	Sources of Ember Load to Buildings	727	17%
	Little to No Exposure	1,975	46%
	Water	130	3%
	Total	**4,265**	**100%**

Source: Southern Wildfire Risk Assessment

Figure F-10 depicts the WUI for Islamorada. Figure F-11 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts. Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors, is depicted in Figure F-12.

Much of Islamorada is within the Functional WUI with some small clusters of direct exposure present along the outer edge. Where there is a rating for burn probability, scattered throughout the Village with WUI areas, it is very low; otherwise, much of the city is without a burn probability rating. There are small areas of higher characteristic fire intensity throughout the Village, but large swaths of the Village are not rated on the characteristic fire intensity scale.

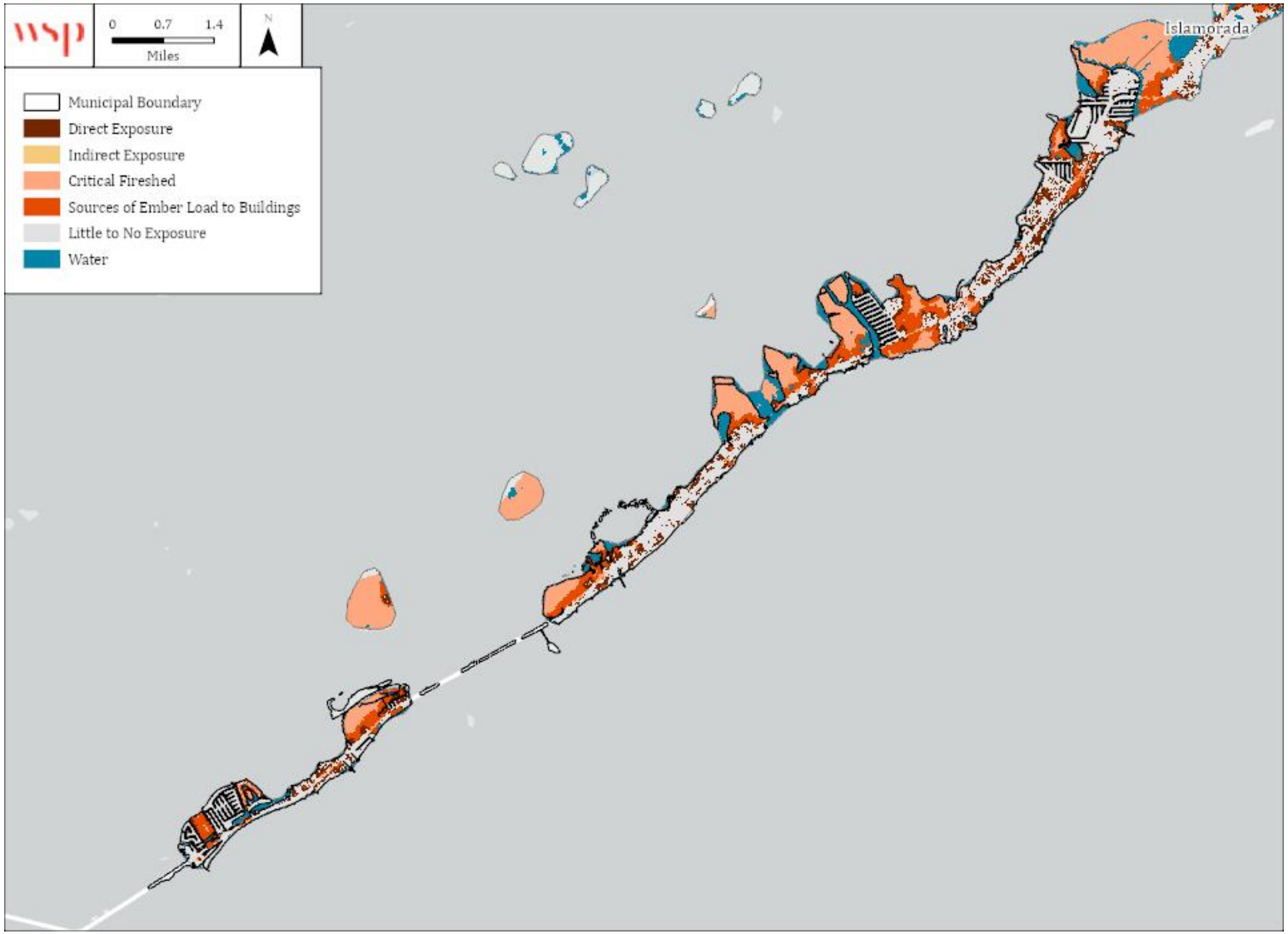
Table F.16 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to wildfire risk on the Functional WUI scale.

Table F.16 – Critical Facilities Exposed to Wildfire, Islamorada Village of Islands

Type	Critical Facility Count	Structure Value
Communications	0	$0
Energy	0	$0
Food, Hydration, Shelter	1	$9,028,418.00
Hazardous Materials	0	$0
Health and Medical	0	$0
Safety and Security	0	$0
Transportation	0	$0
Water Systems	1	$0
Total	**2**	**$9,028,418.00**

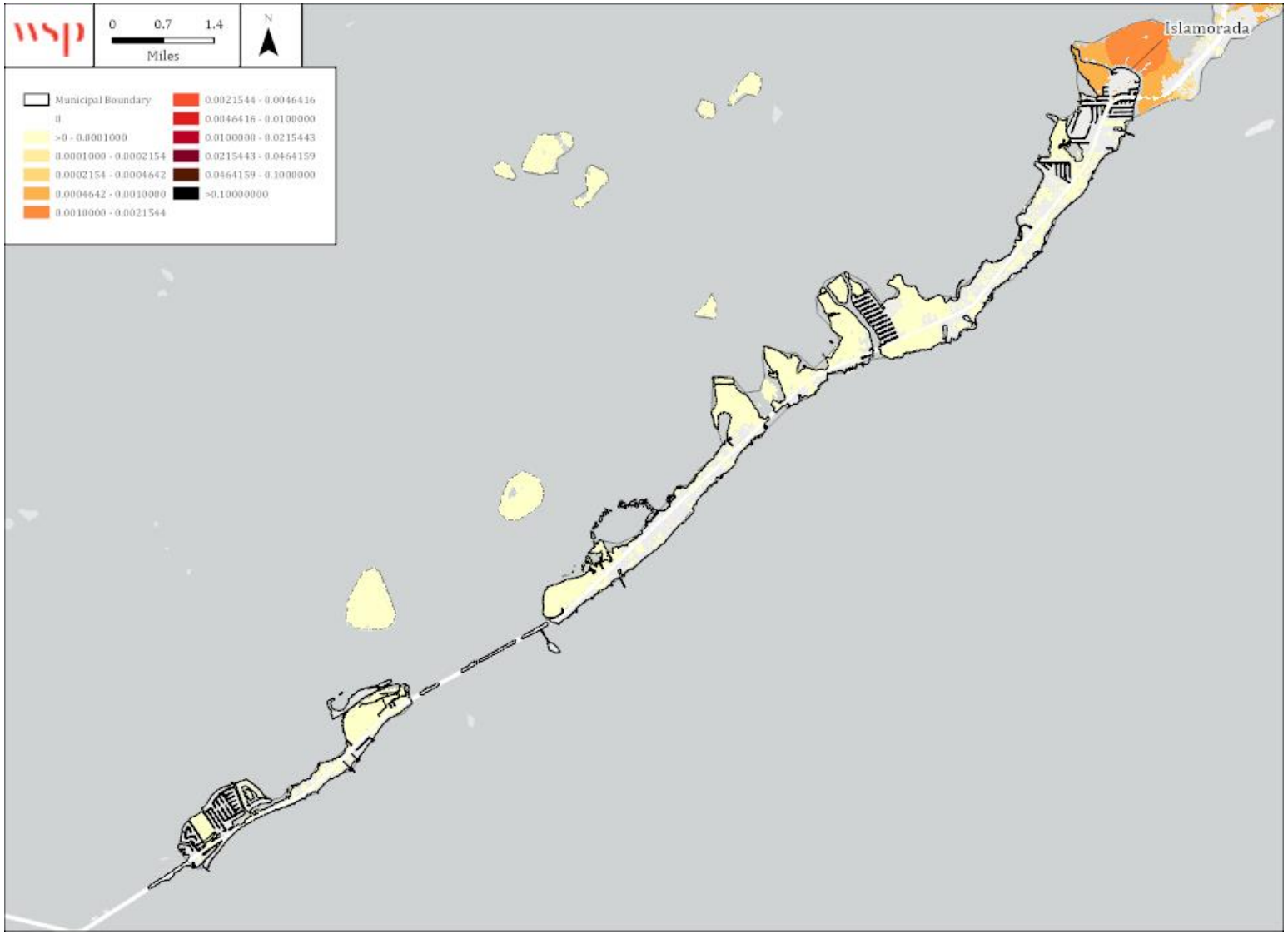
Source: Southern Wildfire Risk Assessment, Monroe County LMS Working Group

Figure F-10 – Functional Wildland Urban Interface, Islamorada Village of Islands



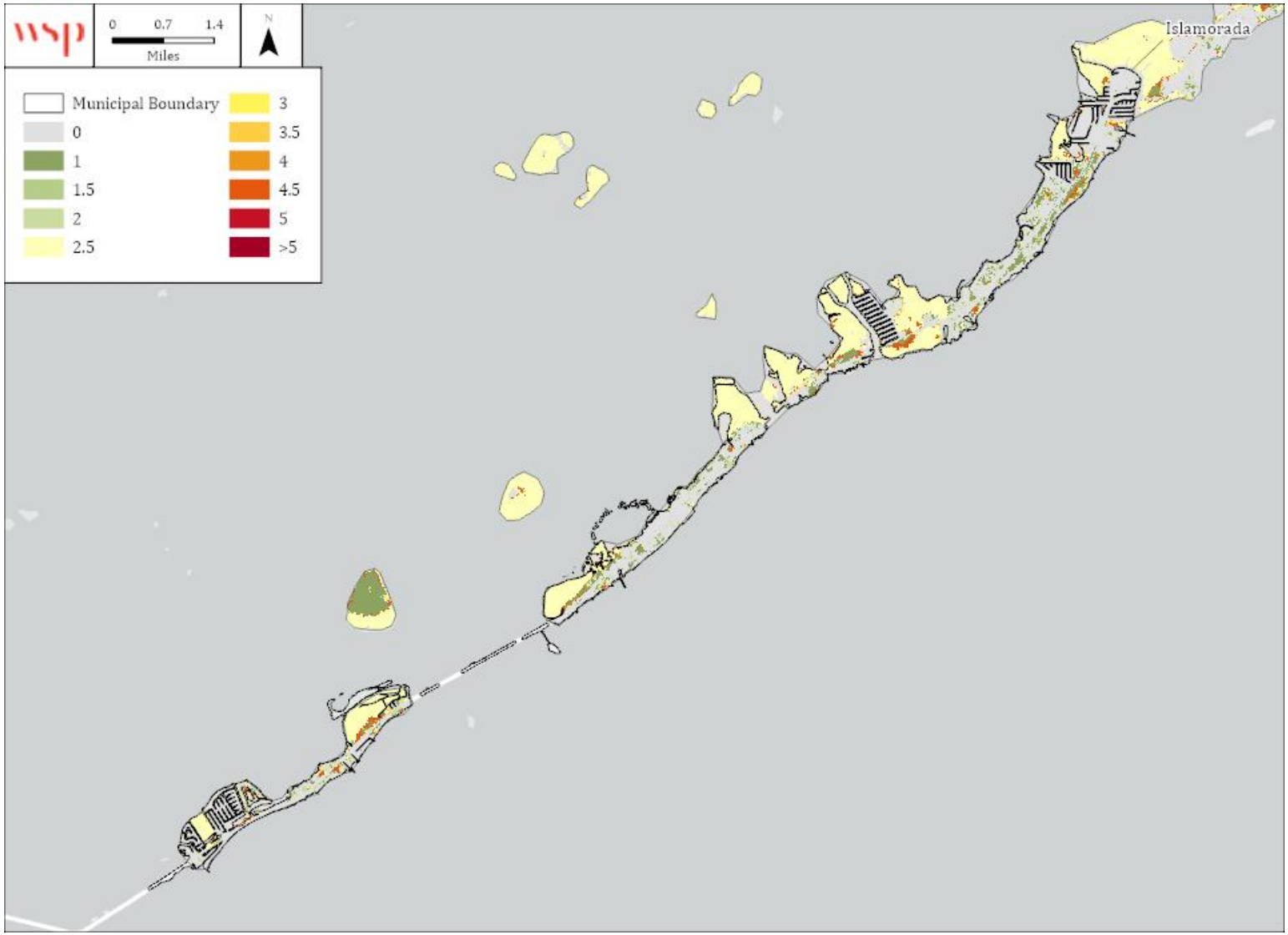
Source: Southern Wildfire Risk Assessment

Figure F-11 – Burn Probability, Islamorada Village of Islands



Source: Southern Wildfire Risk Assessment

Figure F-12 – Potential Fire Intensity, Islamorada Village of Islands



Source: Southern Wildfire Risk Assessment

F.3 MITIGATION STRATEGY

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
1	Monroe County and Municipalities	Support efforts in Monroe County to address the potential negative impacts related to climate change, including sea level rise. Monroe County is the most vulnerable partner that participates in the SE FL Compact with respect to climate change induced sea level increases. Critical resources like the primary source of drinking water as well as homes, businesses, and infrastructure are directly at risk. The LMS should actively support its own Climate Change action plans (Monroe County and Key West) and support the implementation of a Regional Collaborative Climate Action Plan with the neighboring counties through the Southeast Florida Regional Climate Compact to address the impacts of sea level rise and other related climate change impacts	Sea Level Rise	3	H	Prevention	County/Jurisdictional Planning and Engineering Departments	Less than $10,000	Staff Time	2025 - 2030	Carry Forward (Provide Update)	This is an ongoing collaboration. This county and municipalities continue to participate in the SE FL Compact and Climate Change Planning by attending summits and supporting initiatives. This includes incorporating Sea Level Rise projections into this plan.
2	Monroe County and Municipalities	Verify Repetitive Loss Property Data - Monroe County and municipalities that participate in the CRS will verify the repetitive loss property data obtained from FEMA. The NFIP maintains	Flood	1, 2	H	Prevention, Public Education	County/Jurisdictional Floodplain Management	$10,000 to $50,000	Staff Time	2020-2025	Carry Forward (Provide Update)	This action is ongoing in the communities with identified repetitive loss properties. Data verification

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
		records of past flood insurance claims and tracks properties that have received multiple claims. These properties and similarly situated buildings present likely opportunities for mitigation. Verifying the data serves two purposes: it helps the NFIP improve its records, and it helps identify Repetitive Loss Areas. Prepare Repetitive Loss Area Maps - Monroe County and municipalities that prepare Repetitive Loss Area Analyses will identify repetitive loss areas within their jurisdiction using the methods described in FEMA/CRS guidance. Identification of Repetitive Loss Areas helps identify property owners who may be interested in reducing their exposure and working with the communities to seek mitigation funds.										occurs annually and repetitive loss area maps are updated upon request.
3	Monroe County and Municipalities	Elevate Buildings Located within Floodprone Areas	Tropical Cyclones, Flood, Sea Level Rise	2	M	Property Protection	County Emergency Management Department with Jurisdictional Representatives	$5,225,000	HMGP, BRIC, FMA, CDBG-DR	5 years	Carry Forward (Provide Update)	Residential elevation projects are now covered under the Elevate Florida Program. Continue to pursue other elevation projects.
4	Monroe County and Municipalities	Wind Retrofit of County Facilities	Severe Storms and Tornadoes,	2	M	Property Protection	Monroe County Public Works	$8,837,280	HMGP, BRIC, HLMP	1 - 5 years	Carry Forward (Provide Update)	On going upgrades to apartments. Final project will be to

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
			Tropical Cyclones									build new apartment buildings by 2028
5	Monroe County and Municipalities	County-wide Road Elevation and Drainage Improvements (Phase 1 of 2)	Tropical Cyclones, Flood, Sea Level Rise	2	M	Structural Projects	Monroe County Roads and Bridges ; Monroe County Public Works	$367,200,000	HMGP, BRIC, FMA, CDBG-MIT	5 years	Carry Forward (Provide Update)	Road Elevation projects in progress
6	Monroe County and Municipalities	Natural Resources Adaptation Plan	Flood, Sea Level Rise, Tropical Cyclones	2, 3	H	Prevention, Natural Resource Protection	Monroe County Planning and Environmental Resources	$142,000	BRIC, HMPG	3 Years	Carry Forward (Provide Update)	80% complete
7	Monroe County and Municipalities	Engine generators at Water Treatment Plant	All	2	M	Structural Projects	FKAA	$1,500,000	HMGP, BRIC, HLMP, CDBG	1 - 3 years	Carry Forward (Provide Update)	This project is currently in the bidding phase.
8	Monroe County and Municipalities	Hospital Hardening: Evaluate/identify necessary improvements needed to retrofit hospital facilities and perform needed retrofits to mitigate storm damages. Facilities include: Lower Keys Health Systems, De Poo Hospital, Fisherman's Hospital, Mariners' Hospital, Nursing Homes (including Bayshore Manor)	All	2	M	Property Protection	LKMC/Baptist Health/Monroe County	Over $1,000,000	HMGP, BRIC, CDBG-MIT, HLMP	5 - 10 years	Carry Forward (Provide Update)	No progress
9	Monroe County and Municipalities	Marathon Potable Water Pump Station Mitigation	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$3,000,000.00	DEP - Resilient Florida	2 years	New	
10	Monroe County and Municipalities	Decentralized Wastewater Treatment Project	Flood, Sea Level Rise, Tropical Cyclones	2	H	Structural Projects	FKAA	$450,000.00	DEP - Water Quality Improvements	2 years	New	
11	Monroe County and Municipalities	Plantation Key Transmission Main	Flood, Sea Level Rise,	2	H	Structural Projects	FKAA	$1,750,000.00	DEP - Rep Gimenez Request	2 years	New	

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
			Tropical Cyclones									
21	Monroe County, Marathon, Islamorada, Key Colony Beach, Layton	Self-Supporting Transmission Poles	All	2	M	Structural Projects	FKEC	$6,000,000	HMGP, BRIC, FMA	1 - 5 years	Carry Forward (Provide Update)	Awaiting FDEM approval
34	Islamorada, Key Colony Beach, Key West, Layton, Marathon	Evaluate protective measures for critical infrastructure and facilities to protect against dynamic hazards including flood, wind, sea level rise, and strong storms. Critical facilities provide services that the whole community depends on for basic functioning. The communities will evaluate the need for protecting critical facilities and infrastructure and address as needed.	All	2	M	Property Protection, Prevention	Jurisdiction Engineering/Public Works	$10,000 to $50,000	Staff Time	1 - 5 years	Carry Forward (Provide Update)	Completed flood protection project - elevated breakwater, protected marina office. Continue to pursue additional projects. Adaptation action Plan is underway and will identify new opportunities.
190	Islamorada	Emergency Back-up Power for Critical Facilities	All	2	H	Property Protection	Islamorada Public Works	$500,000	HMGP, BRIC	1 - 5 years	Carry Forward (Provide Update)	Still in progress. One station has received a generator, the other is pending.
191	Islamorada	Flood-proofing for Fire Stations (3)	Tropical Cyclones, Flood, Sea Level Rise	2	M	Property Protection	Islamorada Fire Rescue; Islamorada Public Works	$300,000	HMGP, BRIC, FMA	1 - 5 years	Carry Forward (Provide Update)	Still in progress. Project is in design phase.
192	Islamorada	Wastewater System Mitigation	All	2	M	Property Protection	Islamorada Wastewater Utility; Islamorada Public Works	$600,000	HMGP, BRIC, FMA	1 - 5 years	Carry Forward (Provide Update)	Still in progress. 4 out of 6 station have been completed.
193	Islamorada	Fire Station 20 FEMA 361 Saferoom for First Responders	All	1, 2, 3	M	Emergency Services	Islamorada Public Works	$6,000,000	HMGP, BRIC, FMA	1 - 5 years	Carry Forward	In process. Combined with floodproofing for

Action #	Jurisdiction(s)	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Mitigation Category	Lead Agency / Department	Cost Estimate	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
											(Provide Update)	one station. In design phase.
194	Islamorada	Overseas Highway/ Sea Oats Beach Flood and Erosion Protection	Tropical Cyclones, Flood, Sea Level Rise, Coastal Erosion	2	H	Structural Projects, Natural Resource Protection	Islamorada Public Works	$10,000,000	HMGP, BRIC, FMA	1 - 5 years	Carry Forward (Provide Update)	FDOT completed this project, but ongoing work is likely
195	Islamorada	Become Storm Ready Community	All	1	H	Emergency Services, Public Education	Islamorada Development Services	$10,000	Staff Time	2 - 3 years	New	

APPENDIX A PLAN REVIEW TOOL

Placeholder

APPENDIX B PLANNING PROCESS DOCUMENTATION

B.1 PLANNING STEP 1: ORGANIZE TO PREPARE THE PLAN

Table B.1 – LMSWG Meeting Topics, Dates, and Locations

Meeting Title	Meeting Topic	Meeting Date	Meeting Location
LMSWG Mtg. #1 – Project Kick-Off	1) Introduction to DMA and CRS requirements and the planning process 2) Review of LMSWG responsibilities and the project schedule. 3) Discuss local capability	January 30, 2025 2 p.m.	Microsoft Teams
LMSWG Mtg. #2	1) Review Draft Hazard Identification & Risk Assessment (HIRA) 2) Review and update plan goals and objectives	March 26, 2025 10 a.m.	Monroe County Emergency Operations Center & Microsoft Teams
LMSWG Mtg. #3	1) Report on status of actions from the 2020 plan 2) Draft Mitigation Action Strategies	June 5, 2025 3 p.m.	Microsoft Teams
LMSWG Mtg. #4	1) Review the Draft Local Mitigation Strategy 2) Solicit comments and feedback	July 1, 2025 2 p.m.	Microsoft Teams

Note: All LMSWG Meetings were open to the public.

