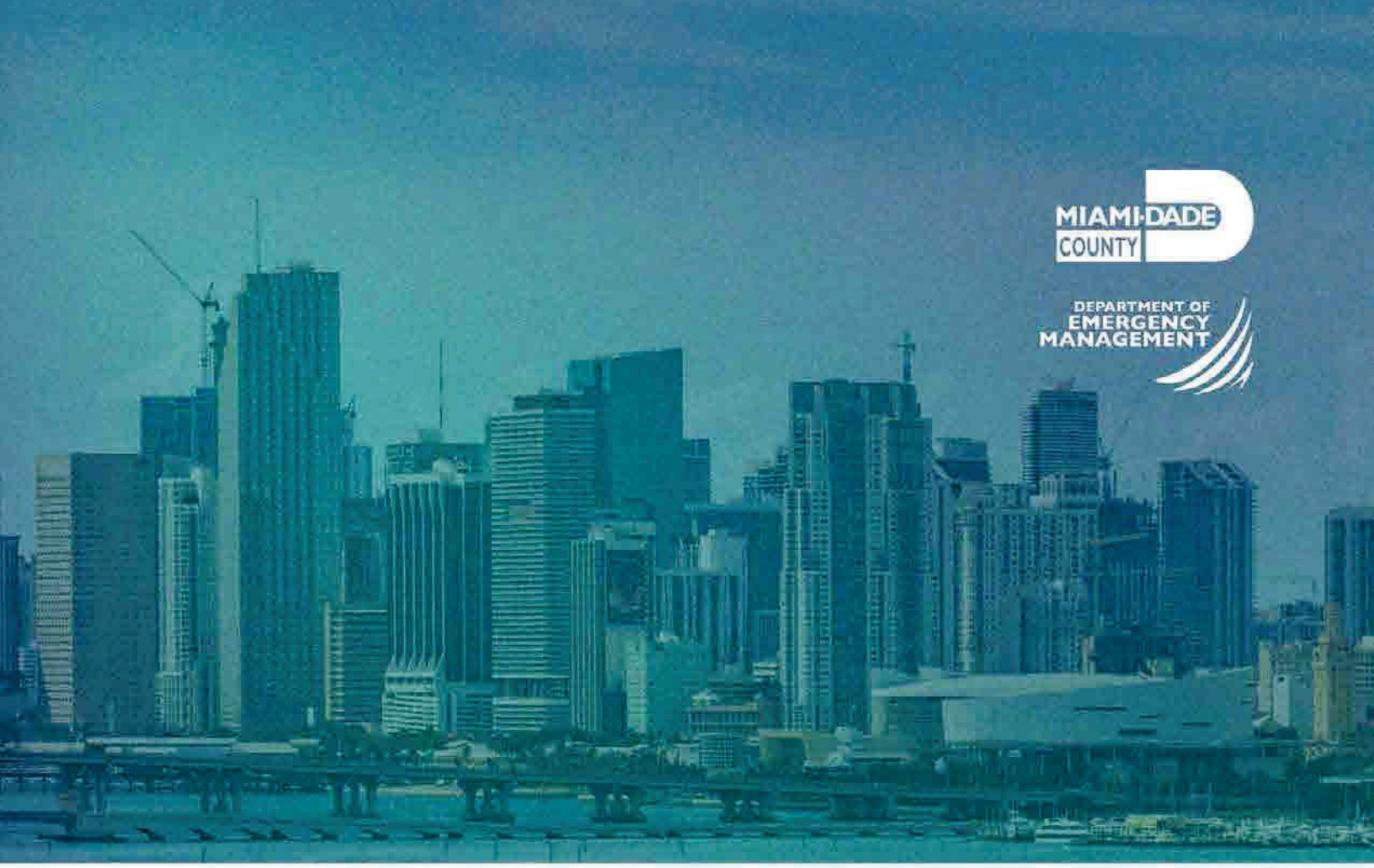


MIAMI-DADE COUNTY

DEPARTMENT OF EMERGENCY MANAGEMENT

LOCAL MITIGATION STRATEGY: LMS 2025



Miami-Dade County

PART 1: 2025 THE STRATEGY

MIAMI-DADE
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INTRODUCTION

The Local Mitigation Strategy (LMS) is a comprehensive plan designed to reduce the community's long-term vulnerability to disasters. This plan forms the foundation of Miami-Dade County's approach to mitigation initiatives and establishes the county's eligibility for Hazard Mitigation Assistance (HMA) funding. The mitigation objectives and goals determined in this plan are informed by an assessment of the hazards unique to Miami-Dade County. As a living document, the LMS Plan is revised to integrate necessary changes identified by whole community partners under the direction of Miami-Dade County Department of Emergency Management (DEM).

This plan was published on the DEM website for public review and feedback received was integrated prior to submission to the Florida Division of Emergency Management (FDEM) for approval. The LMS Plan was presented to the Miami-Dade Board of County Commissioners (BCC) for adoption in 2025.

A review of the changes that have been made to the LMS since its last adoption in 2020 is provided in *Part 4: Appendix A*.

Purpose

The purpose of the LMS is to develop a comprehensive approach to effectively reduce the impact of current and future hazards and risks faced by local communities within Miami-Dade County. [1]

The LMS accomplishes this through the following measures:

- A planning process that encourages whole community participation and input;
- Review and incorporation of community plans, local, state and federal regulations and guidance, studies, reports and technical information;
- Overview of past and present occurrences and projected future hazard events;
- Linkage of mitigation measures and actions to the Threat and Hazard Identification and Risk Assessment (THIRA);
- Identification of measures and actions as LMS Projects are accomplished, are planned for implementation, or identified as potential or future initiatives;
- Identification of potential or actual funding sources;
- Integration of GIS to provide maps to illustrate hazard and risk areas, consequence analysis and mitigation measures;
- Annual reviews and updates;
- Regular meetings, informational messaging, trainings and workshops to engage the mitigation participants;
- An identified process for monitoring the overall progress of mitigation strategies and documentation of completed initiatives