LMSWG MEETING MINUTES AND ATTENDANCE

LMSWG MEETING 1: JANUARY 30, 2025

MONROE COUNTY LOCAL MITIGATION STRATEGY UPDATE

LOCAL MITIGATION STRATEGY WORKING GROUP (LMSWG) – MEETING #1

January 30, 2025, 2pm, Microsoft Teams

ATTENDANCE

There were 23 attendees. The following individuals were in attendance:

- Brian Shea, Planning Director, City of Marathon
- Julia Cheon, Planning and Environmental Resources, Monroe County
- Carla Fry, Florida Department of Health
- Brittani Harden, Keys Energy
- James Johnson, Marathon Fire Rescue
- Kelcee Degraffenreid, Florida Keys Aqueduct Authority
- Karla Garcia, Florida Keys Aqueduct Authority
- Mehan Bosey - Keys Health Ready Coalition
- Mike Lalbachan, Monroe County Land Authority
- Elizabeth Lustberg, Monroe County Planning Department
- Dan Sabino, Keys Energy
- Cory Schwisow, Monroe County Emergency Management
- Shellie Cavalliere, City of Layton
- Terry Abel, Islamorada Fire Chief
- Zoe Porter, Key West Floodplain Manager
- Tom Harding, Key Colony Beach
- Heather Carruthers –K2M Design Architecture and Engineering
- Mimi Young, City of Layton
- David Stroud, WSP
- Abby Moore, WSP
- Ranger Ruffins, WSP
- Kimmy Hansen, WSP
- Lori Lehr, Lehr LCPC

AGENDA

- Welcome & Introductions
- Why Plan?
- Project Overview
- Planning Process
- Project Schedule
- Next Steps
- Discussion

WHY PLAN?

David Stroud and Abby Moore with WSP facilitated the meeting following the agenda above. David began the presentation with why we plan in the first place. David discussed that the Disaster Mitigation Act (DMA) of 2000 which is codified in 44 CFR 201.6 requires local governments to update their hazard

mitigation plans every five years to receive FEMA pre- and post-disaster mitigation funding through the Hazard Mitigation Assistance funding programs. David reviewed some trends in disasters including that we now have more frequent and intense hazard events and greater exposure to risk (people, property and critical infrastructure). In 2024 there were 27 billion-dollar disasters. Hazard mitigation is a priority for multiple reasons, including that the cost of doing nothing is too high, many events are predictable and repetitive, loss reduction can be effective, cost-beneficial, and environmentally-sound, there are legal and moral responsibilities to prevent disasters, and there are federal funds available to support mitigation. The average benefit-cost ratio for federally-funded projects is 6:1.

PROJECT OVERVIEW

David explained that we must follow the DMA planning process and this plan will integrate Community Rating System (CRS) Activity 510 planning steps into the DMA four-phase planning process to meet the requirements of both programs. The DMA process provides continued eligibility for mitigation funding, guides mitigation activities in a coordinated and economical manner, integrates hazard mitigation with other planning mechanisms, directs future development in a safe manner, and helps make communities more disaster resistant. The CRS program provides policy holders in participating communities with flood insurance discounts based on the number of CRS points the communities earn. The flood insurance premium reductions are community-wide.

Cory asked if there is an opportunity for communities to improve their CRS rating through this process. David explained that it depends on the number of points each community has. While every point helps the communities, it may not be enough points to put them over a new rating threshold.

WSP will ensure that the updated local mitigation strategy meets all FEMA planning requirements, coordinates with the natural hazards in the updated State Hazard Mitigation Plan, includes natural and human-caused hazards as identified by the LMSWG, incorporates local climate change data and findings, and addresses equitable outcomes.

PLANNING PROCESS

Abby described the planning process in more detail.

Phase 1 - Organize Resources

Phase 1 is already underway. The LMSWG was reconvened with some new members and will be asked to attend four meetings, provide input on risk and capability, update mitigation actions, and review plan drafts. LMSWG members, especially staff, were also asked to consider ways to involve the public throughout the planning process. Another priority is to identify stakeholders that should be invited to participate in the planning process, especially those that may be able to represent underserved communities and/or vulnerable populations. To maximize CRS credit and support awareness of the plan, 30 outside stakeholders must be invited to participate and provide input. Lori and David noted the importance of jurisdictional representation at the working group meetings to ensure maximum CRS credit.

Phase 2 - Assess Risks

Phase 2 covers the risk assessment, which includes the hazard identification, the vulnerability assessment, and the capability assessment. The hazards that were addressed in the previous plan were presented and are as follows: tropical cyclones, flood, severe storms (thunderstorm wind, lightning, and hail), tornadoes and waterspouts, sea level rise and climate change, drought, wildfire, coastal erosion, extreme heat, radiological incident, and cyber attack. Cory also asked if terror attacks should be included in this plan. Abby explained that this may be better covered in an emergency operation plan, but that it could be included if the working group wants to include it. David further explained that it's only best to include if there is an associated mitigation action to include in the plan. Cory mentioned that they have received funding for barriers in the past. Abby noted that the county has until March to decide if they want to include this in the plan.

Mike noted that the County has considered sea walls and asked if this is something that can be included in the mitigation strategy. Abby confirmed that it could be included.

Phase 3 - Develop a Mitigation Strategy

Phase 3 involves developing a mitigation strategy by reviewing and updating the plan goals and objectives, evaluating mitigation alternatives, including existing and new projects, and drafting an action plan with prioritized projects. Abby reviewed different approaches to mitigation, the six FEMA/CRS mitigation categories, and the count of actions by category for each jurisdiction in the existing LMS. In the plan update communities must have at least one action for each natural hazard to meet FEMA requirements and should include a flood-related action for at least 5 of the 6 mitigation categories to maximize CRS credit.

Heather asked if one mitigation action could cover multiple hazards. Abby explained that this is possible but noted that we want to try and address all hazards, especially high and medium risk hazards. Abby also highlighted that actions are only required for natural hazards – FEMA does not evaluate actions for human-cased hazards.

Abby also explained that all existing projects included in the previous plan will need a status update. WSP will send an excel spreadsheet to every jurisdiction to provide updates and comments on their actions.

Phase 4 - Adoption and Implementation

Phase 4 is where the communities must adopt and implement the plan. The communities and LMSWG will meet quarterly to review the action plan and look for funding and opportunities to implement projects. The plan will continue to be updated every five years.

PROJECT SCHEDULE

Abby presented a tentative schedule for the planning process, which includes additional LMSWG meetings around April, May, and June. The draft plan is due to FDEM in July. The plan must be approved by FDEM and FEMA and adopted by all communities before the current plan expires in January 2026.

NEXT STEPS

Abby discussed public outreach efforts which includes public meetings facilitated by WSP, a public survey, and a plan website. Community staff were asked to post outreach on local websites and social media and consider ways to advertise the plan and the survey at community events. The plan website used for the previous plan update will be rebooted and shared once it is available.

WSP will work with the County to schedule a public meeting. This meeting will probably be held virtually. WSP will provide publicity language for the survey and public meeting.

WSP will be reaching out to jurisdiction representatives to schedule Community Data Collection Meetings to discuss local hazard information, local capabilities, and mitigation action updates. WSP will reach out with date and time options over the next few weeks. Any community staff or stakeholders that can provide useful information are welcome to join the calls.

Abby asked the LMSWG to begin reviewing the existing actions and thinking about status updates. They can also begin considering new mitigation actions. The LMSWG was also asked to look for opportunities to support public engagement and to document any publicity and engagement efforts.

Thursday, January 30, 2025 1:53 PM - 3:04 PM

21
Attended

1:53 PM - 3:04 PM
Start and end time

1h 10m 50s
Meeting duration

1h 3m 22s
Average attendance time

Participants

Name	First join	Last leave	In-meeting duration
AM Moore, Abigail abigail.moore@wsp.com	1:56 PM	3:04 PM	1h 8m 12s
Ruffins, Ranger ranger.ruffins@wsp.com	1:56 PM	3:04 PM	1h 7m 34s
DS Stroud, David david.stroud@wsp.com	1:56 PM	3:04 PM	1h 7m 24s
L Lalbachan-Mike Lalbachan-Mike@monroecounty-fl.gov	1:57 PM	3:04 PM	1h 6m 51s
S Schwisow-Cory Schwisow-Cory@MonroeCounty-FL.G...	1:57 PM	3:04 PM	1h 6m 54s
ZP Zoe Porter zoe.porter@cityofkeywest-fl.gov	1:57 PM	3:04 PM	1h 6m 44s
LL Lori Lehr lori@lorilehrinc.com	1:57 PM	3:04 PM	1h 6m 58s
BS Brian Shea Sheab@ci.marathon.fl.us	1:57 PM	3:04 PM	1h 6m 54s
L Lustberg-Elizabeth Lustberg-Elizabeth@MonroeCounty-F...	1:57 PM	3:04 PM	1h 6m 42s
J James - Marathon F... (Unverified)	1:57 PM	3:03 PM	1h 6m 20s
KH Hansen, Kimberly Kimberly.Hansen@wsp.com	1:58 PM	3:04 PM	1h 6m 7s
DS Sabino, Dan Dan.Sabino@KeysEnergy.com	1:58 PM	3:02 PM	1h 4m 28s

SC	Shellie Cavalliere (Unverified)	1:58 PM	3:04 PM	1h 5m 22s
BH	Harden, Brittani Brittani.Harden@KeysEnergy.com	1:58 PM	3:04 PM	1h 5m 7s
	17344760531 (Unverified)	1:59 PM	3:04 PM	1h 4m 55s
C	Cheon-Julie Cheon-Julie@MonroeCounty-FL.Gov	1:59 PM	3:04 PM	1h 3m 6s
KD	Kelcee Degraffenreid kehernandez@fkaa.com	2:00 PM	3:03 PM	1h 3m 42s
CF	Fry, Carla A Carla.Fry@flhealth.gov	2:00 PM	3:04 PM	1h 3m 34s
TA	terry abel terry.abel@islamorada.fl.us	2:00 PM	3:04 PM	1h 3m 19s
KA	Keys Health Ready Coalition Ad... admin@keysready.org	2:01 PM	2:24 PM	23m 43s
HC	Heather Carruthers hcarruthers@k2mdesign.com	2:04 PM	3:04 PM	56m 49s

LMSWG MEETING 2: MARCH 26, 2025

MONROE COUNTY LOCAL MITIGATION STRATEGY UPDATE

LOCAL MITIGATION STRATEGY WORKING GROUP (LMSWG) – MEETING #2

March 26, 2025, 10am, Monroe County Emergency Operations Center & Microsoft Teams

ATTENDANCE

There were three attendees in person and 15 online. The following individuals were in attendance:

- Cory Schwisow, Monroe County Emergency Management
- Liz Lustberg, Monroe County Planning Department
- Alison Higgins, Key West Resiliency Manager
- Alyssa Panzer, Islamorada Sustainability and Resiliency Coordinator
- Andrew Engelmeyer, Islamorada Public Works Director
- Brian Shea, City of Marathon Planning Director
- Julie Cheon, Monroe County Planning and Environmental Resources
- Carla Fry, Florida Department of Health in Monroe County
- Kelcee Degraffenreid, Florida Keys Aqueduct Authority
- Kristen Livengood, Monroe County PIO
- Dan Sabino, Keys Energy
- Tom Harding, Key Colony Beach Commissioner
- Heather Carruthers – K2M Design Architecture and Engineering
- Maria Covelli, Marathon
- Sherrie Schwab, FL Domestic Abuse Shelter
- David Stroud, WSP
- Ranger Ruffins, WSP
- Abby Moore, WSP

AGENDA

- Welcome & Introductions
- Project Overview & Where we are in the planning process
- Hazard Identification
- Asset Inventory
  - People, Property, and Critical Facilities
- Hazard Profiles: Risk & Vulnerability
  - Summary of all natural hazards
- Remaining Data Needs
- Public Survey Update
- Next Steps

Cory Schwisow began the meeting with opening remarks thanking attendees for participating. He acknowledged that recent weeks have been busy and disruptive in Monroe County due to nearby wildfires and response activities. He asked that attendees provide as much feedback and information as possible to WSP to support the plan update.

PROJECT OVERVIEW

David Stroud and Ranger Ruffins with WSP facilitated the meeting following the agenda above. David explained that the planning process is set by the Disaster Mitigation Act (DMA) of 2000 which is codified in 44 CFR 201.6. WSP integrates the Community Rating System (CRS) Activity 510 planning steps into the DMA four-phase planning process to meet the requirements of both programs. There are four phases in the planning process: organize resources, assess risks, develop a mitigation strategy, and adopt & implement. We are currently working in phase two, which encompasses the hazard identification and risk assessment (HIRA).

There are four main steps in the HIRA: identify hazards, profile hazard events, inventory assets, and estimate losses. Risk is a combination of a hazard, vulnerability, and exposure. Each of these factors is evaluated in the risk assessment process.

HAZARD IDENTIFICATION

To update the hazard identification, WSP reviewed the hazards in the 2023 State Hazard Mitigation Plan and the hazards in the 2021 Monroe County LMS. All existing hazards in the Monroe County LMS were carried forward for re-evaluation. Cory asked if all State hazards must be included, and David clarified that hazards in the State plan that aren't relevant to the planning area are not included in the LMS. For example, winter storms and earthquakes are not evaluated in the LMS.

Looking at FEMA Major Disaster Declarations, there have been 27 disaster declarations that included Monroe County. Most of these events have been hurricanes and tropical storms. Heather Carruthers asked if this plan includes the mainland portion of Monroe County, as this may explain why the County has received declarations for freezes and fire. David confirmed that it does include the full extent of Monroe County.

David reviewed data from NCEI Storm Events database, which is compiled at a county level and reports hazard events by type along with any reported property damages, crop damages, deaths, injuries, and narrative descriptions of the event. Reviewing past events from this database provides at least a basic understanding of the types of events and impacts that can occur in the county.

David concluded by listing the hazards that were identified for inclusion in the plan update:

Natural Hazards
Flood
Tropical Cyclones
Severe Storms & Tornadoes
Wildfire
Coastal Erosion
Drought
Extreme Heat
Sea Level Rise

Technological & Human Caused Hazards
Radiological Incidents
Cyber Attack

Heather Carruthers asked about the omission of earthquake from the hazard list and whether the hazard identification is only retrospective or if we also look forward at what can happen in the future. She noted having felt an earthquake in Monroe County. David clarified that we are looking at retrospective data as well as future trends and projections. Ranger added that each hazard profiled will include a hazard specific discussion of impacts of climate change.

Cory asked about the inclusion of transportation disruption and provided examples of how the Keys have experienced disruptions and economic losses as a result of road and bridge closures. WSP will evaluate this further.

ASSET INVENTORY

David presented summary tables of the asset inventory. According to Census data, the 2020 Monroe County population was 82,874, which is a 13.4% increase since 2010. Based on county parcel and assessor data and Microsoft building footprint data, there are an estimated 42,625 buildings in the county with a structure value of over $18 billion.

There are 430 identified critical facilities countywide, which have been summarized by FEMA lifeline category. Critical facilities were identified using data from the existing LMS, updates from community staff collected at the community data meetings, and certain energy, water, wastewater, and government facilities from the communities' Vulnerability Assessments. AJ Engelmeyer asked if water systems include wastewater facilities. Ranger confirmed that it does include wastewater facilities, and the full inventory will be provided so the LMSWG can confirm and add to the inventory if needed.

HAZARD PROFILES

David presented the Priority Risk Index (PRI) methodology which is used to rate each hazard on a set of standard criteria. This provides an overall risk rating to summarize and rank the risk of each hazard. The preliminary PRI ratings are shown below:

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Coastal Erosion	Likely	Limited	Small	More than 24 hrs	Less than 1 week	2.5
Drought	Likely	Minor	Large	More than 24 hrs	More than 1 week	2.5
Extreme Heat	Likely	Limited	Large	More than 24 hrs	Less than 1 week	2.7
Flood	Highly Likely	Critical	Large	6 to 12 hours	Less than 1 week	3.5
Sea Level Rise	Highly Likely	Critical	Large	More than 24 hrs	More than 1 week	3.4
Severe Storms & Tornadoes	Highly Likely	Limited	Moderate	Less than 6 hrs	Less than 6 hrs	2.9
Wildfire	Likely	Limited	Small	Less than 6 hrs	Less than 1 week	2.6
Radiological Incident	Unlikely	Critical	Moderate	Less than 6 hrs	More than 1 week	2.6
Cyber Attack	Possible	Minor	Small	Less than 6 hrs	More than 1 week	2.4

Note: Tropical cyclones were missing from this list but are rated as a high risk hazard.

Cory asked if coastal erosion is based on long-term erosion or impacts from specific storm events. He noted that erosion is particularly a concern in Key West around Higgs Beach and Martello. Alison Higgins agreed that the coastal erosion rating seems low; the individual criteria fit but the hazard should be rated higher overall. Erosion has also been a major issue in Islamorada, particularly when storm surge washed across the island in the Matecumbe area. Dan Sabino asked whether the erosion that occurs with severe storms is covered under that hazard.

David and Ranger presented summary information on each of the identified natural hazards. See slides 21-34 for more detail.

Flood

- Per the effective FIRM data, nearly 72% of the county is in Zone AE and over 22% is in Zone VE; this is skewed by the large mainland portion of Monroe County and surrounding water area that is included in these acreages. Acreages will be provided by community in the plan which should provide a better picture of flood zone acreage where people live.
- There are 35,244 buildings located in Zone AE and 2,716 in Zone VE. This is just exposure by flood zone. WSP is working on developing loss estimates using FEMA's Hazus software. WSP will also evaluate flood exposure and loss estimates using the preliminary FIRM.

Tropical Cyclones

- There are 29 named hurricanes and tropical storms recorded in NCEI from 2000-2024. These storms caused $66.3 million in property damage and $149.9 million in crop damage, which likely includes damages to all impacted areas, not just Monroe County. These events also caused 5 deaths and 25 injuries in Monroe County.
- NCEI includes 15 records of storm surge events which caused $2 million in property damage, 1 death, and 1 injury.
- Storm surge exposure was evaluated using data from the Vulnerability Assessments for the 100-year event and the 500-year event.

Severe Storms & Tornadoes

- There are 32 tornadoes reported in NCEI from 2000-2024, which caused $5.3 million in property damages.
- NCEI reports 12 damaging lightning strikes causing $73k in property damage and 4 injuries, 7 hail incidents with hail up to 1.75" in diameter, and 53 thunderstorm wind records causing $147k in damages. These events are likely underreported but illustrate the type of damage that can and has occurred.

Wildfire

- WUI is where structures meet undeveloped wildland or vegetative fuels. An estimated 15% of the county's population lives within the critical fireshed, where fire can reach a significant number of buildings within a single burning period. About 1% of the population lives in areas of direct exposure, which is where burnable landcover is within 75m of buildings.
- From 2000-2024, FDACS reports 167 fires which burned 186 acres.
- Burn probability is moderate to high in over half of the county, but this is primarily in the mainland. 30% of the county is not included in burn probability estimates.
- Current wildfire is in the Miami-Dade side of Everglades. Monroe County's focus has been on fire watches in Big Pine area.
- In 2017, after Irma there were issues with fires in Big Pine.

Coastal Erosion

- State Critically Eroded Beaches Report indicates 15.02 miles of Florida Key' 36.3 miles of beaches are critically eroded. This includes erosion from storms, wave action, sea level rise, human activity.
- Dan Sabino noted there are areas where land around transmission poles eroded. Florida Keys Electric Coop also has this issue and has moved poles with HMGP funding.
- Tom Harding indicated that a significant amount of work has been done at Sea Oats Beach. Ranger acknowledged that ongoing work will be addressed in the hazard profile.

Drought

- From 2000-2024 Monroe County was in drought 42% of the time, mostly in abnormally dry conditions. There is about a 10% chance of drought in any given week based on past occurrences.

Extreme Heat

- In 2023, more people in the US died from heat-related illness than any year on record. Certain populations have higher vulnerability. Climate change is expected to make extreme heat worse across the southeast.
- Highest temperature on record for Key West is 96°F, which occurred in July and August 2024.

Sea Level Rise

- Current trend is 2.64 mm/year. Scenarios for the Key West tidal gage show up to 5+ feet of sea level rise by 2100 under the intermediate-high scenario or 2+ feet under the intermediate-low scenario.
- At the 2040 time horizon, there is little difference between the intermediate-low and intermediate-high scenarios.
- Sea level rise exposure was evaluated using data from the Vulnerability Assessments. These exposure estimates do not account for building elevation, except where elevation certificate data was available.
- Cory noted that John Rizzo has very detailed report on sea level rise impacts on specific keys.

REMAINING DATA NEEDS

Ranger indicated that we need to hold community data collection meetings with Monroe County and Marathon. Representatives from these communities are asked to let WSP know availability for a meeting.

We need to provide a count of repetitive loss properties by jurisdiction and indicate the number that are residential vs. commercial. We would also like to incorporate mapping of repetitive loss areas into the flood hazard profile. WSP can use FEMA open data for repetitive loss property counts or communities can provide this summarized data if they already have it. WSP cannot handle raw repetitive loss data from FEMA unless we are included with third-party access on your data sharing agreement. WSP will provide request forms to each community which you can submit to FEMA if you wish to request updated data to share with us.

PUBLIC SURVEY UPDATE

Ranger provided an update on the public survey, which has received 120 responses so far. Most respondents have been impacted by past disasters, and many mentioned Hurricane Irma. Flood, tropical cyclone, severe storms, and sea level rise were noted has the highest risk hazards per public input.

NEXT STEPS

Ranger presented the schedule for the planning process, which includes additional LMSWG meetings in May and June. The draft plan is due to FDEM in July. The plan must be approved by FDEM and FEMA and adopted by all communities before the current plan expires in January 2026.

Ranger shared the following action items for WSP and the LMSWG:

WSP will:

- Share the draft risk assessment for LMSWG review
- Schedule community meetings with Monroe County and Marathon
- Provide ISAA request form templates for repetitive loss data requests
- Schedule the next LMSWG meeting for May

LMSWG members were asked to:

- Provide summarized repetitive loss data, repetitive loss area shapefiles, or submit ISAA requests to FEMA
- Review the draft risk assessment
- Provide a status report on existing mitigation measures if you haven't already done so
- Support public engagement by promoting the public survey and the plan website. The QR code for the public survey is provided below. The plan website link is www.MonroeCountyFL-LMS.com.

Monroe County, FL Local Mitigation Strategy Public Survey

Wednesday, March 26, 2025 9:51 AM - 11:18 AM

20
Attended

9:51 AM - 11:18 AM
Start and end time

1h 27m 34s
Meeting duration

1h 6m 12s
Average attendance time

Participants

Name	First join	Last leave	In-meeting duration
AM Moore, Abigail abigail.moore@wsp.com	9:51 AM	11:18 AM	1h 27m 32s
DS Stroud, David david.stroud@wsp.com	9:51 AM	11:18 AM	1h 27m 12s
Ruffins, Ranger ranger.ruffins@wsp.com	9:53 AM	11:18 AM	1h 25m 34s
AE Andrew Engelmeyer andrew.engelmeyer@islamorada.fl.us	9:58 AM	11:14 AM	1h 16m 47s
TH Tom Harding (Unverified)	9:58 AM	11:09 AM	1h 11m 52s
R Rey (Unverified)	9:58 AM	10:03 AM	4m 56s
SN Shawna's Notetaker (Unverified)	9:59 AM	11:18 AM	1h 19m 32s
CF Fry, Carla A Carla.Fry@flhealth.gov	9:59 AM	11:03 AM	1h 3m 39s
KD Kelcee Degraffenreid kehernandez@fkaa.com	10:00 AM	11:14 AM	1h 14m 37s
AP Alyssa Panzer alyssa.panzer@islamorada.fl.us	10:00 AM	10:51 AM	50m 51s
SS Sherrie Schwab - D... (Unverified)	10:00 AM	11:14 AM	1h 14m 2s
HC Heather Carruthers hcarruthers@k2mdesign.com	10:00 AM	11:14 AM	1h 13m 53s
DS Sabino, Dan Dan.Sabino@KeysEnergy.com	10:01 AM	11:14 AM	1h 13m 42s
BS Brian Shea Sheab@ci.marathon.fl.us	10:01 AM	11:14 AM	1h 13m 26s
C Cheon-Julie Cheon-Julie@MonroeCounty-FL.Gov	10:01 AM	11:14 AM	1h 12m 54s
R Rey (Unverified)	10:02 AM	11:15 AM	1h 8m 12s
MC Maria Covelli covellim@ci.marathon.fl.us	10:03 AM	11:18 AM	1h 15m 23s
AH Alison Higgins ahiggins@cityofkeywest-fl.gov	10:05 AM	11:14 AM	1h 8m 13s
L Livengood-Kristen Livengood-Kristen@MonroeCounty-F...	10:18 AM	11:18 AM	59m 57s
TH Tom Harding (Unverified)	11:12 AM	11:14 AM	1m 55s

LMSWG MEETING 3: JUNE 5, 2025

MONROE COUNTY LOCAL MITIGATION STRATEGY UPDATE

LOCAL MITIGATION STRATEGY WORKING GROUP (LMSWG) – MEETING #3

June 5, 2025, 3pm, Microsoft Teams

ATTENDANCE

In addition to the consulting team there were 22 attendees who attended virtually through Microsoft Teams. The following individuals were in attendance:

- Cory Schwisow, Monroe County Emergency Management
- Liz Lustberg, Monroe County Planning Department
- Emily Schemper, BOCC Planning and Environmental Services
- Alison Higgins, Key West Resiliency Manager
- Alyssa Panzer, Islamorada Sustainability and Resiliency Coordinator
- Christie Martin, Florida Keys Aqueduct Authority
- Megan Bosi, Keys Ready Healthcare Coalition
- Mike Lalbachan, Monroe County BOCC
- Lori Lehr, BOCC Community Rating System
- Mimi Young, Layton City Clerk
- Shellie Cavalliere, Layton Code Enforcement
- Robert Mather, Engineer in the planning department
- Tony Hammon, Building official in Key Colony Beach
- Kevin Wilson, BOCC Assistant County Administrator
- Carla Fry, Florida Department of Health in Monroe County
- Kelcee Degraffenreid, Florida Keys Aqueduct Authority
- Lauren Wells, Florida Keys Aqueduct Authority
- Terry Abel, Islamorada Fire Chief
- Dan Sabino, Keys Energy
- Tom Harding, Key Colony Beach Commissioner
- Heather Carruthers – K2M Design Architecture and Engineering
- Shawna Martin, Ovid Solutions, Stakeholder
- Kimmy Hansen, WSP
- Ranger Ruffins, WSP
- Abby Moore, WSP

AGENDA

1. Project Overview & Where we are in the planning process
2. Capability Assessment
   a. New Capabilities
   b. Substantial Damage Management Procedures
3. Mitigation Strategy
   a. Review Goals and Objectives
   b. Mitigation Action Updates
      i. FEMA & CRS Action Requirements
      ii. Action Prioritization
4. Discussion
5. Next Steps

Cory Schwisow began the meeting with opening remarks thanking attendees for their participation and feedback throughout the plan update. Abby Moore and Ranger Ruffins with WSP facilitated the meeting following the agenda above.

PROJECT OVERVIEW

Abby Moore kicked off the meeting with a review of the four phases of FEMA disaster mitigation planning process and the 10 steps of the CRS planning process. We are currently working through Phase 3: Mitigation Strategy, which aligns with Step 6 (Set Goals), Step 7 (Review Possible Activities), and Step 8 (Draft an Action Plan) of the CRS planning process. Abby reminded the committee that there will be one more committee meeting and one more public meeting where WSP will present the draft plan. Afterwards, the plan will be sent to FDEM for review.

CAPABILITY ASSESSMENT

A capability assessment measures local resources and tools available to support or implement mitigation projects. It identifies gaps, conflicts, and opportunities in existing local plans, policies, and programs. Additionally, a capability assessment identifies mitigation measures already in place or underway.

Indicators of capability in this plan update include the following:

- Planning & Regulatory – plans, programs, ordinances
- Administrative & Technical – staff, training, expertise
- Fiscal Resources – bonds, fees, taxes, CIP, grants
- Education and Resources – engaged stakeholders, public outreach, warning & notification
- Mitigation Resources – grants, past mitigation projects performance
- Political Will – public and leadership support for mitigation, investments, regulation enforcement

Changes Since the Last Plan Update

Abby reviewed the changes in capability that have occurred since the last plan update. Capability updates were captured during the individual community meetings with WSP, with the exception of Marathon and Monroe County.

Abby suggested communities think about the following changes and updates over the past five years when updating their capability results:

- Additional funding
- New or updated plans
- New staff
- Updated flood or open space regulations
- New emergency warning systems or strategies
- Completed mitigation projects

Cory mentioned that open space management plans are difficult for all jurisdictions to complete and asked if this would reflect negatively on the municipalities. Abby said that it doesn't, and they can remove whatever isn't relevant to the communities. The committee will discuss this topic further and report their decision to WSP.

New FEMA Requirements

Abby briefly noted that there is a new FEMA requirement for substantial damage estimate procedures. The plan must include information on how participating communities use the NFIP to reduce risk after a disaster through substantial damage and substantial improvement (SD/SI) procedures. Abby noted that WSP has not yet received all the information on the community's post event procedures. These procedures don't have to be reported in detail, but the plan must document that these post event procedures exist within the community.

Capability Vs. Mitigation

Abby emphasized the difference between capability and mitigation actions and gave examples of different scenarios found on slide 12. Mitigation actions should be applicable to the next five years and should be

specific actions that help achieve the plans goals and objectives. It is important to focus on projects that reduce risk and vulnerability. Abby noted that status updates need to be reported for each individual action and to remove actions that speak to the regular duties of departments.

The committee asked if it was possible to add mitigation actions post plan approval. Abby responded that it is possible but will require a plan amendment which can be a lengthy process, and it is much easier to turn in the mitigation actions now. Additionally, Abby noted that mitigation actions with pending or unknown funding sources should still be included in the plan.

MITIGATION STRATEGY

A mitigation strategy is meant to reduce the impact of hazards on existing development and ensure future development occurs in a way that minimizes vulnerability.

Goals & Objectives

Ranger reviewed the existing goals and objectives from the previous plan update and discussed potential revisions to implement with the committee for the current plan update. These revisions can be found on slides 17 and 18 of the presentation. No further comments or revisions were recommended by the HMPC.

Mitigation Action Requirements

Ranger informed the committee that FEMA requires at least one mitigation action for each identified hazard in the plan update. All mitigation actions will need to be organized into the categories found below. Abby noted that to maximize CRS credit they should include flood-related actions in at least five of the six mitigation categories.

1. Prevention (land development plans & zoning, freeboard requirements)
2. Property Protection (acquisition, elevation, floodproofing, backup generators)
3. Structural Projects (floodwalls, stormwater improvements, harden critical infrastructure)
4. Emergency Services (warning systems, response capacity & capability improvements)
5. Natural Resource Protection (dune or wetland restoration, vegetative management, open space preservation)
6. Public Education (mailings, websites, social media campaigns, interactive map tools, hazard disclosure requirements, targeted outreach and engagement)

Current Action Plans

Ranger reviewed a summary of the current action plans in terms of what mitigation categories they cover and what hazards they address – slides 20 and 21. The current action plan has 37 multi-jurisdictional actions, and some actions fall within multiple mitigation categories. WSP will provide a full list of the mitigation strategies for communities to review and provide status updates.

PRI Summary Results

Ranger briefly reviewed the PRI summary results with the committee which can be found on slide 22. Flood, sea level rise, and tropical cyclones were the only hazard profiles to be rated a "High Risk" for Monroe County. Ranger reminded the committee that it is important to consider adding more mitigation actions for the high priority hazards.

High Risk (≥ 3.0)	Flood Sea Level Rise Tropical Cyclones
Moderate Risk (2.0 - 2.9)	Costal Erosion Drought Extreme Heat Severe Storms and Tornadoes Wildfire Radiological Incident Cyber Attack
Low Risk (< 2.0)	--

New Mitigation Action Ideas

Ranger discussed potential new mitigation action ideas that could be added into the plan update. She reminded the committee that these are only ideas to help them think of new actions and have not been added to the plan update. The action ideas presented can be found on slides 24-26. Lori Lehr noted to the committee that many communities are currently developing a watershed management plan with outside

funding sources. Many of the projects occurring in the watershed management plan could be included as new mitigation actions in the LMS plan update and it will be beneficial to have cohesion between the two plans during updates in the future.

Survey Results

Ranger reviewed results of the public survey which received a total of 126 responses. Abby will send a copy of the survey responses, which can be sorted by jurisdiction to help give specific feedback to the different communities regarding proposed mitigation action ideas.

PROJECT SCHEDULE & NEXT STEPS

Ranger presented the schedule for the planning process, which includes final LMSWG and public meetings in the end of June or early July. The draft plan is due to FDEM in July. The plan must be approved by FDEM and adopted by all communities before the current plan expires in January 2026.

Ranger shared the following action items for WSP and the LMSWG:

WSP will:

- Share the draft plan for committee and public review
- Schedule final LMSWG meeting & public meetings

LMSWG members were asked to:

- Send mitigation action status updates and new mitigation actions to Ranger (ranger.ruffins@wsp.com)
- Provide feedback on draft capability assessment

Thursday, June 5, 2025 2:51 PM - 4:01 PM

23
Attended

2:51 PM - 4:01 PM
Start and end time

1h 9m 38s
Meeting duration

55m 15s
Average attendance time

Participants

Name	First join	Last leave	In-meeting duration
AM Moore, Abigail abigail.moore@wsp.com	2:54 PM	4:00 PM	1h 6m 33s
L Lalbachan-Mike Lalbachan-Mike@monroecounty-fl.gov	2:54 PM	4:00 PM	1h 6m 12s
S Schwisow-Cory Schwisow-Cory@MonroeCounty-FL.G...	2:54 PM	4:00 PM	1h 6m 15s
L Lustberg-Elizabeth Lustberg-Elizabeth@MonroeCounty-F...	2:55 PM	4:00 PM	1h 5m 32s
S Schemper-Emily Schemper-Emily@MonroeCounty-FL....	2:55 PM	2:55 PM	36s
W Wilson-Kevin Wilson-Kevin@MonroeCounty-FL.Gov	2:55 PM	3:20 PM	24m 57s
Ruffins, Ranger ranger.ruffins@wsp.com	2:55 PM	4:00 PM	1h 5m 8s
KD Kelcee Degraffenreid kehernandez@fkaa.com	2:56 PM	4:00 PM	1h 4m 16s
TH Tom Harding (Unverified)	2:57 PM	4:00 PM	1h 3m 14s
KH Hansen, Kimberly Kimberly.Hansen@wsp.com	2:57 PM	4:00 PM	1h 2m 49s
DS Sabino, Dan Dan.Sabino@KeysEnergy.com	2:58 PM	4:00 PM	1h 2m 5s
ML Mimi Young Layton (Unverified)	2:59 PM	4:00 PM	1h 1m 9s

SN	Shawna's Notetaker (Unverified)	2:59 PM	4:01 PM	1h 1m 32s
T	Tony (Unverified)	3:00 PM	4:00 PM	1h 17s
CM	Christie Martin cmartin@fkaa.com	3:00 PM	3:30 PM	30m 20s
LL	Lori Lehr lori@lorilehrinc.com	3:00 PM	4:00 PM	59m 46s
CF	Fry, Carla A Carla.Fry@flhealth.gov	3:00 PM	4:00 PM	59m 35s
AP	Alyssa Panzer alyssa.panzer@islamorada.fl.us	3:00 PM	4:00 PM	59m 35s
KA	Keys Health Ready Coalition Ad... admin@keysready.org	3:01 PM	3:55 PM	54m 3s
HC	Heather Carruthers hcarruthers@k2mdesign.com	3:01 PM	3:49 PM	48m 28s
AH	Alison Higgins ahiggins@cityofkeywest-fl.gov	3:01 PM	4:00 PM	58m 39s
RM	Robert Mather robert.mather@islamorada.fl.us	3:02 PM	4:00 PM	58m 28s
TA	terry abel terry.abel@islamorada.fl.us	3:09 PM	4:00 PM	51m 20s

LMSWG MEETING 4: JULY 1, 2025

MONROE COUNTY LOCAL MITIGATION STRATEGY UPDATE

LOCAL MITIGATION STRATEGY WORKING GROUP (LMSWG) – MEETING #4

July 1, 2025, 2pm, Microsoft Teams

ATTENDANCE

In addition to the consulting team there were 24 attendees who attended virtually through Microsoft Teams. The following individuals were in attendance:

- Cory Schwisow, Monroe County Emergency Management
- Liz Lustberg, Monroe County Planning Department
- Alison Higgins, Key West Resiliency Manager
- Alyssa Panzer, Islamorada Sustainability and Resiliency Coordinator
- Beren Lindenberg, College of the Florida Keys, Director, Institutional Effectiveness
- Brian Shea, City of Marathon Planning Director
- Christie Martin, Florida Keys Aqueduct Authority
- Mimi Young, Layton City Clerk
- Shellie Cavalliere, Layton Code Enforcement
- Mike Lalbachan, Monroe County Mitigation Administrator
- Robert Mather, Islamorada Engineer
- Kelcee Degraffenreid, Florida Keys Aqueduct Authority
- Lauren Wells, Florida Keys Aqueduct Authority
- Kristen Livengood, Monroe County PIO
- Maria Covelli, City of Marathon Grants Coordinator
- Matt William, Key West Utilities Director
- Megan Rumbaugh, Islamorada Senior Floodplain/CRS Coordinator
- Dan Sabino, Keys Energy
- Tom Harding, Key Colony Beach Commissioner
- Zoe Porter, Key West Development Review Manager
- Shawna Martin, Ovid Solutions, Stakeholder
- Meghan Bosi, Keys Health Ready Coalition
- Ranger Ruffins, WSP
- Abby Moore, WSP

AGENDA

1. Project Overview & Where we are in the planning process
2. Draft Plan Review
   a. Structure of the Plan
3. Review of Key Plan Components
   a. Planning Process
   b. Risk Assessment
   c. Mitigation Strategy
4. Plan Adoption & Implementation
5. Next Steps
6. Discussion/ Feedback on Draft Plan

Cory Schwisow began the meeting with opening remarks thanking attendees for their participation and feedback throughout the plan update. Abby Moore and Ranger Ruffins with WSP facilitated the meeting following the agenda above.

PROJECT OVERVIEW & WHERE WE ARE IN THE PLANNING PROCESS

Abby Moore with WSP began the presentation by explaining where we are in the planning process. We are nearing the end of the planning process as we have drafted the plan and now need to finalize it with

any new or updated mitigation actions that the communities include. The plan will then need to be adopted and the LMSWG and communities will work on implementation for the next five years.

STRUCTURE OF THE PLAN

Abby provided an overview of the structure of the draft plan including a summary of each section of the plan, as follows.

- **Section 1: Introduction** provides background information on the plan, including context and justification for planning and the scope of the plan.
- **Section 2: Planning Process** summarizes how the planning process was conducted and how all planning requirements were met, including how the communities, public, and stakeholders were involved in the plan. This section also documents implementation progress of the last plan in terms of completed and deleted mitigation actions.
- **Section 3: Planning Area Profile** for summary information on the region and participating communities, including geographic, climate, demographic, and economic characteristics of the region.
- **Section 4: Hazard Identification and Risk Assessment** contains the bulk of the plan. This section presents the hazard identification and profiles each hazard with information on the location at risk, past occurrences, probability of future occurrence, and vulnerability of people, property, and critical facilities.
- **Section 5: Capability Assessment** summarizes each community's existing tools, staff, and other resources that can support the implementation of mitigation projects.
- **Section 6: Mitigation Strategy** reviews the goals and objectives of the plan and details how mitigation actions were identified and prioritized. Abby explained that existing mitigation actions from the previous plan were reviewed, and project status updates are reported in the plan. Some projects were carried forward.
- **Section 7: Mitigation Action Plan** presents the action plan tables for each community.
- **Section 8: Plan Maintenance** describes past plan integration, opportunities for future plan integration, and the process for regular monitoring, maintenance, and implementation of the plan, including ongoing responsibilities of the LMSWG.
- **Section 9: Plan Adoption** will document each community's adoption of the plan update.
- **Annexes** are provided for each participating community. The annexes provide an asset inventory with a full critical facility list, risk assessment data with vulnerability assessment results specific to the community for spatially defined hazards, and the mitigation action plan.
- **Appendix A** provides the Plan Review Tool, which documents for the plan reviewers where the planning requirements were met.
- **Appendix B** provides planning process documentation demonstrating how the LMSWG, public, and stakeholders were involved and engaged in the planning process.
- **Appendix C** provides mitigation alternatives analysis, documenting the review of mitigation action options, which is important for the CRS program planning requirements.
- **Appendix D** describes the County's method for HMA project prioritization.
- **Appendix E** lists data and resources that were referenced in the plan.

KEY PLAN COMPONENTS

Planning Process

Abby reviewed key parts of the planning process, including the LMSWG meetings, the public meetings, and all the participating communities' public outreach efforts. She noted that there is one more opportunity to get the public involved in the planning process with the review of the draft plan. The plan has been posted on the plan website. Communities can share this link and encourage folks to read and comment on the plan.

Abby reviewed some high-level survey results, which were previously presented to the LMSWG. There were 126 responses overall. Regarding past hazard experiences, many responses reference past hurricanes and flooding. Regarding recommended steps local governments could take to reduce hazard impacts, responses include suggestions for drainage improvements and regulations and guidelines for reduced risk of future development.

Abby presented the Priority Risk Index results as a summary of the risk and vulnerability assessment. She explained that the PRI is a methodology for comparing the hazards based on five categories: probability, severity, spatial extent, warning time, and duration. Flood, Sea Level Rise, and Tropical Cyclone were rated as "High Risk" for the County. The remaining hazards were rated has "Moderate" risk.

Goals & Objectives

Abby reviewed the updated goals and objectives discussed at the previous meeting. WSP has not received any additional comments since the last meeting, so Abby asked for any additional feedback. No further comments or revisions were recommended by the LMSWG. The plan goals and objectives are as follows:

Goal 1: Protect and maintain the life, health, safety, and welfare of the community.

- **Objective 1.1:** Provide public education and outreach to inform residents and visitors how to protect themselves and their property.
- **Objective 1.2:** Improve preparedness, response, and recovery capabilities to minimize hazard impacts.
- **Objective 1.3:** Reduce losses from business interruption and support long term business viability.

Goal 2: Protect and preserve property and assets, including the built environment and natural resources.

- **Objective 2.1:** Retrofit or otherwise protect community infrastructure systems, including critical facilities, utilities, water, sewer, communications, and transportation.
- **Objective 2.2:** Use planning and regulatory tools to protect future development and prevent hazard risks from worsening.
- **Objective 2.3:** Preserve and protect natural areas and resources that provide hazard risk reduction and other beneficial functions.
- **Objective 2.4:** Pursue property protection and structural projects to reduce vulnerability of existing

Goal 3: Build local capacity to enhance resiliency and enable communities to quickly recover from hazard impacts.

- **Objective 3.1:** Explore, develop, and implement new pre-disaster opportunities that build community resilience.
- **Objective 3.2:** Ensure continuity and redundancy of critical local government operations and systems.

- **Objective 3.3:** Strengthen regional connections and continue to foster inter-jurisdictional coordination for risk reduction efforts.

Mitigation Strategy

Abby reviewed a sample of the mitigation action plan to explain the organization of the table and the information included for each project, such as the lead agency, timeline for implementation, and potential funding sources.

Abby asked the committee to submit final mitigation actions to Ranger by Friday, July 11th. This includes mitigation action updates and new mitigation actions. She remined the committee to include any actions that communities may want to pursue for grant funding in the next five years. In order to receive federal funding projects need to be included in this mitigation action plan.

Mike asked if the mitigation action plan should include a project for residential elevation in order to be eligible for the State funding program. Cory noted that everything for the residential elevation program will go directly to the State. Abby noted that we will review State guidelines to ensure the County does not need to include a related action. Ranger noted that a general elevation and acquisition project remains in the action plan to ensure such projects are accounted for if funding streams were to change over time.

PLAN ADOPTION AND IMPLEMENTATION

Abby explained that every community will need to adopt the plan. Template language for the adoption resolution from will be provided. Once FDEM approves the plan, communities can adopt the plan.

Moving forward, the LMSWG should meet quarterly to report on progress toward implementation and monitor funding opportunities and implementation of mitigation actions. The plan will continue to be updated every five years.

NEXT STEPS

The LMSWG should send any final mitigation actions updates or new actions to Ranger (ranger.ruffins@WSP.com) by Friday, July 11th. WSP will submit the draft plan to FDEM for review and approval on July 18th.

A final public meeting is scheduled for tonight, at 5pm. Please send any screenshots of meeting publicity to WSP so documentation can be added into the plan.

The LMSWG was asked to review the draft plan which is available on the plan website: https://www.monroecountyfl-lms.com/. Any draft plan comments should be sent by Friday, July 11th. Comments will be incorporated into the final approved version of the plan.

In this meeting (23) Mute all

- Ruffins, Ranger
- AH Alison Higgins (Unverified)
- AP Alyssa Panzer (Unverified)
- BL Beren Lindenberg (Unverified)
- BS Brian Shea (Unverified)
- CM Christie Martin (Unverified)
- KD Kelcee Degraffenreid (Unverified)
- KA Keys Health Ready Coalition Admin (Unverified)
- L Lalbachan-Mike (Unverified)
- LW Lauren Wells (Unverified)
- L Livengood-Kristen (Unverified)
- L Lustberg-Elizabeth (Unverified)
- MC Maria Covelli (Unverified)
- MW Matt Willman (Unverified)
- MR Megan Rumbaugh (Unverified)
- ML Mimi Young Layton (Unverified)
- AM Moore, Abigail Organizer
- RM Robert Mather (Unverified)
- DS Sabino, Dan (Unverified)
- S Schwisow-Cory (Unverified)
- SN Shawna's Notetaker (Unverified)
- TH Tom Harding (Unverified)
- ZP Zoe Porter (Unverified)

QUARTERLY LMS MEETINGS

Per Florida Administrative Code Chapter 27P-22, annual meetings of the LMS working group are required. To maximize CRS credit and support plan maintenance and implementation, the Monroe County LMSWG meets quarterly. The table below summarizes the LMSWG meetings that have been held since the approval of the 2020 Local Mitigation Strategy in January 2021 until the start of this plan update in January 2025. Meetings have been held virtually via Zoom or at the Monroe County Government Center. Additional documentation of these meetings is maintained by Monroe County Emergency Management.

Date & Time	Topics Covered
12/18/2024, 1pm	Elevate Florida, HMGP Update, Non-Disaster Grants Update, Watershed Planning Program, LMS Update – Guest Speaker WSP, Upcoming Training, New Projects
6/28/2024, 1pm	Mitigation Bureau Updates, HMGP/FMA/PDM Update, Training Opportunities
3/28/2024, 11am	National Weather Service, HMGP Update, Hurricane Idalia, New Projects – FKAA, Training Opportunities
9/20/2023, 11am	Hurricane Nicole HMGP, HMA BRIC/FMA, New Projects
8/9/2023, 11am	Hurricane Ian HMGP, project prioritization
4/28/2023, 11am	Hurricane Ian HMGP, project prioritization
3/28/2023, 11am	National Weather Service, HMA programs, Hurricane Ian HMGP, My Safe Florida Home program, training
12/6/2021, 11am	NWS 2021 hurricane summary, project prioritization for Covid HMGP
10/20/2021, 10am	Irma HMGP update, Covid HMGP, FDEM BRIC/FMA update, update on new LMS Board in WebEOC, NWS forecast
9/17/2021, 3pm	Hurricane Irma HMGP; NWS: tropical storm forecast
9/14/2021, 3pm	Hurricane Irma HMGP
7/15/2021, 10am	Hurricane Irma update, BRIC/FMA update, LMS Board in WebEOC, NWS: Tropical Storm Elsa, Domestic Abuse Shelter mitigation initiative
3/23/2021, 10am	LMS update approval, Key Colony Beach: mitigation initiatives to add, HMGP Irma update, BRIC/FMA update, CDBG Irma update, Lori Lehr: CRS info, NWS: hurricane forecast products and information

Note: Documentation of LMSWG meetings held in 2022 was not available for this plan update.

B.2 PLANNING STEP 2: INVOLVE THE PUBLIC

Table B.2 – Public Meeting Topics, Dates, Locations

Meeting Title	Meeting Topic	Meeting Date	Meeting Location
Public Meeting #1	1) Introduction to DMA, CRS, and FMA requirements and the planning process 2) Review of HMPC responsibilities and the project schedule.	March 13, 2025 5 p.m.	Microsoft Teams
Public Meeting #2	1) Review Draft Local Mitigation Strategy 2) Solicit comments and feedback	July 1, 2025 5 p.m.	Microsoft Teams

PUBLIC MEETING MINUTES, ATTENDANCE, AND ANNOUNCEMENTS

PUBLIC MEETING 1: MARCH 13, 2025

MONROE COUNTY LOCAL MITIGATION STRATEGY UPDATE

PUBLIC MEETING #1

March 13, 2025, 5pm, Microsoft Teams

ATTENDANCE

There were eight attendees. The following individuals were in attendance:

- Kris Tebbets
- Tom Harding
- Diane Smith
- Steve Russ
- Cory Schwisow
- David Stroud, WSP
- Abby Moore, WSP
- Ranger Ruffins, WSP

AGENDA

- Welcome & Introductions
- Why Plan?
- Project Overview
- Planning Process
- Project Schedule
- Next Steps
- Discussion

WHY PLAN?

David Stroud and Abby Moore with WSP facilitated the meeting following the agenda above. David began the presentation with why we plan in the first place. David discussed that the Disaster Mitigation Act (DMA) of 2000 which is codified in 44 CFR 201.6 requires local governments to update their hazard mitigation plans every five years to receive FEMA pre- and post-disaster mitigation funding through the Hazard Mitigation Assistance funding programs. David reviewed some trends in disasters including that we now have more frequent and intense hazard events and greater exposure to risk (people, property and critical infrastructure). In 2024 there were 27 billion-dollar disasters. Hazard mitigation is a priority for multiple reasons, including that the cost of doing nothing is too high, many events are predictable and repetitive, loss reduction can be effective, cost-beneficial, and environmentally-sound, there are legal and moral responsibilities to prevent disasters, and there are federal funds available to support mitigation. The average benefit-cost ratio for federally-funded projects is 6:1.

PROJECT OVERVIEW

David explained that we must follow the DMA planning process and this plan will integrate Community Rating System (CRS) Activity 510 planning steps into the DMA four-phase planning process to meet the requirements of both programs. The DMA process provides continued eligibility for mitigation funding, guides mitigation activities in a coordinated and economical manner, integrates hazard mitigation with other planning mechanisms, directs future development in a safe manner, and helps make communities more disaster resistant. The CRS program provides policy holders in participating communities with flood insurance discounts based on the number of CRS points the communities earn. The flood insurance premium reductions are community-wide.

WSP will ensure that the updated local mitigation strategy meets all FEMA planning requirements, coordinates with the natural hazards in the updated State Hazard Mitigation Plan, includes natural and human-caused hazards as identified by the LMSWG, incorporates local climate change data and findings, and addresses equitable outcomes.

PLANNING PROCESS

Abby described the planning process in more detail.

Phase 1 - Organize Resources

Phase 1 is already underway. The LMSWG was reconvened with some new members and will be asked to attend meetings, provide input on risk and capability, update mitigation actions, and review plan drafts. The planning team will also identify stakeholders that should be invited to participate in the planning process, especially those that may be able to represent underserved communities and/or vulnerable populations. Abby asked attendees to suggest any groups, people, or stakeholders that should be included.

Phase 2 - Assess Risks

Phase 2 covers the risk assessment, which includes the hazard identification, the vulnerability assessment, and the capability assessment. The hazards that were addressed in the previous plan were presented and are as follows: tropical cyclones, flood, severe storms (thunderstorm wind, lightning, and hail), tornadoes and waterspouts, sea level rise and climate change, drought, wildfire, coastal erosion, extreme heat, radiological incident, and cyber attack.

Phase 3 - Develop a Mitigation Strategy

Phase 3 involves developing a mitigation strategy by reviewing and updating the plan goals and objectives, evaluating mitigation alternatives, including existing and new projects, and drafting an action plan with prioritized projects. Abby reviewed different approaches to mitigation, the six FEMA/CRS mitigation categories: property protection, structural projects, emergency services, natural resource protection, and public education. In the plan update communities must have at least one action for each natural hazard to meet FEMA requirements and should include a flood-related action for at least 5 of the 6 mitigation categories to maximize CRS credit.

Phase 4 - Adoption and Implementation

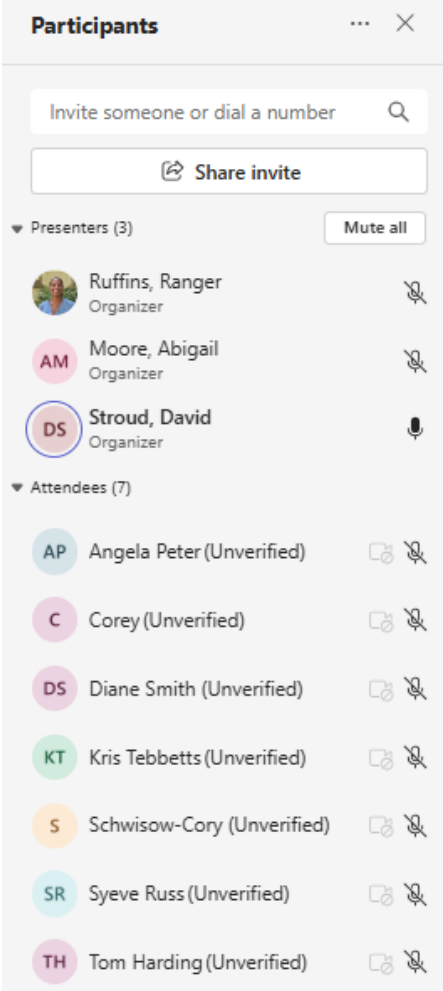
Phase 4 is where the communities must adopt and implement the plan. The communities and LMSWG will meet quarterly to review the action plan and look for funding and opportunities to implement projects. The plan will continue to be updated every five years.

PROJECT SCHEDULE

Abby presented a tentative schedule for the planning process, which includes additional LMSWG meetings around April, May, and June. The draft plan is due to FDEM in July. The plan must be approved by FDEM and FEMA and adopted by all communities before the current plan expires in January 2026.

NEXT STEPS

Abby discussed public outreach efforts which include public meetings facilitated by WSP, a public survey, and a plan website. The plan website will host the survey, meeting materials, and draft plans for review when made available.


Participants
Invite someone or dial a number
Share invite
Presenters (3)
Mute all
Ruffins, Ranger
Organizer
AM
Moore, Abigail
Organizer
DS
Stroud, David
Organizer
Attendees (7)
AP
Angela Peter (Unverified)
C
Corey (Unverified)
DS
Diane Smith (Unverified)
KT
Kris Tebbetts (Unverified)
S
Schwisow-Cory (Unverified)
SR
Syeve Russ (Unverified)
TH
Tom Harding (Unverified)

County hosts mitigation meeting

Mar 13, 2025

Listen to this article now
Powered by Trinity Audio

MONROE COUNTY — Monroe County is updating the Multi-Jurisdictional Local Mitigation Strategy to reduce the risk of loss from a hurricane, flooding or other disaster.

This plan update is required for the county and incorporated communities to maintain eligibility for pre- and post-disaster mitigation funding from FEMA. This effort will also help all communities identify hazard risks, understand vulnerability and develop and prioritize proactively mitigating risk.

Trending Now

1. Visitor dies in snorkeling-related incident
2. First Baptist Church of Islamorada meets community needs

City of Key Colony Beach, Florida
March 10 at 9:19 AM ·

VIRTUAL PUBLIC MEETING REGARDING MITIGATION STRATEGY & RISK TO BE HELD MARCH 13
MONROE COUNTY, FL – Monroe County is updating the Multi-Jurisdictional Local Mitigation Strategy. This plan update is required for the county and incorporated communities to maintain eligibility for pre- and post-disaster mitigation funding from FEMA. This effort will also help all communities identify hazard risks, understand vulnerability, and develop and prioritize proactively mitigating risk.

To kick off the planning process, a virtual public meeting will be held on Thursday, March 13 at 5 p.m. to provide information on the plan update process, review the identified hazards, and gather feedback from the public.

For more information about the plan update and to register to receive the meeting link, visit www.MonroeCountyFL-LMS.com.

What is mitigation? Mitigation means reducing the risk of loss from any undesirable event, like a hurricane, flooding, or other disasters. In short, mitigation means to minimize loss or harm.

1 comment

Like Comment Send Share

From: city of layton <mimi@cityoflayton.ccsend.com>
Sent: Friday, March 7, 2025 4:33 PM
To: cityhall@cityoflayton.com
Subject: Monroe County Local Mitigation Strategy Public Meeting

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Monroe County is updating the Multi-Jurisdictional Local Mitigation Strategy. This plan update is required for the county and incorporated communities to maintain eligibility for pre- and post-disaster mitigation funding from FEMA. This effort will also help all communities to identify hazard risks, understand vulnerability, and develop and prioritize ways to proactively mitigate risk.

To kick off the planning process, a virtual public meeting will be held on Thursday, March 13th at 5pm to provide information on the plan update process, review the identified hazards, and gather feedback from the public. **Click here** to register and receive a link to attend the meeting.

For more information about the plan update, visit **www.MonroeCountyFL-LMS.com**.

city of layton | PO BOX 778 | Long Key, FL 33001 US

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City of Marathon, Florida
March 10 at 10:00 AM ·

It's time to update the Monroe County Local Mitigation Strategy! Join us for a virtual public meeting on 3/13 at 5pm to learn about the plan update and provide input on hazards, risks, and mitigation opportunities. Click https://events.teams.microsoft.com/.../7c96fc91-a5ad-458b... to register and receive a link to attend the meeting.

For more information about the plan update, visit www.MonroeCountyFL-LMS.com.

2 1 share

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MONROE COUNTY FLORIDA

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List Week Month

Find a Facility Notify Me Print Subscribe to iCalendar

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Start Date End Date Enter Search Terms

Start Date End Date Word or Phrase Show Past Events Select a Calendar

Return to Previous

Event Details

Virtual Public Meeting: Local Mitigation Strategy & Risk

Thursday, March 13, 2025

Date: March 13, 2025

Time: 5:00 PM - 7:00 PM

Location: For more information about the plan update and to register to receive the meeting link, visit www.MonroeCountyFL-LMS.com.

Monroe County is updating the Multi-Jurisdictional Local Mitigation Strategy. This plan update is required for the county and incorporated communities to maintain eligibility for pre- and post-disaster mitigation funding from FEMA. This effort will also help all communities identify hazard risks, understand vulnerability, and develop and prioritize proactively mitigating risk.

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What is mitigation? Mitigation means reducing the risk of loss from any undesirable event, like a hurricane, flooding, or other disasters. In short, mitigation means to minimize loss or harm.

PUBLIC MEETING 2: JULY 1, 2025

MONROE COUNTY LOCAL MITIGATION STRATEGY UPDATE

PUBLIC MEETING #2

July 1, 2025, 5pm, Microsoft Teams

ATTENDANCE

There were twelve attendees. The following individuals were in attendance:

- Cory Schwisow, Monroe County Emergency Management
- Liz Lustberg, Monroe County Planning Department
- Tom Harding, Key Colony Beach Commissioner
- M'Liss Bordelon
- Carlos Javier
- Dave
- Harry Appel
- Janine Oliveria
- JW
- Rey
- Ranger Ruffins, WSP
- Abby Moore, WSP

AGENDA

1. Project Overview & Where we are in the planning process
2. Draft Plan Review
   a. Structure of the Plan
3. Review of Key Plan Components
   a. Planning Process
   b. Risk Assessment
   c. Mitigation Strategy
4. Plan Adoption & Implementation
5. Next Steps
6. Discussion/ Feedback on Draft Plan

PROJECT OVERVIEW & WHERE WE ARE IN THE PLANNING PROCESS

Abby Moore with WSP began the presentation by explaining where we are in the planning process. We are nearing the end of the planning process as we have drafted the plan and now need to finalize it with any new or updated mitigation actions that the communities include. The plan will then need to be adopted and the LMSWG and communities will work on implementation for the next five years.

STRUCTURE OF THE PLAN

Abby provided an overview of the structure of the draft plan including a summary of each section of the plan, as follows.

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- **Section 2: Planning Process** summarizes how the planning process was conducted and how all planning requirements were met, including how the communities, public, and stakeholders were involved in the plan. This section also documents implementation progress of the last plan in terms of completed and deleted mitigation actions.
- **Section 3: Planning Area Profile** for summary information on the region and participating communities, including geographic, climate, demographic, and economic characteristics of the region.

- **Section 4: Hazard Identification and Risk Assessment** contains the bulk of the plan. This section presents the hazard identification and profiles each hazard with information on the location at risk, past occurrences, probability of future occurrence, and vulnerability of people, property, and critical facilities.
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- **Section 6: Mitigation Strategy** reviews the goals and objectives of the plan and details how mitigation actions were identified and prioritized. Abby explained that existing mitigation actions from the previous plan were reviewed, and project status updates are reported in the plan. Some projects were carried forward.
- **Section 7: Mitigation Action Plan** presents the action plan tables for each community.
- **Section 8: Plan Maintenance** describes past plan integration, opportunities for future plan integration, and the process for regular monitoring, maintenance, and implementation of the plan, including ongoing responsibilities of the LMSWG.
- **Section 9: Plan Adoption** will document each community's adoption of the plan update.
- **Annexes** are provided for each participating community. The annexes provide an asset inventory with a full critical facility list, risk assessment data with vulnerability assessment results specific to the community for spatially defined hazards, and the mitigation action plan.
- **Appendix A** provides the Plan Review Tool, which documents for the plan reviewers where the planning requirements were met.
- **Appendix B** provides planning process documentation demonstrating how the LMSWG, public, and stakeholders were involved and engaged in the planning process.
- **Appendix C** provides mitigation alternatives analysis, documenting the review of mitigation action options, which is important for the CRS program planning requirements.
- **Appendix D** describes the County's method for HMA project prioritization.
- **Appendix E** lists data and resources that were referenced in the plan.

KEY PLAN COMPONENTS

Abby reviewed key parts of the planning process, including the LMSWG meetings, the public meetings, and all the participating communities' public outreach efforts. She noted that there is one more opportunity to get the public involved in the planning process with the review of the draft plan. The plan has been posted on the plan website. Communities can share this link and encourage folks to read and comment on the plan.

Abby reviewed some high-level survey results, which were previously presented to the LMSWG. There were 126 responses overall. Regarding past hazard experiences, many responses reference past hurricanes and flooding. Regarding recommended steps local governments could take to reduce hazard impacts, responses include suggestions for drainage improvements and regulations and guidelines for reduced risk of future development.

Abby presented the Priority Risk Index results as a summary of the risk and vulnerability assessment. She explained that the PRI is a methodology for comparing the hazards based on five categories: probability, severity, spatial extent, warning time, and duration. Flood, Sea Level Ris, and Tropical Cyclone were rated as "High Risk" for the County. The remaining hazards were rated has "Moderate" risk.

Goals & Objectives

Abby reviewed the updated goals and objectives discussed at the previous LMSWG meeting. The plan goals and objectives are as follows:

Goal 1: Protect and maintain the life, health, safety, and welfare of the community.

- **Objective 1.1:** Provide public education and outreach to inform residents and visitors how to protect themselves and their property.
- **Objective 1.2:** Improve preparedness, response, and recovery capabilities to minimize hazard impacts.
- **Objective 1.3:** Reduce losses from business interruption and support long term business viability.

Goal 2: Protect and preserve property and assets, including the built environment and natural resources.

- **Objective 2.1:** Retrofit or otherwise protect community infrastructure systems, including critical facilities, utilities, water, sewer, communications, and transportation.
- **Objective 2.2:** Use planning and regulatory tools to protect future development and prevent hazard risks from worsening.
- **Objective 2.3:** Preserve and protect natural areas and resources that provide hazard risk reduction and other beneficial functions.
- **Objective 2.4:** Pursue property protection and structural projects to reduce vulnerability of existing

Goal 3: Build local capacity to enhance resiliency and enable communities to quickly recover from hazard impacts.

- **Objective 3.1:** Explore, develop, and implement new pre-disaster opportunities that build community resilience.
- **Objective 3.2:** Ensure continuity and redundancy of critical local government operations and systems.
- **Objective 3.3:** Strengthen regional connections and continue to foster inter-jurisdictional coordination for risk reduction efforts.

Mitigation Strategy

Abby reviewed a sample of the mitigation action plan to explain the organization of the table and the information included for each project, such as the lead agency, timeline for implementation, and potential funding sources.

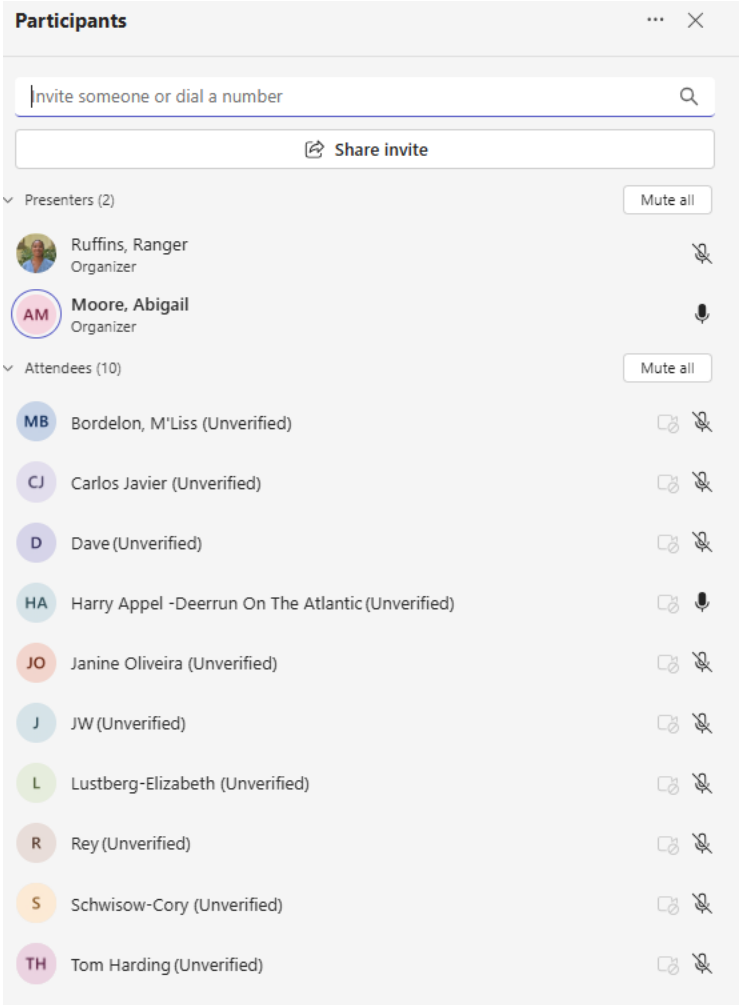
Abby asked attendee to review the mitigation action plan and submit any questions or ideas for additional actions to County's consultants. Suggestions should be submitted by Friday, July 11th. The draft plan is available for review on the County's LMS plan website: https://www.monroecountyfl-lms.com/.

PLAN ADOPTION AND IMPLEMENTATION

Abby explained that every community will adopt the plan once it has been approved by FDEM. Moving forward, the LMSWG will meet quarterly to report on progress toward implementation and monitor funding opportunities and implementation of mitigation actions. The plan will continue to be updated every five years.

NEXT STEPS

The draft plan is available for review on the plan website: https://www.monroecountyfl-lms.com/. Any draft plan comments should be sent by Friday, July 11th. Comments will be incorporated into the final approved version of the plan.


Participants
Invite someone or dial a number
Share invite
Presenters (2)
Mute all
Ruffins, Ranger
Organizer
AM
Moore, Abigail
Organizer
Attendees (10)
Mute all
MB
Bordelon, M'Liss (Unverified)
CJ
Carlos Javier (Unverified)
D
Dave (Unverified)
HA
Harry Appel -Deerrun On The Atlantic (Unverified)
JO
Janine Oliveira (Unverified)
J
JW (Unverified)
L
Lustberg-Elizabeth (Unverified)
R
Rey (Unverified)
S
Schwisow-Cory (Unverified)
TH
Tom Harding (Unverified)

City of KEY COLONY BEACH

I WANT TO ▾ GOVERNMENT ▾ DEPARTMENTS ▾ COMMUNITY ▾ ABOUT OUR CITY ▾

Monroe County Local Mitigation Strategy Update – Virtual Public Meeting 07-01-2025 – 5:00 PM

/ Uncategorized / By City Clerk

MONROE COUNTY PRESS RELEASE:

The Monroe County Local Mitigation Strategy update is nearly complete, and we want to hear from you! Join us for a virtual public meeting on Tuesday, July 1st at 5 pm to learn about the draft plan and provide your comments to the planning team. Click here to register to attend.

This plan evaluates our communities' hazard risks and vulnerabilities and establishes goals, objectives, and actions for reducing risk and building local resilience. This plan update is also required for the county and incorporated communities to maintain eligibility for pre- and post-disaster mitigation funding from FEMA.

This meeting is an opportunity to:

- Share your experiences and identify recurring risks
- Discuss mitigation actions that will enhance Monroe County's resiliency
- Provide feedback that is crucial for a plan that truly reflects and serves our community

For more information about the plan update, visit www.MonroeCountyFL-LMS.com.

Key Colony Beach Facebook Group · Join
City of Key Colony Beach, Florida · 5d ·

Monroe County Local Mitigation Strategy Update - Virtual Public Meeting 07-01-2025 - 5:00 PM
MONROE COUNTY PRESS RELEASE:

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For more information about the plan update, visit www.MonroeCountyFL-LMS.com.

City of Key Colony Beach, Florida
June 25 at 8:40 AM ·

Monroe County Local Mitigation Strategy Update - Virtual Public Meeting 07-01-2025 - 5:00 PM

MONROE COUNTY PRESS RELEASE:

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Discuss mitigation actions that will enhance Monroe County's resiliency
Provide feedback that is crucial for a plan that truly reflects and serves our community
For more information about the plan update, visit www.MonroeCountyFL-LMS.com.

1

Like Comment

County Local Mitigation Strategy Meeting - July 1

The Monroe County Local Mitigation Strategy update is nearly complete, and we want to hear from you! Join us for a virtual public meeting on Tuesday, July 1 at 5pm to learn about the draft plan and provide your comments to the planning team. Click on the button below to register to attend.

This plan evaluates our communities' hazard risks and vulnerabilities and establishes goals, objectives, and actions for reducing risk and building local resilience. This plan update is also required for the county and incorporated communities to maintain eligibility for pre- and post-disaster mitigation funding from FEMA.

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For more information about the plan update, visit **www.MonroeCountyFL-LMS.com**.

Register to Attend

City of Marathon, Florida
4h ·

The Monroe County Local Mitigation Strategy update is nearly complete, and the City of Marathon and Monroe County want your participation.

Monroe County BOCC - Florida Keys
22h ·

The Monroe County Local Mitigation Strategy update is nearly complete, and we want to hear from you! Join us for a virtual public meeting on Tuesday, July 1 at 5pm to learn about the draft plan and provide your comments to the planning team.

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For more information about the plan update and to register for meeting, visit www.MonroeCountyFL-LMS.com.

Monroe County Emergency Management - Florida Keys
22h ·

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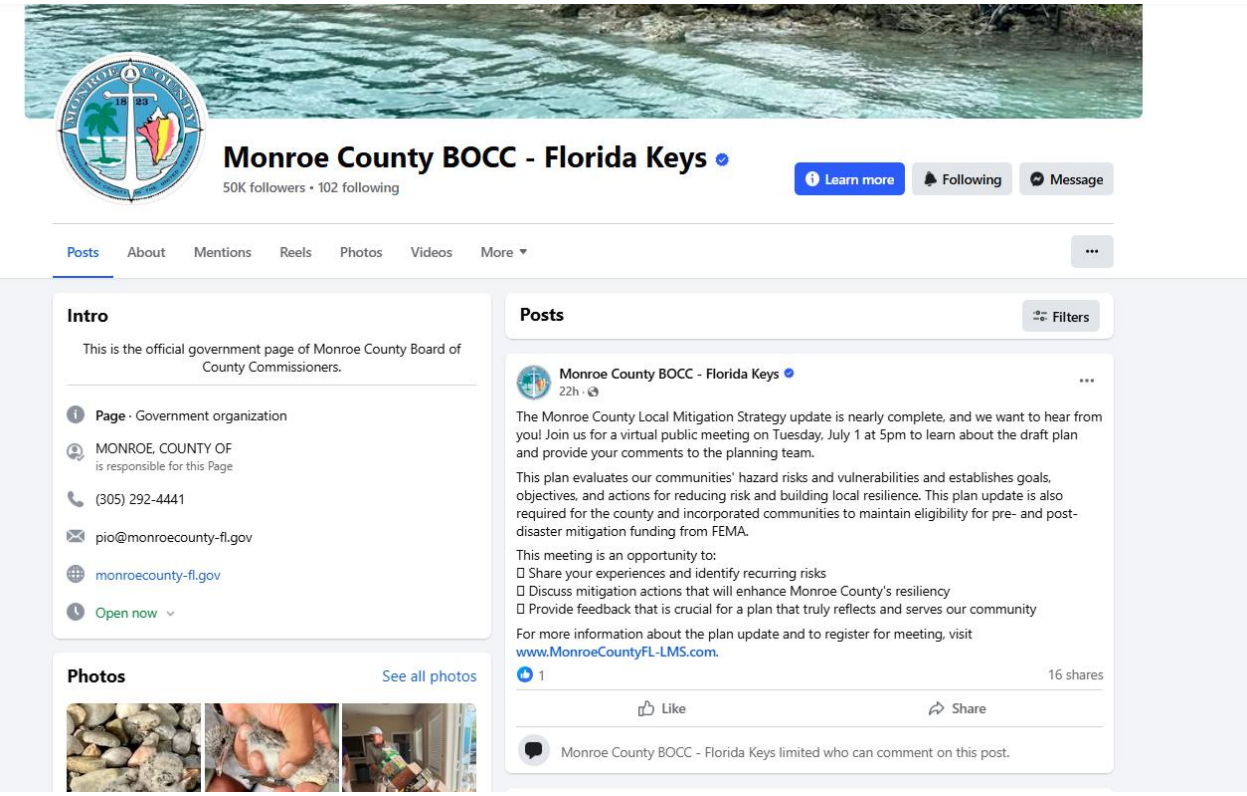
1

Like Comment Share

Write a comment...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MONROE, COUNTY OF
is responsible for this Page
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pio@monroecounty-fl.gov
monroecounty-fl.gov
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Monroe County BOCC - Florida Keys
22h
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For more information about the plan update and to register for meeting, visit www.MonroeCountyFL-LMS.com.
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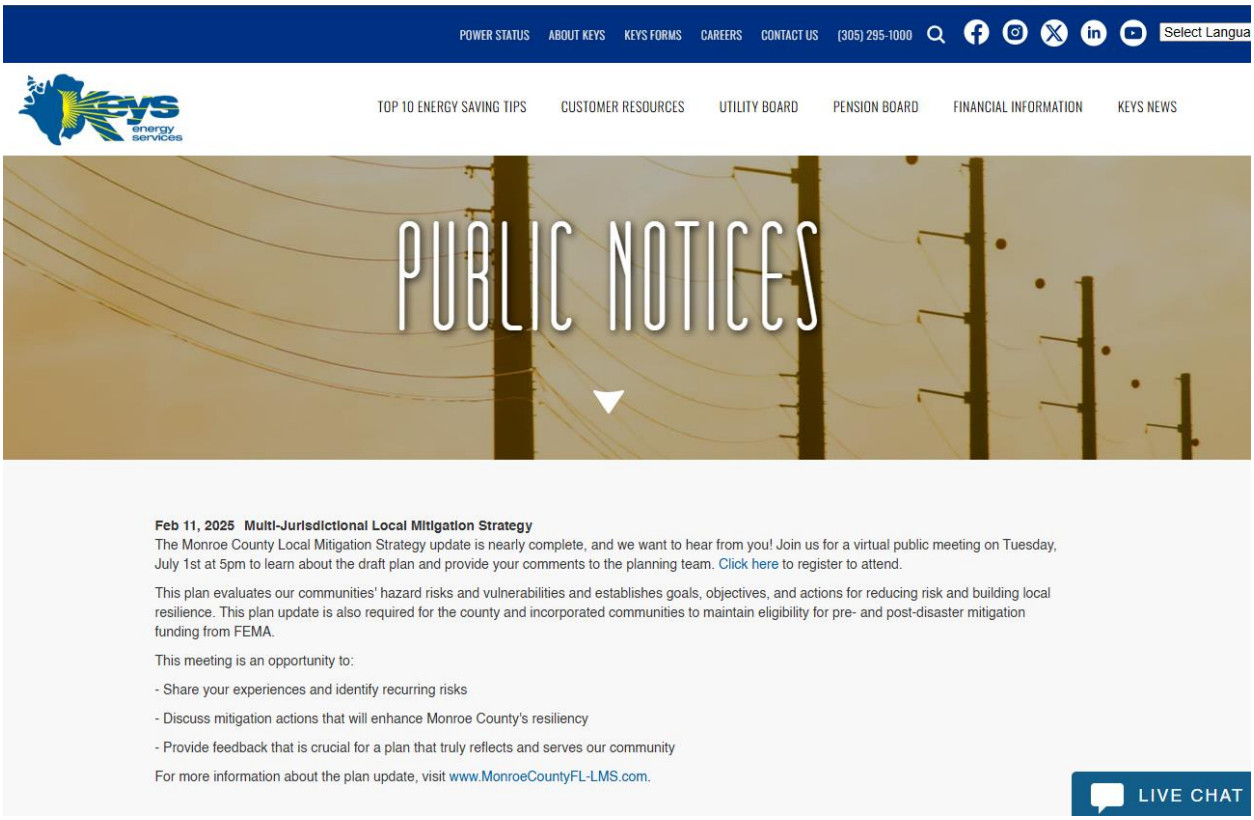
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CUSTOMER RESOURCES
UTILITY BOARD
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FINANCIAL INFORMATION
KEYS NEWS
PUBLIC NOTICES
Feb 11, 2025 Multi-Jurisdictional Local Mitigation Strategy
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For more information about the plan update, visit www.MonroeCountyFL-LMS.com.
LIVE CHAT

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Florida Keys

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FLOOD INFORMATION

Comprehensive Plan Update 2016

The Monroe County Local Mitigation Strategy update is nearly complete,

and we want to hear from you! Join us for a virtual public meeting on Tuesday, July 1st at 5pm to learn about the draft plan and provide your comments to the planning team. Click here to register to attend.

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For more information about the plan update, visit www.MonroeCountyFL-LMS.com.

Social Media language

The Monroe County Local Mitigation Strategy update is nearly complete! Join us for a virtual public meeting on 7/1 at 5pm to learn about the plan update and provide feedback on hazards, risks, and mitigation opportunities. Click here to register and receive a link to attend the meeting.

For more information about the plan update, visit www.MonroeCountyFL-LMS.com.

wsp PLAN MATERIALS RESOURCES CONTACT US

Join us for a virtual public meeting on **Tuesday, July 1st at 5pm** to learn about the draft plan and provide your comments to the planning team. Click here to register to attend.

From: Human Resources <hr@cfk.edu>
Sent: Tuesday, July 1, 2025 3:52 PM
Subject: Monroe County Local Mitigation Strategy Final Public Meeting

Greetings,
This message is being sent on behalf of Beren Lindenberg, Senior Director Sponsored Programs.

For employees that are residents of Monroe County, FL, this is being shared with you on behalf of Beren Lindenberg, Senior Director Sponsored Programs, in her role as a participant on the Monroe County Local Mitigation Strategy (LMS) working group.

The five-year plan update is nearly complete, and we want to hear from you! Join us for a virtual public meeting on Tuesday, July 1st at 5pm to learn about the draft plan and provide your comments to the planning team. Click here to register to attend.

This plan evaluates our communities' hazard risks and vulnerabilities and establishes goals, objectives, and actions for reducing risk and building local resilience. This plan update is also required for the county and incorporated communities to maintain eligibility for pre- and post-disaster mitigation funding from FEMA.

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- Discuss mitigation actions that will enhance Monroe County's resiliency

- Provide feedback that is crucial for a plan that truly reflects and serves our community For more information about the plan update, visit www.MonroeCountyFL-LMS.com.

Thanks,

Beren

Beren C. Lindenberg
Senior Director, Sponsored Programs
T: 305-809-3109

Office of Talent Acquisition, Development, and Accountability (TADA)
E-mail: hr@cfk.edu
Phone: 305-809-3179/305-809-3118

The College of the Florida Keys
5901 College Road | Key West, FL 33040
www.cfk.edu

PLAN WEBSITE OUTREACH

Take the Survey

Survey Link

This survey is an opportunity for you to share your opinions and participate in the mitigation planning process.

Project Timeline

Working Group Meeting #1	January 2025
Public Meeting #1	February 2025
Working Group Meeting #2	April 2025
Working Group Meeting #3	May 2025
Working Group Meeting #4	June 2025
Public Meeting #2	June 2025
Plan Due to FL DEM	July 2025
Current Plan Expiration	January 2026

Meeting Materials

01/30/25 - LMSWG Meeting 1 Minutes and Presentation

03/26/25 - LMSWG Meeting 2 Minutes and Presentation

06/05/25 - LMSWG Meeting 3 Minutes and Presentation

Draft Documents

Check back for updates throughout the planning process.

- DRAFT Hazard Identification and Risk Assessment
- DRAFT Capability Assessment
- DRAFT Local Mitigation Strategy

KEY WEST CHAMBER OF COMMERCE

Visit Key West Live, Work & Relocate The Chamber

PUBLIC INPUT REQUESTED REGARDING LOCAL HAZARD RISKS AND MITIGATION OPTIONS

2/24/2025 0 Comments

FLORIDA KEY, FL – Monroe County and its municipalities are updating the Multi-Jurisdictional Local Mitigation Strategy. Local governments are required to prepare and update these plans to be eligible for FEMA hazard mitigation assistance grants following storms and other disasters.

Public input is critical to the planning process. Please take a few minutes to complete a brief public survey to provide your input on hazard risks and mitigation options. Click here or scan the QR code for the survey.

For more information about the plan update, visit https://www.monroecountyfl-lms.com/. On this site, you will find information about upcoming and past Local Mitigation Strategy Working Group meetings and public meetings, the link for the public survey, draft documents, and other mitigation planning resources.

Islamorada Village of Islands

VILLAGE COUNCIL | DEPARTMENTS | RESIDENTS | COMMUNITY | HOW DO I...

- Comprehensive Plan
- Village Code
- Geographic Information System (GIS)
- Planning Forms, Applications & Manuals
- Planning & Development Services Application Fees
- Quasi-Judicial Reports
- Planning & Development On-Going Projects +
- Planning References
- Affordable Housing

Home › Departments › Planning & Development Services › Sustainability and Resiliency

Sustainability and Resiliency

Sustainability is the ability to maintain or preserve something over time, such as the use of resources so as not to deplete them for use in our generation or for generations to come.

Resiliency is the ability to recover from a shock or disturbance, which refers to a communities ability to recover from disaster, climate change, and other environmental challenges.

Contact Us

Alyssa Panzer
Sustainability & Resiliency Coordinator
Alyssa Panzer
Phone: 305-664-6447
More Information

Planning

Timeline

NEW**2025: Multijurisdictional Local Mitigation Strategy 5 year Update: For more information about the plan update, visit the project website at https://www.monroecountyfl-lms.com/. On this site you will find information about upcoming and past Local Mitigation Strategy Working Group meetings and public meetings, a link for the public survey, draft documents, and other mitigation planning resources.

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FLOOD INFORMATION

Comprehensive Plan Update 2016

In FLOOD INFORMATION:

- Elevation Certificates

Monroe County is updating the Multi-Jurisdictional Local Mitigation Strategy. Local governments are required to prepare and update these plans to be eligible for FEMA hazard mitigation assistance grants.

Public input is critical to the planning process. Please take a few minutes to complete a brief public survey to provide your input on hazard risks and mitigation options. Click here for the survey.

For more information about the plan update, visit the project website at https://www.monroecountyfl-lms.com/. On this site you will find information about upcoming and past Local Mitigation Strategy Working Group meetings and public meetings, a link for the public survey, draft documents, and other mitigation planning resources.

Local Mitigation Strategy for review

LMS Progress report 2023

Islamorada,
Village of Islands

Village Weekly Update
February 22, 2025

FKAA Plantation Key Transmission Main Replacement Project Update

As mentioned in previous updates, FKAA is launching their latest transmission replacement project on Plantation Key. While preparation for the project has already begun, the actual construction is slated to begin on Monday, February 24 at 10am just north of Tavernier Creek Bridge. Traffic delays are expected northbound and southbound around the area while work is being completed.

You can find more information about the FKAA project, including any updates to the project, here.

Comprehensive Plan Updates

As part of the Comprehensive Plan process, Able City East has launched a community survey, giving residents a more detailed opportunity to share their thoughts and insights and shape Islamorada's future! It is extremely important to use this opportunity to make your voice heard during this pivotal time.

Of note, Able City East will also be hosting a weeklong charette and they want to hear from you! This plan aims to balance environmental stewardship, community connectivity, and economic resilience to preserve Islamorada's charm as both a beloved home and a sought-after destination for generations to come. To learn more about the Comprehensive Plan, click here.

Free Cancer Screening with Sylvester Comprehensive Cancer Center – February 28

Sylvester Comprehensive Cancer Center's Office of Outreach and Engagement helps communities in South Florida that may not have access to healthcare. They want to help people by working with different groups in the community by providing free cancer screenings and services, as well as education on ways to prevent and detect cancer early.

The Sylvester bus will be at Centennial Bank in Islamorada (MM81) on Friday, February 28. The team will be there to talk about cancer prevention and offering free cancer screenings. To learn more and attend an event where we can offer these screenings, call 305-243-1120 or visit SylvesterGameChanger.com.

86800 Overseas Highway, Islamorada, FL 33036
305-664-6400 · Fax 305-664-6465 · www.islamorada.fl.us

County Launches Local Mitigation Strategy Update

Monroe County is updating the Multi-Jurisdictional Local Mitigation Strategy. Local governments are required to prepare and update these plans to be eligible for FEMA hazard mitigation assistance grants. Public input is critical to the planning process. Please take a few minutes to complete a brief public survey to provide your input on hazard risks and mitigation options. Click here for the survey.

For more information about the plan update, visit the project website at https://www.monroecountyfl-lms.com/. On this site you will find information about upcoming and past Local Mitigation Strategy Working Group meetings and public meetings, a link for the public survey, draft documents, and other mitigation planning resources.

Public Survey

Monroe County distributed and publicized a public survey, shown below, that requested public input into the Local Mitigation Strategy planning process and the identification of mitigation activities that could lessen the risk and impact of future flood hazard events. The survey was announced at the first public meeting, provided via a link on participating jurisdictions web and social media accounts, and made available online on the plan website.

1. Where do you live?

- ◯ Unincorporated Monroe County
- ◯ Key Colony Beach
- ◯ Key West
- ◯ Layton
- ◯ Marathon
- ◯ Islamorada
- ◯ I live outside of Monroe County but work or recreate in Monroe County.
- ◯ Other

2. Have you ever experienced or been impacted by a hazard or disaster in Monroe County?

- ◯ Yes
- ◯ No

3. If you answered "Yes" to question 2, please explain your experience and where it occurred.

Enter your answer

4. On a scale of 1-5, how concerned are you about the possibility of your community being impacted by a hazard event?

1	2	3	4	5

Not at all concerned — Very concerned

5. Please review the list of hazards below and rate each hazard based on how much risk you think it poses to your community.

	No risk	Low risk	Moderate risk	High risk
Coastal Erosion	○	○	○	○
Drought	○	○	○	○
Extreme Heat	○	○	○	○
Flood	○	○	○	○
Sea Level Rise & Climate Change	○	○	○	○
Severe Storms (Thunderstorm Wind, Lightning, Hail)	○	○	○	○
Tornado & Waterspouts	○	○	○	○
Tropical Cyclones	○	○	○	○
Wildfire	○	○	○	○
Cyber Attack	○	○	○	○
Radiological Incident	○	○	○	○

6. Is your home located in a floodplain?

- ○ Yes
- ○ No
- ○ No, but I still experience flooding
- ○ I don't know

7. Do you have flood insurance for your home and/or personal property?

- ○ Yes
- ○ No
- ○ I don't know

8. If you do NOT have flood insurance, what is the reason?

- ◯ It's too expensive
- ◯ I never really considered it
- ◯ I don't need it because my home is elevated or otherwise protected
- ◯ Other

9. Have you taken any actions to protect your home or neighborhood from hazards?

- ◯ Yes
- ◯ No

10. If you answered "Yes" to question 9, what actions have you implemented?

Enter your answer

11. Do you know what government office to contact to learn more about your hazard risks and how to reduce vulnerability in your area?

- ◯ Yes
- ◯ No

12. What are some steps your local government could take to reduce the risk of future hazard damages in your neighborhood?

Enter your answer

13. Many community-wide activities can reduce our risk from hazards. These activities generally fall into one of the following six broad categories:

    - **Prevention:** administrative and regulatory actions, plans, policies, and ordinances that influence how land is developed and buildings are built. *Examples include planning and zoning, building codes, open space preservation, land use, and floodplain regulations.*
    - **Property Protection**: actions that involve the modification of existing buildings to protect them from a hazard or remove them from a hazardous area. *Examples include acquisition, relocation, elevation, structural retrofits, and storm shutters.*
    - **Natural Resource Protection**: actions that minimize hazard losses and preserve or restore the functions of natural systems. *Examples include floodplain protection, habitat preservation, slope stabilization, stream buffers, wetland and marsh protection, and forest management.*
    - **Structural Projects**: actions that lessen the impact of a hazard by modifying the natural progression of a hazard. *Examples include dams, levees, floodwalls, berms, drainage infrastructure, detention/retention basins, channel modifications, retaining walls, and storm sewers.*
    - **Emergency Services**: actions that protect people and property during and immediately after a hazard event. *Examples include warning systems, evacuation planning, emergency response training, and protection of critical emergency facilities or systems.*
    - **Public Education and Awareness**: actions to inform the public about hazards and techniques they can use to protect themselves and their property. *Examples include outreach projects, school education programs, library materials, and demonstration events.*

    Please rank these categories by how important you think each one is for your community to consider pursuing.

	1 - Most Important	2	3	4	5	6 - Least Important
Prevention	○	○	○	○	○	○
Property Protection	○	○	○	○	○	○
Natural Resource Protection	○	○	○	○	○	○
Structural Projects	○	○	○	○	○	○
Emergency Services	○	○	○	○	○	○
Public Education	○	○	○	○	○	○

14. What is the best way for you to receive information about the impacts of hazards and how to protect your home or neighborhood? Please select your top three choices.

Please select 3 options.

- [ ] Newspaper
- [ ] TV Ads/Programming
- [ ] Radio Ads/Programming
- [ ] Public library
- [ ] Public workshop/meetings
- [ ] School meetings
- [ ] Mail
- [ ] Email
- [ ] Text message
- [ ] Local government website
- [ ] Local government social media
- [ ] Other

The County received 126 responses to the survey. Questions and responses are detailed in Figure B.1 through Figure B.14.

Figure B.1 – Survey Response, Place of Residence

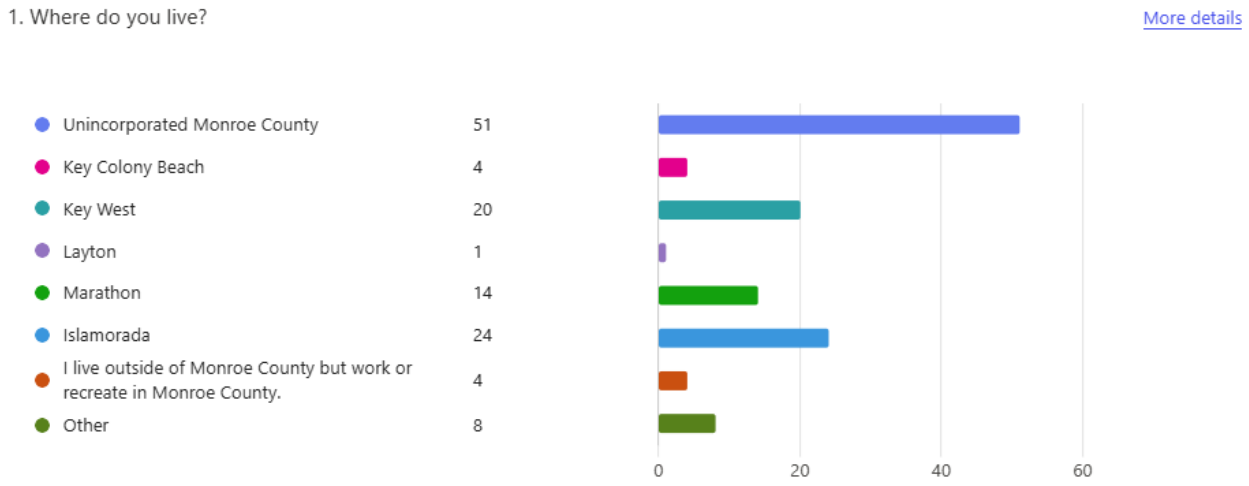


Figure B.2 – Survey Response, Past Hazard Experience

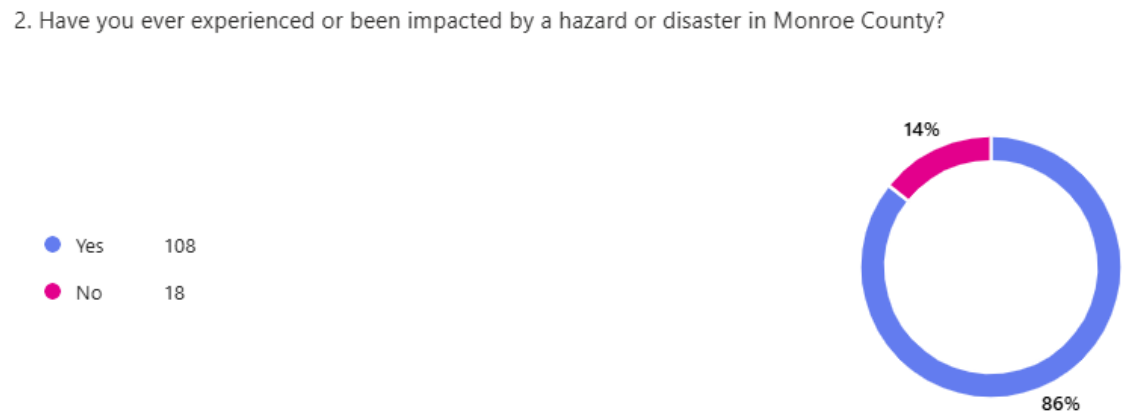


Figure B.3 – Survey Response, Past Hazard Experience Explanation

3. If you answered "Yes" to question 2, please explain your experience and where it occurred.

More details

106
Responses

Latest Responses
"Irma and Ian"
"2017 Irma"
"Flooding in my house"
...

34 respondents (32%) answered Hurricane Irma for this question.

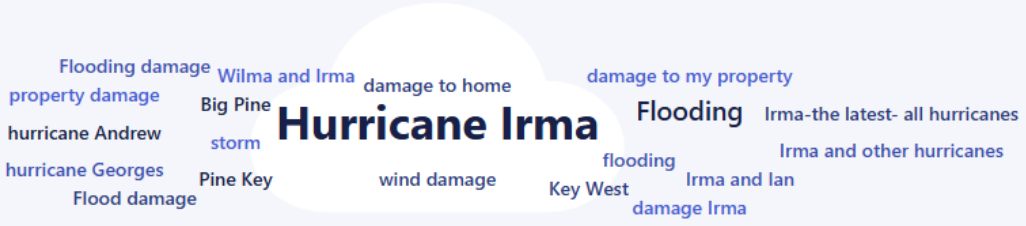


Figure B.4 - Survey Response, Concern About Hazards

4. On a scale of 1-5, how concerned are you about the possibility of your community being impacted by a hazard event?

4.40
Average Rating

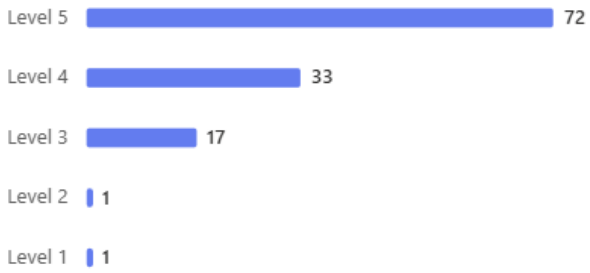


Figure B.5 – Survey Response, Hazard Risk Ratings

5. Please review the list of hazards below and rate each hazard based on how much risk you think it poses to your comm unity.

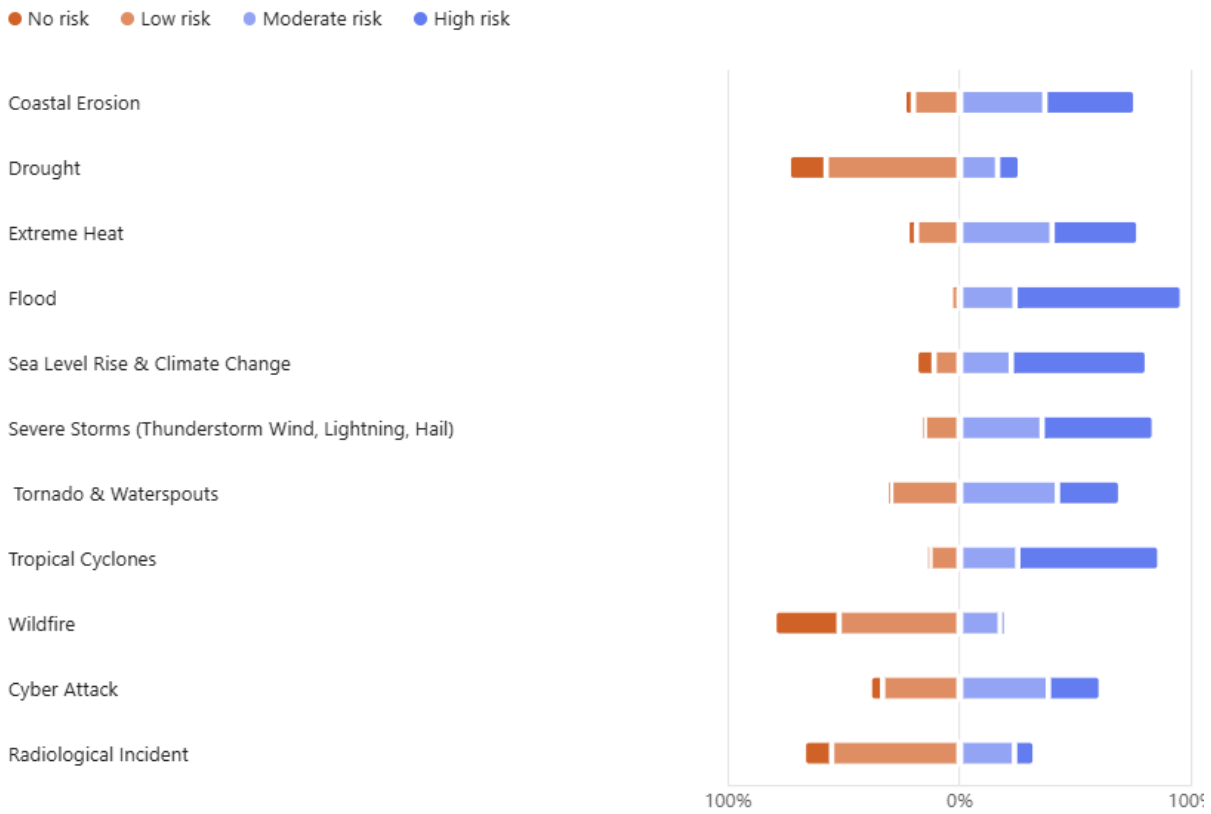


Figure B.6 – Survey Response, Home in Floodplain

6. Is your home located in a floodplain?

Figure B.7 – Survey Response, Flood Insurance

7. Do you have flood insurance for your home and/or personal property?

Yes	80
No	37
I don't know	7

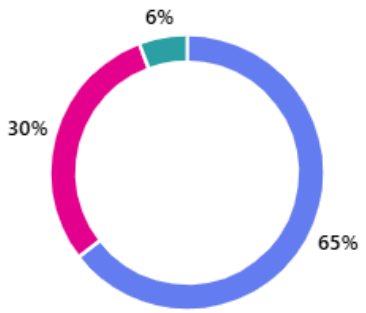


Figure B.8 – Survey Response, Reason for Not Having Flood Insurance

8. If you do NOT have flood insurance, what is the reason?

It's too expensive	25
I never really considered it	1
I don't need it because my home is elevated or otherwise protected	12
Other	11

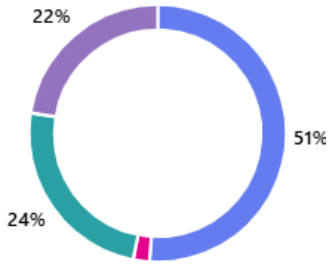


Figure B.9 – Survey Response, Personal Actions Taken for Mitigation

9. Have you taken any actions to protect your home or neighborhood from hazards?

Yes	91
No	33

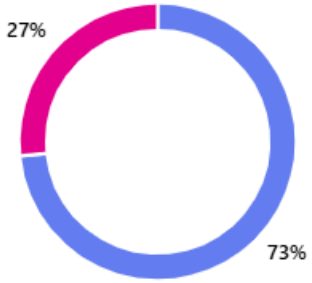


Figure B.10 – Survey Response, Personal Actions Taken for Mitigation, Explained

10. If you answered "Yes" to question 9, what actions have you implemented?

More details

89
Responses

Latest Responses
"Membrane roof, hurricane windows"
"Upgraded my home with hurricane impact windows and doors."
...

20 respondents (22%) answered windows and doors for this question.

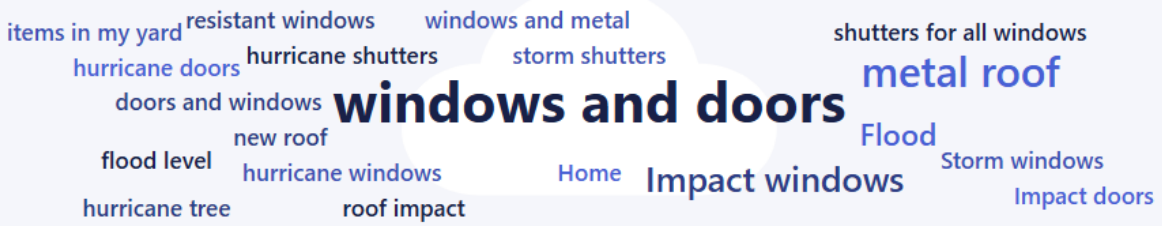


Figure B.11 – Survey Response, Knowledge of Who to Contact for More Information

11. Do you know what government office to contact to learn more about your hazard risks and how to reduce vulnerability in your area?

Yes	61
No	63

Figure B.12 – Survey Response, Suggested Mitigation

12. What are some steps your local government could take to reduce the risk of future hazard damages in your neighbor hood?

More details

92
Responses

Latest Responses
"Rebuild/elevate-friendly city codes"
...

16 respondents (17%) answered water for this question.

Figure B.13 – Survey Response, Preferred Mitigation Categories

13. Many community-wide activities can reduce our risk from hazards. These activities generally fall into one of the follo wing six broad categories:

- **Prevention:** administrative and regulatory actions, plans, policies, and ordinances that influence how land is de veloped and buildings are built. *Examples include planning and zoning, building codes, open space preservation, land use, and floodplain regulations.*
- **Property Protection**: actions that involve the modification of existing buildings to protect them from a hazard or remove them from a hazardous area. *Examples include acquisition, relocation, elevation, structural retrofits, a nd storm shutters.*
- **Natural Resource Protection**: actions that minimize hazard losses and preserve or restore the functions of nat ural systems. *Examples include floodplain protection, habitat preservation, slope stabilization, stream buffers, wet land and marsh protection, and forest management.*
- **Structural Projects**: actions that lessen the impact of a hazard by modifying the natural progression of a hazar d. *Examples include dams, levees, floodwalls, berms, drainage infrastructure, detention/retention basins, channel modifications, retaining walls, and storm sewers.*
- **Emergency Services**: actions that protect people and property during and immediately after a hazard event. *E xamples include warning systems, evacuation planning, emergency response training, and protection of critical e mergency facilities or systems.*
- **Public Education and Awareness**: actions to inform the public about hazards and techniques they can use to protect themselves and their property. *Examples include outreach projects, school education programs, library m aterials, and demonstration events.*

Please rank these categories by how important you think each one is for your community to consider pursuing.

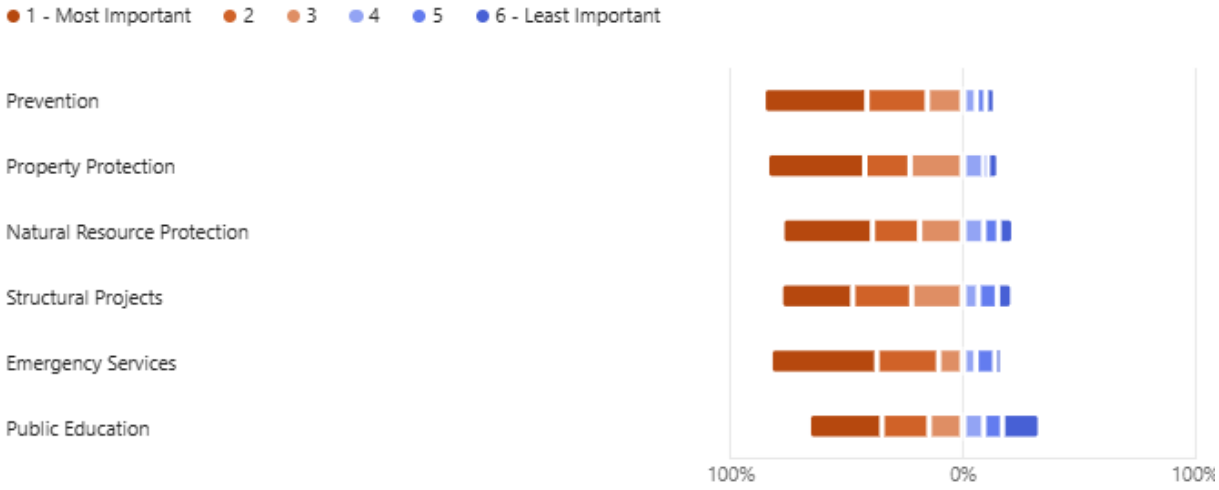
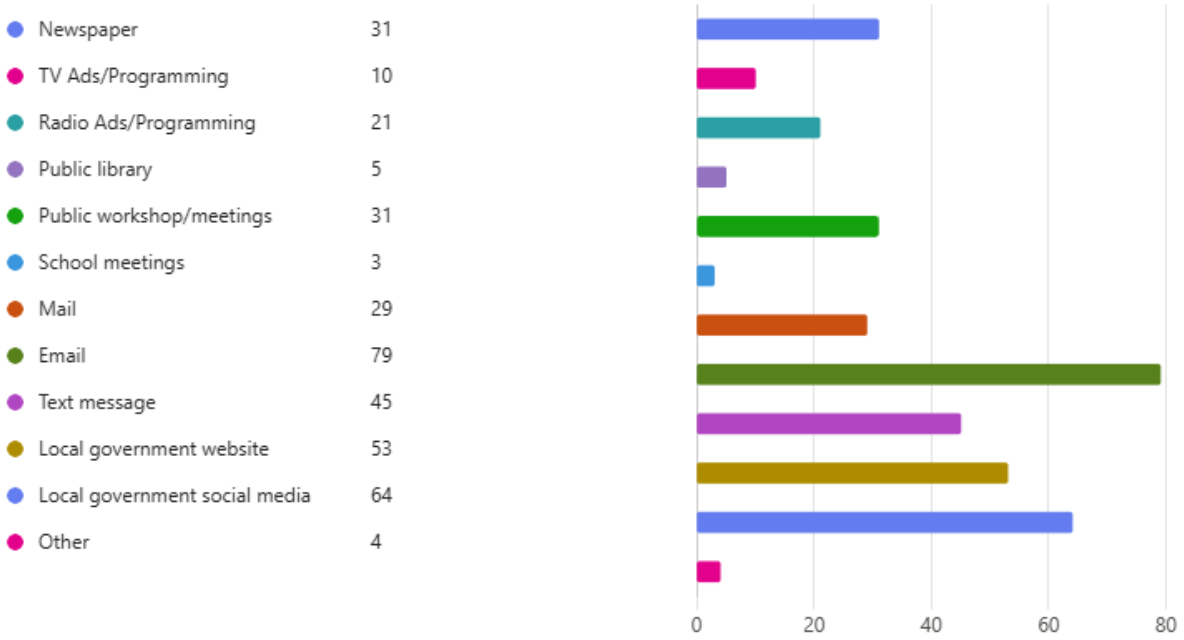


Figure B.14 – Survey Response, Preferred method of Communication

14. What is the best way for you to receive information about the impacts of hazards and how to protect your home or n eighborhood? Please select your top three choices.



B.3 PLANNING STEP 3: COORDINATE

This planning step credits the incorporation of other plans and other agencies' efforts into the development of the Hazard Mitigation Plan. Other agencies and organizations must be contacted to determine if they have studies, plans and information pertinent to the Hazard Mitigation Plan, to determine if their programs or initiatives may affect the community's program, and to see if they could support the community's efforts. To incorporate stakeholder input into the plan, a variety of stakeholders were identified by the LMSWG and sent an email inviting them to attend a public meeting, review the draft plan, and provide feedback and comments. The coordination letter sent via email is provided below. A list of stakeholders detailing their involvement is provided in Table B.3.

Stakeholders were also involved through specific requests for data to support the development of the plan.

Monroe County LMS Update - Public Meeting Invitation

Reply | Reply All | Forward

Thu 6/26/2025 4:15 PM

Ruffins, Ranger
To
Cc Schwisow-Cory; Moore, Abigail
Bcc josett.valdez2@redcross.org; deborah.koch@redcross.org; executivedirector@keysdiscovery.com; martha@REEF.org; tiffani.mensch@uwcollierkeys.org; cwoodhead@fkoc.org; lvandermolen@fkoc.org; **+24 others**

Business Confidential\Internal and External

Good afternoon,

My name is Ranger Ruffins and I'm a consultant working for Monroe County.

Monroe County and its incorporated communities have developed an update to their 2020 Multi-Jurisdictional Local Mitigation Strategy. To assist with this process, the County, incorporated communities, and the Local Mitigation Strategy Working Group are seeking stakeholder input and expertise to support the planning effort.

We invite you to attend a virtual public information meeting on the draft plan to be held on **Tuesday, July 1st at 5 p.m**. via Microsoft Teams. You can register for the meeting using this link: Meeting Registration. Additionally, after the meeting, a full draft of the plan will be posted for review at https://monroecountyfl-lms.com/. Please email any comments or feedback on the draft plan to me at ranger.ruffins@wsp.com. We appreciate any input you may have.

Thank you for your assistance in this effort to make Monroe communities safer and more resilient!

Ranger Ruffins
Hazard Mitigation & Resilience Planner
She/Her

M +1 302-299-8501

Table B.3 – Stakeholder List

First Name	Last Name	Organization, Title
Non-Profit Organizations		
Josett	Valdez	Regional CEO, South Florida Region of American Red cross
Deborah	Koch	Executive Director, Greater Miami and the Keys, American Red Cross
Bonnie	Barnes	Executive Director, Florida Keys History and Discovery Center
Martha	Klitzkie	Co-Executive Director, Reef Environmental Education Foundation
Tiffani	Mensch	President/CEO, United Way of the Florida Keys
Carolyn	Woodhead	Executive Director, Florida Keys Outreach Coalition for the Homeless
Lenny	Molen	Neece Program Assistant, Florida Keys Outreach Coalition for the Homeless
Jessica	Pierce	Florida National Parks Association, Executive Director
Educational Institutions		
Tamrah	Salazar Hill	Executive Director, Facilities, College of the Florida Keys
Rachel	Oropeza	Director, President's Office, College of the Florida Keys
Theresa	Axford	Superintendent, Monroe County School District
Surrounding Municipalities		
Jerry	Bell	Miami-Dade Assistant Director of Planning
Pete	Gomez	Miami-Dade County Emergency Management Director
Dan	Summers	Director, Collier County Bureau of Emergency Services
Amy	Howard	Emergency Management Coordinator, Collier Emergency Management
Isabel Cosio	Carballo	Executive Director, South Florida Regional Planning Council
Federal Government		
Roy	McClure	FEMA NFIP/CRS Specialist
David	Holcomb	ISO/CRS Specialist
Mike	Bratcher	ISO/CRS Specialist
Sherry	Harper	ISO/CRS Technical Coordinator
Dr. Dorothy	Sifuentes	USGS-Caribbean-Florida Water Science Center Director
State Government		
Laura	Dhuwe	Bureau Chief, FDEM Mitigation Bureau
Jillian	Kraynak	State NFIP Coordinator/State Floodplain Manager, Office of Floodplain Management
Heidi	Hoffman	Environmental Consultant, Florida Department of Environmental Protection Emergency Response Planning Consultant
Elizabeth	Sweigert	Director of South District Management, Florida Department of Environmental Protection
M'Liss	Bordelon	Environmental Administrator, Southeast District Branch Office Florida Department of Emergency Management
Business Community		
Kerry	Baker	Executive Director, Key West Chamber of Commerce
Judy	Hull	Director, Islamorada Chamber of Commerce
Daniel	Samess	CEO, Greater Marathon Chamber of Commerce
Karen	Williams-DeCastro	President, Florida Keys Board of Realtors
Jodi	Weinhofer	President and CEO, The Lodging Association of the Florida Keys

APPENDIX C MITIGATION ALTERNATIVES

44 CFR Subsection D §201.6(c)(3)(ii): [The mitigation strategy section shall include] a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.

As part of the process of developing the mitigation action plans found in Section 7, the LMSWG reviewed and considered a comprehensive range of mitigation options before selecting the actions identified for implementation. This section summarizes the full range of mitigation measures evaluated and considered by the LMSWG, including a review of the categories of mitigation measures outlined in the 2017 CRS Coordinator's Manual, a discussion of current local implementation and CRS credits earned for those measures, and a list of the specific mitigation projects considered and recommended for implementation.

Mitigation alternatives identified for implementation by the LMSWG were evaluated and prioritized using the criteria discussed in Section 6 of this plan.

C.1 CATEGORIES OF MITIGATION MEASURES CONSIDERED

Once it was determined which flood hazards warranted the development of specific mitigation actions, the LMSWG analyzed viable mitigation options that supported the identified goals and objectives. The LMSWG was provided with the following list of mitigation categories which are utilized as part of the CRS planning process.

- Prevention
- Property Protection
- Natural Resource Protection
- Structural Projects
- Emergency Services
- Public Education and Awareness

Action ideas within each of these categories were discussed and considered for inclusion in the plan. The LMSWG was encouraged to select actions to pursue within most if not all of these categories so as to develop a comprehensive approach to hazard mitigation.

C.2 ALTERNATIVE MITIGATION MEASURES PER CATEGORY

This section presents a summary review of the mitigation measures that were considered by the LMSWG. The CRS Credit Sections are based on the 2017 CRS Coordinator's Manual and the 2021 Addendum.

C.2.1 PREVENTATIVE AND REGULATORY MEASURES

Preventative measures are designed to keep a problem - such as flooding - from occurring or from getting worse. The objective of preventative measures is to ensure that future development is not exposed to damage and does not cause an increase in damages to other properties. Building, zoning, planning and code enforcement offices usually administer preventative measures. Some examples of types of preventative measures include:

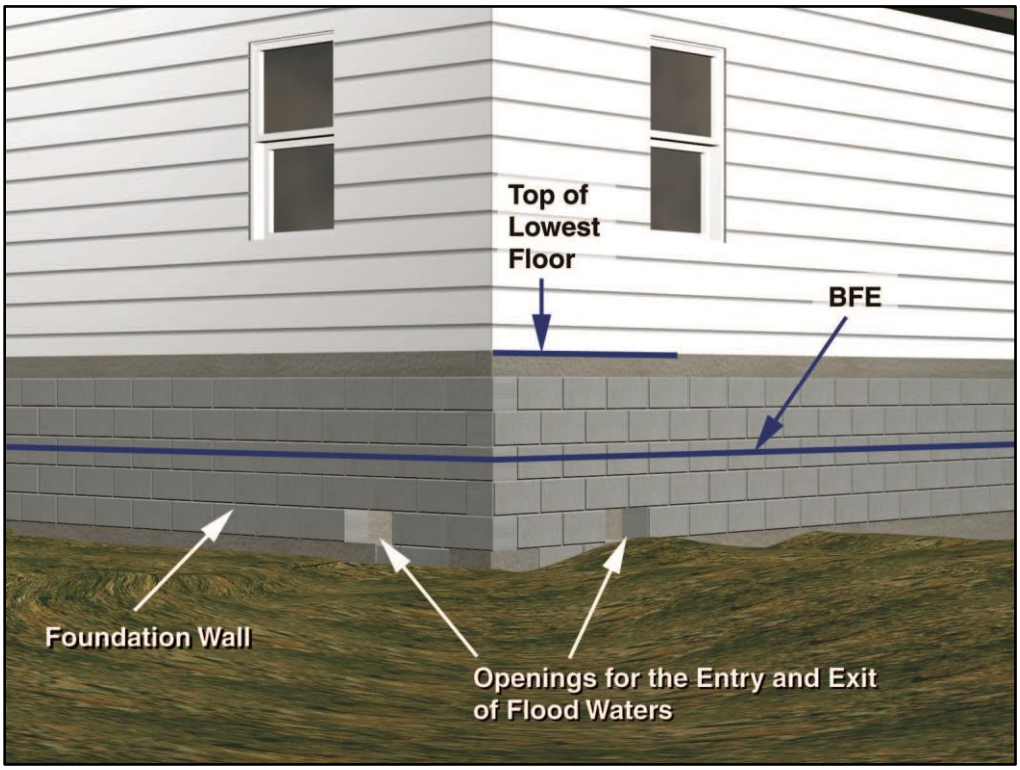
- Building codes
- Zoning ordinance
- Comprehensive or land use plan
- Open space preservation
- Floodplain regulations
- Subdivision regulations
- Stormwater management regulations

BUILDING CODES

Building codes provide one of the best methods for addressing natural hazards. When properly designed and constructed according to code, the average building can withstand many of the impacts of natural hazards. Hazard protection standards for all new and improved or repaired buildings can be incorporated into the local building code. Building codes can ensure that the first floors of new buildings are constructed to be higher than the elevation of the 100-year flood (the flood that is expected to have a one percent chance of occurring in any given year). This is shown in Figure C.1.

Just as important as having code standards is the enforcement of the code. Adequate inspections are needed during the course of construction to ensure that the builder understands the requirements and is following them. Making sure a structure is properly elevated and anchored requires site inspections at each step.

Figure C.1 – Building Codes and Flood



Source: FEMA Publication: *Above the Flood: Elevating Your Floodprone House, 2000*

ASCE 24 is a referenced standard in the International Building Code. Any building or structure that falls within the scope of the IBC that is proposed in a flood hazard area is to be designed in accordance with ASCE 24. Freeboard is required as a function of the nature of occupancy and the flood zone. Dwellings and most other buildings have 1-foot of freeboard; certain essential facilities have 2-3 feet; only agricultural facilities, temporary facilities and minor storage facilities are allowed to have their lowest floors at the BFE.

COMPREHENSIVE OR LAND USE PLAN

Building codes provide guidance on how to build in hazardous areas. Planning and zoning activities direct development away from these areas, particularly floodplains and wetlands. They do this by designating land uses that are compatible with the natural conditions of land that is prone to flooding, such as open space or recreation.

OPEN SPACE PRESERVATION

Keeping the floodplain and other hazardous areas open and free from development is the best approach to preventing damage to new developments. Open space can be maintained in agricultural use or can serve as parks, greenway corridors and golf courses.

Comprehensive and capital improvement plans should identify areas to be preserved by acquisition and other means, such as purchasing an easement. With an easement, the owner is free to develop and use private property, but property taxes are reduced or a payment is made to the owner if the owner agrees to not build on the part set aside in the easement.

Although there are some federal programs that can help acquire or reserve open lands, open space lands and easements do not always have to be purchased. Developers can be encouraged to dedicate park land and required to dedicate easements for drainage and maintenance purposes.

ZONING ORDINANCE

Zoning enables a community to designate what uses are acceptable on a given parcel. Zoning can ensure compatibility of land use with the land's level of suitability for development. Planning and zoning activities can also provide benefits by allowing developers more flexibility in arranging improvements on a parcel of land through the planned development approach. Zoning regulations describe what type of land use and specific activities are permitted in each district, and how to regulate how buildings, signs, parking, and other construction may be placed on a lot. Zoning regulations also provide procedures for rezoning and other planning applications. The zoning map and zoning regulations provide properties with certain rights to development.

FLOODPLAIN REGULATIONS

A Flood Damage Prevention Ordinance sets development standards for Special Flood Hazard Areas (SFHAs). Communities participating in the National Flood Insurance Program (NFIP) are required to adopt a flood damage prevention ordinance that meets at least the minimum standards of the NFIP; however, a community can incorporate higher standards for increased protection. For example, communities can adopt higher regulatory freeboard requirements, cumulative substantial damage definitions, fill restrictions, and other standards.

Another important consideration in floodplain regulations is the protection of natural and beneficial functions and the preservation of natural barriers such as vegetation. Vegetation along a stream bank is extremely beneficial for the health of the stream. Trees and other plants have an extensive root system that strengthen stream banks and help prevent erosion. Vegetation that has sprouted up near streams should remain undisturbed unless removing it will significantly reduce a threat of flooding or further destruction of the stream channel.

STORMWATER MANAGEMENT REGULATIONS

Stormwater runoff is increased when natural ground cover is replaced by urban development. Development in the watershed that drains to a river can aggravate downstream flooding, overload the community's drainage system, cause erosion, and impair water quality. There are three ways to prevent flooding problems caused by stormwater runoff:

1. Regulating development in the floodplain to ensure that it will be protected from flooding and that it won't divert floodwaters onto other properties;
2. Regulating all development to ensure that the post-development peak runoff will not be greater than it was under pre-development conditions; and
3. Set construction standards so buildings are protected from shallow water.

REDUCING FUTURE FLOOD LOSSES

Zoning and comprehensive planning can work together to reduce future flood losses by directing development away from hazard prone areas. Creating or maintaining open space is the primary way to reduce future flood losses.

Planning for open space must also be supplemented with development regulations to ensure that stormwater runoff is managed and that development is protected from flooding. Enforcement of the flood damage prevention ordinance and the flood protection elevation requirement provides an extra level of protection for buildings constructed in the planning area.

Stormwater management and the requirement that post-development runoff cannot exceed pre-development conditions is one way to prevent future flood losses. Retention and detention requirements also help to reduce future flood losses.

CRS CREDIT

The CRS encourages strong building codes. It provides credit in two ways: points are awarded based on the community's Building Code Effectiveness Grading Schedule (BCEGS) classification and points are awarded for adopting the International Code series. In North Carolina, communities are limited by the State Building Code Council which has not implemented the most current version of the International Building Code.

CRS credits are available for regulations that encourage developers to preserve floodplains or other hazardous areas away from development. There is no credit for a plan, only for the enforceable regulations that are adopted pursuant to a plan. Communities in Monroe County could receive credit for Activity 430 – Higher Regulatory Standards and for Activity 420 – Open Space Preservation for preserving parcels within the SFHA as open space. Preserving flood prone areas as open space is one of the highest priorities of the Community Rating System. The credits in the 2017 manual have doubled for OSP (Open Space Preservation). The participating communities could also receive credit for Activity 450 – Stormwater Management for enforcing regulations for stormwater management and soil and erosion control. Several prevention actions considered by the LMSWG are detailed below.

Table C.1 – Prevention Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Prevention Measures Considered by LMSWG and Not Recommended			
-	Continue enforcement of state building codes and more stringent local building requirements	The County and municipalities all utilize the Florida Building Code; they have enforcement of such as an ongoing policy and do not need to commit additional resources through this plan update process to complete this activity.	n/a
-	Continued enforcement of zoning and development regulations	The LMSWG has established this is an ongoing policy and is unlikely to need additional resources to continue pursuing this preventative measure	n/a
Prevention Measures and Funding Recommended for Implementation			
	Post-Disaster (Flood) Recovery Plan	This plan will help the City bounce back post flood event and better able residents to rebuild property and mitigate future flood.	Local, State
	CRS Group to work together on Beyond Minimum requirements	Exceeding minimum floodplain regulations will further protect property within the City and increase potential points gained in the CRS program and reduce flood insurance premiums.	Local

C.2.2 PROPERTY PROTECTION MEASURES

Property protection measures are used to modify buildings or property subject to damage. Property protection measures fall under three approaches:

- Modify the site to keep the hazard from reaching the building;
- Modify the building (retrofit) so it can withstand the impacts of the hazard; and
- Insure the property to provide financial relief after the damage occurs.

Property protection measures are normally implemented by the property owner, although in many cases technical and financial assistance can be provided by a government agency.

This low floodwall has landscaping to minimize the adverse impact on the property's appearance.

KEEPING THE HAZARD AWAY

Generally, natural hazards do not damage vacant areas. As noted earlier, the major impact of hazards is to people and improved property. In some cases, properties can be modified so the hazard does not reach the damage-prone improvements. For example, a berm can be built to prevent floodwaters from reaching a house.

FLOODING

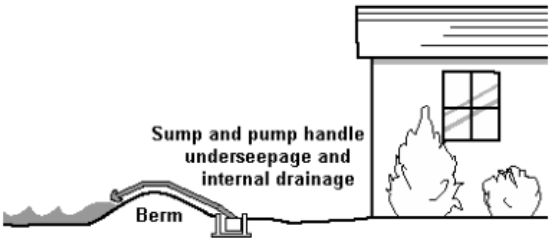
There are five common methods to keep a flood from reaching and damaging a building:

- Erect a barrier between the building and the source of the flooding.
- Move the building out of the flood-prone area.
- Elevate the building above the flood level.
- Demolish the building.
- Replace the building with a new one that is elevated above the flood level.

Small, wood frame buildings are the easiest to relocate

Source: Kennedy House Movers, Huntsville, AL

The latter three approaches are the most effective types to consider for the planning area.



Small barriers can be effective against shallow flooding.

BARRIERS

A flood protection barrier can be built of dirt or soil (a "berm") or concrete or steel (a "floodwall"). Careful design is needed so as not to create flooding or drainage problems on neighboring properties. Depending on how porous the ground is, if floodwaters will stay up for more than an hour or two, the design needs to account for leaks, seepage of water underneath, and rainwater that will fall inside the perimeter. This is usually done with a sump or drain to collect the internal groundwater and surface water and a pump and pipe to pump the internal drainage over the barrier. Barriers can only be built so high. They can be overtopped by a flood higher than expected. Barriers made of earth are susceptible to erosion from rain and floodwaters if not properly sloped, covered with grass, and properly maintained.

RELOCATION

Moving a building out of a flood prone area to higher ground is the surest and safest way to protect it from flooding. While almost any building can be moved, the cost increases for heavier structures, such as those with exterior brick and stone walls, and for large or irregularly shaped buildings. Relocation is also preferred for large lots that include buildable areas outside the floodplain or where the owner has a new flood-free lot (or portion of the existing lot) available.

BUILDING ELEVATION

Raising a building above the flood level can be almost as effective as moving it out of the floodplain. Water flows under the building, causing little or no damage to the structure or its contents. Raising a building above the flood level is cheaper than moving it and can be less disruptive to a neighborhood. Elevation has proven to be an acceptable and reasonable means of complying with floodplain regulations that require new, substantially improved, and substantially damaged buildings to be elevated above the base flood elevation.

DEMOLITION

Some buildings, especially heavily damaged or repetitively flooded ones, are not worth the expense to protect them from future damages. It is cheaper to demolish them and either replace them with new, flood protected structures, or relocate the occupants to a safer site. Demolition is also appropriate for buildings that are difficult to move – such as larger, slab foundation or masonry structures – and for dilapidated structures that are not cost-beneficial to protect.

Demolishing a repetitively flooded home

PILOT RECONSTRUCTION

If a building is not in good shape, elevating it may not be worthwhile or it may even be dangerous. An alternative is to demolish the structure and build a new one on the site that meets or exceeds all flood protection codes. FEMA funding programs refer to this approach as "pilot reconstruction." It is still a pilot program, and not a regularly funded option. Certain rules must be followed to qualify for federal funds for pilot reconstruction.

RETROFITTING

An alternative to keeping the hazard away from a building is to modify or retrofit the site or building to minimize or prevent damage. There are a variety of techniques to do this, as described below.

Dry Floodproofing

Dry floodproofing means making all areas below the flood protection level watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings, such as doors, windows and vents, are closed, either permanently, with removable shields, or with sandbags. Dry floodproofing of new and existing nonresidential buildings in the regulatory floodplain is permitted under state, FEMA and local regulations. Dry floodproofing of existing residential buildings in the floodplain is also permitted as long as the building is not substantially damaged or being substantially improved. Owners of buildings located outside the regulatory floodplain can always use dry floodproofing techniques.

Dry floodproofing is only effective for shallow flooding, such as repetitive drainage problems. It does not protect from the deep flooding along lakes and larger rivers caused by hurricanes or other storms.

Wet Floodproofing

The alternative to dry floodproofing is wet floodproofing: water is let in and everything that could be damaged by a flood is removed or elevated above the flood level. Structural components below the flood level are replaced with materials that are not subject to water damage. For example, concrete block walls

are used instead of wooden studs and gypsum wallboard. The furnace, water heater and laundry facilities are permanently relocated to a higher floor. Where the flooding is not deep, these appliances can be raised on blocks or platforms.

INSURANCE

Technically, insurance does not mitigate damage caused by a natural hazard. However, it does help the owner repair, rebuild, and hopefully afford to incorporate some of the other property protection measures in the process. Insurance offers the advantage of protecting the property, so long as the policy is in force, without requiring human intervention for the measure to work.

Private Property

Although most homeowner's insurance policies do not cover a property for flood damage, an owner can insure a building for damage by surface flooding through the NFIP. Flood insurance coverage is provided for buildings and their contents damaged by a "general condition of surface flooding" in the area. Most people purchase flood insurance because it is required by the bank when they get a mortgage or home improvement loan. Usually these policies just cover the building's structure and not the contents. Contents coverage can be purchased separately. Renters can buy contents coverage, even if the owner does not buy structural coverage on the building. Most people don't realize that there is a 30-day waiting period to purchase a flood insurance policy and there are limits on coverage.

Public Property

Governments can purchase commercial insurance policies. Larger local governments often self-insure and absorb the cost of damage to one facility, but if many properties are exposed to damage, self-insurance can drain the government's budget. Communities cannot expect federal disaster assistance to make up the difference after a flood.

LOCAL IMPLEMENTATION/CRS CREDIT

The CRS provides the most credit points for acquisition and relocation under Activity 520, because this measure permanently removes insurable buildings from the floodplain. Communities in Monroe County could receive credit for Activity 520 – Acquisition and Relocation, for acquiring and relocating buildings from the SFHA. The LMSWG recommended that communities pursue the purchase buildings which are subject to flood damage in order to return this land to open space.

The CRS also credits barriers and elevating existing buildings under Activity 530. The credit for Activity 530 is based on the combination of flood protection techniques used and the level of flood protection provided. Points are calculated for each protected building. Bonus points are provided for the protection of repetitive loss buildings and critical facilities. Communities could receive credit for Activity 360 – Flood Protection Assistance by providing advice and assistance to homeowners who may want to flood proof their home or business. Advice is provided both on property protection techniques and on financial assistance programs to help fund mitigation.

Flood insurance information for each community is provided in Section 5 and in greater detail in each community's annex. There is no credit for purchasing flood insurance, but the CRS does provide credit for local public information programs that, among other topics, explain flood insurance to property owners. The CRS also reduces the premiums for those people who do buy NFIP coverage. Communities in Monroe County could receive credit for Activity 330 – Outreach Projects. Property protection mitigation options considered by the LMSWG are described below.

Table C.2 – Property Protection Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Property Protection Measures Considered by LMSWG and Not Recommended			

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
-	Islamorada: Acquisition and Demolition of Residential Structures	This project was deleted because of a delay in funding – the included homes had already mitigated the problem or sold the home to new owners who mitigated on their own.	n/a
Property Protection Measures and Funding Recommended for Implementation			
Monroe County and Municipalities	Elevate Buildings Located within Flood prone Areas	This effort will help the County and Cities protect properties that are regularly flooded.	Local, State, Federal
Islamorada	Emergency Back-up power for Critical Facilities	This effort will help the Village protect its critical facilities to provide continuity of operations during a flood or other event.	Local, State, Federal

C.2.3 NATURAL RESOURCE PROTECTION

Resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. These activities enable the naturally beneficial functions of fields, floodplains, wetlands, and other natural lands to operate more effectively. Natural and beneficial functions of watersheds, floodplains and wetlands include:

- Reduction in runoff from rainwater and stormwater in pervious areas
- Infiltration that absorbs overland flood flow
- Removal and filtering of excess nutrients, pollutants and sediments
- Storage of floodwaters
- Absorption of flood energy and reduction in flood scour
- Water quality improvement
- Groundwater recharge
- Habitat for flora and fauna
- Recreational and aesthetic opportunities

As development occurs, many of the above benefits can be achieved through regulatory steps for protecting natural areas or natural functions. This section covers the resource protection programs and standards that can help mitigate the impact of natural hazards, while they improve the overall environment. Six areas were reviewed:

- Wetland protection
- Erosion and sedimentation control
- Stream/River restoration
- Best management practices
- Dumping regulations
- Farmland protection

WETLAND PROTECTION

Wetlands are often found in floodplains and topographically depressed areas of a watershed. Many wetlands receive and store floodwaters, thus slowing and reducing downstream flows. They also serve as

a natural filter, which helps to improve water quality, and they provide habitat for many species of fish, wildlife and plants.

EROSION AND SEDIMENTATION CONTROL

Farmlands and construction sites typically contain large areas of bare exposed soil. Surface water runoff can erode soil from these sites, sending sediment into downstream waterways. Erosion also occurs along stream banks and shorelines as the volume and velocity of flow or wave action destabilize and wash away the soil. Sediment suspended in the water tends to settle out where flowing water slows down. This can clog storm drains, drain tiles, culverts and ditches and reduce the water transport and storage capacity of river and stream channels, lakes and wetlands.

There are two principal strategies to address these problems: minimize erosion and control sedimentation. Techniques to minimize erosion include phased construction, minimal land clearing, and stabilizing bare ground as soon as possible with vegetation and other soil stabilizing practices.

STREAM/RIVER RESTORATION

There is a growing movement that has several names, such as "stream conservation," "bioengineering," or "riparian corridor restoration." The objective of these approaches is to return streams, stream banks and adjacent land to a more natural condition, including the natural meanders. Another term is "ecological restoration," which restores native indigenous plants and animals to an area.

A key component of these efforts is to use appropriate native plantings along the banks that resist erosion. This may involve retrofitting the shoreline with willow cuttings, wetland plants, or rolls of landscape material covered with a natural fabric that decomposes after the banks are stabilized with plant roots.

In all, restoring the right vegetation to a stream has the following advantages:

- Reduces the amount of sediment and pollutants entering the water
- Enhances aquatic habitat by cooling water temperature
- Provides food and shelter for both aquatic and terrestrial wildlife
- Can reduce flood damage by slowing the velocity of water
- Increases the beauty of the land and its property value
- Prevents property loss due to erosion
- Provides recreational opportunities, such as hunting, fishing and bird watching
- Reduces long-term maintenance costs

Communities are required by state and federal regulations to monitor storm water drainage outfalls and control storm water runoff.

BEST MANAGEMENT PRACTICES

Point source pollutants come from pipes such as the outfall of a municipal wastewater treatment plant. They are regulated by the US EPA. Nonpoint source pollutants come from non-specific locations and harder to regulate. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, other chemicals, animal wastes, oils from street surfaces and industrial areas, and sediment from agriculture, construction, mining and forestry. These pollutants are washed off the ground's surface by stormwater and flushed into receiving storm sewers, ditches and streams.

The term "best management practices" (BMPs) refers to design, construction and maintenance practices and criteria that minimize the impact of stormwater runoff rates and volumes, prevent erosion, protect natural resources and capture nonpoint source pollutants (including sediment). They can prevent increases in downstream flooding by attenuating runoff and enhancing infiltration of stormwater. They

also minimize water quality degradation, preserve beneficial natural features onsite, maintain natural base flows, minimize habitat loss, and provide multiple usages of drainage and storage facilities.

DUMPING REGULATIONS

BMPs usually address pollutants that are liquids or are suspended in water that are washed into a lake or stream. Dumping regulations address solid matter, such as shopping carts, appliances and landscape waste that can be accidentally or intentionally thrown into channels or wetlands. Such materials may not pollute the water, but they can obstruct even low flows and reduce the channels' and wetlands' abilities to convey or clean stormwater.

Many cities have nuisance ordinances that prohibit dumping garbage or other "objectionable waste" on public or private property. Waterway dumping regulations need to also apply to "non-objectionable" materials, such as grass clippings or tree branches, which can kill ground cover or cause obstructions in channels. Regular inspections to catch violations should be scheduled.

Many people do not realize the consequences of their actions. They may, for example, fill in the ditch in their front yard without realizing that is needed to drain street runoff. They may not understand how re-grading their yard, filling a wetland, or discarding leaves or branches in a watercourse can cause a problem to themselves and others. Therefore, a dumping enforcement program should include public information materials that explain the reasons for the rules as well as the penalties.

FARMLAND PROTECTION

Farmland protection is an important piece of comprehensive planning and zoning throughout the United States. The purpose of farmland protection is to provide mechanisms for prime, unique, or important agricultural land to remain as such, and to be protected from conversion to nonagricultural uses.

Frequently, farm owners sell their land to residential or commercial developers and the property is converted to non-agricultural land uses. With development comes more buildings, roads and other infrastructure. Urban sprawl occurs, which can lead to additional stormwater runoff and emergency management difficulties.

Farms on the edge of cities are often appraised based on the price they could be sold for to urban developers. This may drive farmers to sell to developers because their marginal farm operations cannot afford to be taxed as urban land. The Farmland Protection Program in the United States Department of Agriculture's 2002 Farm Bill (Part 519) allows for funds to go to state, tribal, and local governments as well as nonprofit organizations to help purchase easements on agricultural land to protect against the development of the land.

LOCAL IMPLEMENTATION/CRS CREDIT

There is credit for preserving open space in its natural condition or restored to a state approximating its natural condition. The credit is based on the percentage of the floodplain that can be documented as wetlands protected from development by ownership or local regulations. Communities in Monroe County could receive credit for Activity 420 – Open Space Preservation for preserving a portion of the SFHA as open space.

Additionally, credit is available for Activity 540 – Drainage System Maintenance. Having a portion of the drainage system inspected regularly throughout the year and maintenance performed as needed would earn a community credit. Communities could also get credit under this activity for providing a listing of problem sites that are inspected more frequently, and for implementing an ongoing Capital Improvements Program.

Table C.3 – Natural Resource Protection Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Natural Resource Protection Measures Considered by LMSWG and Not Recommended			
-	Continued enforcement of soil erosion and sedimentation control ordinance.	All incorporated jurisdictions currently have ordinances in place, additional funding is not needed for continued enforcement.	n/a
-	Acquire land to preserve as open space	The County is prioritizing preservation of open space through the acquisition of repetitive loss properties in order to achieve multiple benefits through additional losses avoided.	n/a
Natural Resource Protection Measures and Funding Recommended for Implementation			
Monroe County and Municipalities	Natural Resources Adaptation Plan	Creation of a natural resources adaptation plan ensures the County and its municipalities preserve their abundant natural resources that serve protective, cultural, and recreational roles.	Local, State, Federal
Monroe County and Municipalities	Add culverts to canals on the East side of the city to improve water flow and water quality.	This action will help manage potential water backup and protect water quality.	Local, State, Federal

C.2.4 EMERGENCY SERVICES MEASURES

Emergency services measures protect people during and after a disaster. A good emergency management program addresses all hazards, and it involves all local government departments. This section reviews emergency services measures following a chronological order of responding to an emergency. It starts with identifying an impending problem (threat recognition) and continues through post-disaster activities.

THREAT RECOGNITION

The first step in responding to a flood is to know when weather conditions are such that an event could occur. With a proper and timely threat recognition system, adequate warnings can be disseminated.

The National Weather Service (NWS) is the prime agency for detecting meteorological threats. Severe weather warnings are transmitted through NOAA's Weather Radio System. Local emergency managers can then provide more site-specific and timely recognition after the Weather Service issues a watch or a warning. A flood threat recognition system predicts the time and height of a flood crest. This can be done by measuring rainfall, soil moisture, and stream flows upstream of the community and calculating the subsequent flood levels.

On smaller rivers and streams, locally established rainfall and river gauges are needed to establish a flood threat recognition system. The NWS may issue a "flash flood watch." This is issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area, but the occurrence is neither certain nor imminent. These events are so localized and so rapid that a "flash flood warning" may not be issued, especially if no remote threat recognition equipment is available. In the absence of a gauging system on small streams, the best threat recognition system is to have local personnel monitor rainfall and stream conditions. While specific flood crests and times will not be predicted, this approach will provide advance notice of potential local or flash flooding.

WARNING

The next step in emergency response following threat recognition is to notify the public and staff of other agencies and critical facilities. More people can implement protection measures if warnings are early and include specific detail.

The NWS issues notices to the public using two levels of notification:

- Watch: conditions are right for flooding, thunderstorms, tornadoes or winter storms.
- Warning: a flood, tornado, etc., has started or been observed.

A more specific warning may be disseminated by the community in a variety of ways. The following are the more common methods:

- CodeRED countywide mass telephone emergency communication system
- Commercial or public radio or TV stations
- The Weather Channel
- Cable TV emergency news inserts
- Telephone trees/mass telephone notification
- NOAA Weather Radio
- Tone activated receivers in key facilities
- Outdoor warning sirens
- Sirens on public safety vehicles
- Door-to-door contact
- Mobile public address systems
- Email notifications

Just as important as issuing a warning is telling people what to do in case of an emergency. A warning program should include a public information component.

STORMREADY

The National Weather Service (NWS) established the StormReady program to help local governments improve the timeliness and effectiveness of hazardous weather-related warnings for the public. To be officially StormReady, a community must:

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

Being designated a NWS StormReady community is a good measure of a community's emergency warning program for weather hazards.

RESPONSE

The protection of life and property is the most important task of emergency responders. Concurrent with threat recognition and issuing warnings, a community should respond with actions that can prevent or reduce damage and injuries. Typical actions and responding parties include the following:

- Activating the emergency operations center (emergency preparedness)
- Closing streets or bridges (police or public works)
- Shutting off power to threatened areas (utility company)
- Passing out sand and sandbags (public works)
- Holding children at school or releasing children from school (school superintendent)
- Opening evacuation shelters (the American Red Cross)
- Monitoring water levels (public works)
- Establishing security and other protection measures (police)

An emergency action plan ensures that all bases are covered and that the response activities are appropriate for the expected threat. These plans are developed in coordination with the agencies or offices that are given various responsibilities.

Emergency response plans should be updated annually to keep contact names and telephone numbers current and to ensure that supplies and equipment that will be needed are still available. They should be critiqued and revised after disasters and exercises to take advantage of the lessons learned and of changing conditions. The end result is a coordinated effort implemented by people who have experience working together so that available resources will be used in the most efficient manner possible.

EVACUATION AND SHELTER

There are six key components to a successful evacuation:

- Adequate warning
- Adequate routes
- Proper timing to ensure the routes are clear
- Traffic control
- Knowledgeable travelers
- Care for special populations (e.g., disabled persons, prisoners, hospital patients, schoolchildren)

Those who cannot get out of harm's way need shelter. Typically, the American Red Cross will staff a shelter and ensure that there is adequate food, bedding, and wash facilities. Shelter management is a specialized skill. Managers must deal with problems like scared children, families that want to bring in their pets, and the potential for an overcrowded facility.

LOCAL IMPLEMENTATION /CRS CREDIT

Flash flood warnings are issued by National Weather Service Offices, which have the local and county warning responsibility. Flood warnings are forecasts of coming floods, are distributed to the public by the NOAA Weather Radio, commercial radio and television, and through local emergency agencies. The warning message tells the expected degree of flooding, the affected river, when and where flooding will begin, and the expected maximum river level at specific forecast points during flood crest.

Communities in Monroe County could receive credit for Activity 610 – Flood Warning Program for maintaining a program that provides timely identification of impending flood threats, disseminates warnings to appropriate floodplain residents, and coordinates flood response activities. Community Rating System credits are based on the number and types of warning media that can reach the community's flood prone population. Depending on the location, communities can receive credit for the telephone calling system and more credits for additional measures, like telephone trees. Being designated as a StormReady community also provides additional credits.

Table C.4 – Emergency Services Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Emergency Services Measures Considered by LMSWG and Not Recommended			
-	Improve Satellite Communication	This activity was completed with the implementation of Starlink and purchase of satellite phones for senior management.	n/a
-	Develop a post-disaster recovery plan to regulate reconstruction	Currently post-event rebuilding is regulated by the floodplain management regulations. Additional higher regulatory standards will be considered for the floodplain management regulations that could support mitigation in reconstruction.	n/a
Emergency Services Measures and Funding Recommended for Implementation			
Layton/ Monroe County	Become/Recertify as a StormReady Community	This certification will improve Layton and Monroe County's ability to swiftly disseminate information regarding hazardous weather events	Local, State
Key West	Planning/Development of Sister City EOC: Develop a plan and implement a Sister City Emergency Operations Center for large scale pre & post disaster situations	Key West maintains records outside of the City, however maintaining a Sister City EOC will ensure effective continuity of operations in the event the City is physically inaccessible	Local, State, Federal

C.2.5 STRUCTURAL PROJECTS

Four general types of flood control projects are reviewed here: levees, reservoirs, diversions, and dredging. These projects have three advantages not provided by other mitigation measures:

- They can stop most flooding, protecting streets and landscaping in addition to buildings.
- Many projects can be built without disrupting citizens' homes and businesses.
- They are constructed and maintained by a government agency, a more dependable long-term management arrangement than depending on many individual private property owners.

However, as shown below, structural measures also have shortcomings. The appropriateness of using flood control depends on individual project area circumstances.

Advantages

- They may provide the greatest amount of protection for land area used
- Because of land limitations, they may be the only practical solution in some circumstances
- They can incorporate other benefits into structural project design, such as water supply and recreational uses
- Regional detention may be more cost-efficient and effective than requiring numerous small detention basins

Disadvantages

- They can disturb the land and disrupt the natural water flows, often destroying wildlife habitat
- They require regular maintenance
- They are built to a certain flood protection level that can be exceeded by larger floods
- They can create a false sense of security
- They promote more intensive land use and development in the floodplain

LEVEES AND FLOODWALLS

Probably the best-known flood control measure is a barrier of earth (levee) or concrete (floodwall) erected between the watercourse and the property to be protected. Levees and floodwalls confine water to the stream channel by raising its banks. They must be well designed to account for large floods, underground seepage, pumping of internal drainage, and erosion and scour.

RESERVOIRS AND DETENTION

Reservoirs reduce flooding by temporarily storing flood waters behind dams or in storage or detention basins. Reservoirs lower flood heights by holding back, or detaining, runoff before it can flow downstream. Flood waters are detained until the flood has subsided, and then the water in the reservoir or detention basin is released or pumped out slowly at a rate that the river can accommodate downstream.

Reservoirs can be dry and remain idle until a large rain event occurs. Or they may be designed so that a lake or pond is created. The lake may provide recreational benefits or water supply (which could also help mitigate a drought).

Retention pond

Flood control reservoirs are most commonly built for one of two purposes. Large reservoirs are constructed to protect property from existing flood problems. Smaller reservoirs, or detention basins, are built to protect property from the stormwater runoff impacts of new development.

DIVERSION

A diversion is a new channel that sends floodwaters to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel. During floods, the floodwaters spill over to the diversion channel or tunnel, which carries the excess water to a receiving lake or river.

LOCAL IMPLEMENTATION /CRS CREDIT

Structural flood control projects that provide at least 100-year flood protection and that result in revisions to the Flood Insurance Rate Map are not credited by the CRS so as not to duplicate the larger premium reduction provided by removing properties from the mapped floodplain. Other flood control projects can be accepted by offering a 25-year flood protection.

Table C.5 – Structural Projects Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Structural Project Measures Considered by LMSWG and Not Recommended			
-	Construction of outfalls, gravity wells, and exfiltration trenches	Key West has completed 17 such projects; continued maintenance is necessary, but no further funds are being sought	n/a

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Structural Project Measures and Funding Recommended for Implementation			
Monroe County and Municipalities	County-wide Road Elevation and Drainage Improvements (Phase 1 of 2)	Structural improvements to City and County streets will mitigate impacts from flooding and aide evacuation procedures.	Local, State, Federal
Key West	701 Palm Seawall: Seawall replacement	Improving the seawall will further resilience to flooding, tropical cyclones, and sea level rise in its immediate surroundings	Local, State, Federal

C.2.6 PUBLIC INFORMATION

OUTREACH PROJECTS

Outreach projects are the first step in the process of orienting property owners to the hazards they face and to the concept of property protection. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties.

Awareness of the hazard is not enough; people need to be told what they can do about the hazard. Thus, projects should include information on safety, health and property protection measures. Research has shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions.

Community newsletters/direct mailings: The most effective types of outreach projects are mailed or distributed to everyone in the community. In the case of floods, they can be sent only to floodplain property owners.

News media: Local newspapers can be strong allies in efforts to inform the public. Local radio stations and cable TV channels can also help. These media offer interview formats and cable TV may be willing to broadcast videos on the hazards.

LIBRARIES AND WEBSITES

The two previous activities tell people that they are exposed to a hazard. The next step is to provide information to those who want to know more. The community library and local websites are obvious places for residents to seek information on hazards, hazard protection, and protecting natural resources.

Books and pamphlets on hazard mitigation can be given to libraries, and many of these can be obtained for free from state and federal agencies. Libraries also have their own public information campaigns with displays, lectures and other projects, which can augment the activities of the local government. Today, websites are commonly used as research tools. They provide fast access to a wealth of public and private sites for information. Through links to other websites, there is almost no limit to the amount of up to date information that can be accessed on the Internet.

In addition to online floodplain maps, websites can link to information for homeowners on how to retrofit for floods or a website about floods for children.

TECHNICAL ASSISTANCE

HAZARD INFORMATION

Residents and business owners that are aware of the potential hazards can take steps to avoid problems or reduce their exposure to flooding. Communities can easily provide map information from FEMA's FIRMs and Flood Insurance Studies. They may also assist residents in submitting requests for map amendments and revisions when they are needed to show that a building is located outside the mapped floodplain.

Some communities supplement what is shown on the FIRM with information on additional hazards, flooding outside mapped areas and zoning. When the map information is provided, community staff can explain insurance, property protection measures and mitigation options that are available to property owners. They should also remind inquirers that being outside the mapped floodplain is no guarantee that a property will never flood.

PROPERTY PROTECTION ASSISTANCE

While general information provided by outreach projects or the library is beneficial, most property owners do not feel ready to retrofit their buildings without more specific guidance. Local building department staffs are experts in construction. They can provide free advice, not necessarily to design a protection measure, but to steer the owner onto the right track. Building or public works department staffs can provide the following types of assistance:

- Visit properties and offer protection suggestions
- Recommend or identify qualified or licensed contractors
- Inspect homes for anchoring of roofing and the home to the foundation
- Explain when building permits are needed for home improvements.

PUBLIC INFORMATION PROGRAM

A Program for Public Information (PPI) is a document that receives CRS credit. It is a review of local conditions, local public information needs, and a recommended plan of activities. A PPI consists of the following parts, which are incorporated into this plan:

- The local flood hazard
- The property protection measures appropriate for the flood hazard
- Flood safety measures appropriate for the local situation
- The public information activities currently being implemented within the community, including those being carried out by non-government agencies
- Goals for the community's public information program
- The outreach projects that will be done each year to reach the goals
- The process that will be followed to monitor and evaluate the projects

LOCAL IMPLEMENTATION /CRS CREDIT

Communities in Monroe County could receive credit under Activity 330 – Outreach Projects as well as Activity 350 – Flood Protection Information. Credit is available for targeted and general outreach projects. Credit is also provided for making publications relating to floodplain management available in the reference section of the local library.

Table C.6 – Public Information and Outreach Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Public Information and Outreach Measures Considered by LMSWG and Not Recommended			
-	Promote hurricane and flood awareness to residents and businesses.	A PPI has been developed which distributes outreach materials that provide hurricane and flood protection and preparedness information.	n/a
-	Comprehensive hazard mitigation (prevention) education and outreach program targeted to government employees, the construction industry, and trades, and the general public.	Public outreach material has been created, published and distributed throughout county.	n/a
Public Information and Outreach Measures and Funding Recommended for Implementation			
Key West	Expand Public Outreach: Mapping, outreach, floodproofing, windproofing, individual mitigation actions, disclosures, financing, etc.	The City will expand on its existing public outreach capabilities to provide information on a wider range of hazards and mitigation opportunities.	Local

APPENDIX D MITIGATION PRIORITIZATION PROCESS

Florida's Administrative Code 27P-22 delegates authority to the LMS Working Group to set priorities and identify projects. FDEM encourages the LMS to pre-identify (and "bank") projects and gather initial data to facilitate the priority setting process and aid in more rapid consideration in the post-disaster period. The LMS allows submissions from jurisdictions, utility agencies, and non-profit organizations, among others. It is expected that initiatives "banked" into the Mitigation Strategy (found in Section 7) are identified based on information and data contained within this plan and other relevant resources. Initiatives are expected to be consistent with current policies and regulations, technically feasible, likely to have high political and social acceptance, and be achievable using existing authorities and staff. These details are identified in the preliminary enhanced STAPLEE prioritization introduced in Section 6.

This appendix further details the County's prioritization process for the projects prioritized for HMA grant consideration.

D.1 MITIGATION PRIORITIZATION PROCESS

Monroe County maintains an evolving list of project initiatives that includes many site-specific initiatives. This list may be modified periodically. The creation of this list results from three distinct steps in the process. The timeline for these steps is contained in the table below and each step is defined in more detail in the sections that follow:

Table D.1 – Project Prioritization Process Timeline

Timeframe	Steps
Quarterly	Step 1: Accept NOIs to "bank" projects; LMSWG Coordinator updates Mitigation Action Plan from Section 7.
Post-Disaster/When NOFA is Issued	Step 2: Entities electing to move projects from the Mitigation Action Plan to the prioritized list submit characterization forms; Ranking subcommittee reviews and completed prioritization forms; LMSWG Coordinator updates prioritization
Annually	Step 3: Entities asked to review lists (Mitigation Action Plan and HMA Prioritized List) to identified projects that are completed, deleted, or to be carried forward.

D.1.1 STEP ONE: PRELIMINARY IDENTIFICATION OF MITIGATION INITIATIVES

Initiatives may be placed on the Mitigation Action Plan list by any eligible entity that provides minimum information. New additions to the Mitigation Action Plan during this cycle are considered part of the "bank" moving forward. The Working Group allows submissions on a quarterly basis, so that eligible entities are not constrained by an annual opportunity to identify and pursue projects and funding. When an initiative submits a new project outside of the 5 year LMS update cycle, they are to do so by submitting a Notice of Intent (NOI) form, which may be obtained from the LMS Coordinator through the

Monroe County Emergency Management Department. Submission of NOIs require the following minimum information:

- Name of owner/entity;
- Name and brief description of initiative/project;
- "Best estimate" of project costs; and
- Identification of mitigation category, mitigation goal(s), and hazards addressed.

D.1.2 STEP TWO: PRIORITIZED MITIGATION INITIATIVES

Implementation of the identified mitigation actions from Step One, especially site-specific initiatives, is usually dependent upon the availability of funding. A project that is on the Step One (Mitigation Action Plan) list is moved to the Step Two (Prioritized) list when the owner/entity anticipates developing and submitting the formal application to FDEM and FEMA; at this point, the LMSWG is charged with prioritizing projects for available funding. Notices of Funding Availability (NOFA) may be issued annually (i.e. for FEMA's FMA and BRIC programs) or after disasters that yield HMGP funds, in which case NOFAs are usually issued within 90 days. Whether on an annual basis or post-disaster, the LMSWG members would be notified and eligible entities would then decide whether they are prepared to submit the applicable information to formalize initiatives from Step One.

The LMS working group is charged with developing a prioritized list of initiatives pursuant to State requirements (Chapter 27P-22.006); at any given time, priorities may change due to various factors such as recent damage, availability of non-federal cost share, or changes in priorities of the funding agency.

When a NOFA is anticipated or received, the LMS Coordinator will notify entities that have initiatives in the Mitigation Action Plan. In order to have an initiative forwarded to the funding agency, detailed data specified in the Characterization Form, which can be obtained from the LMS Coordinator and will be sent out with the announcement of a NOFA, are required so that the LMSWG's Ranking Subcommittee can process and determine priorities – thus creating a Prioritized Initiative (Step Two) list. The most up to date Prioritized List can be found on the following page. The following minimum information will be required:

- Name of owner/entity and the point of contact responsible for providing the detailed information;
- Initiative/project title, description of the project, whether it benefits a critical facility, and whether the applicant has the legal authority to undertake the project;
- Estimate of how quickly the project could be started and how long it would take to complete;
- The LMS goals/objectives addressed, a scope of work and need, and the hazard(s) and problem(s) it would address;
- Description of the general benefits, including number of people impacted, economic benefits, social benefits, environmental benefits, and whether historic resources are affected;
- Estimated total project costs and whether a formal Benefit-Cost Analysis has been prepared or if the estimated benefits are based on the worksheet to approximate a Benefit-to-Cost Ratio;
- Statements regarding feasibility; consistency with other plans, policies, codes and ordinances; permits and approvals necessary; level of effort to implement; and likely reception by the public; and
- An attachment to approximate benefits and costs.

D.1.3 STEP THREE: COMPLETED/DELETED/CARRIED FORWARD INITIATIVES

In order to maintain records that demonstrate progress toward the mitigation goals, such as the details found in Section 2.9, the LMSWG recognizes that is important to track completed initiatives as well as initiatives that are deleted from the list, including those for which sufficient information was not provided to retain on one of the other lists. At least once a year, entities that have initiatives on either list (regardless of source of funding) will report whether these initiatives have been completed, deleted, or are carried forward – subsequently remaining on the appropriate list. At any time, entities may request that an initiative be deleted. The LMS Coordinator will maintain a list of such action.

APPENDIX E REFERENCES

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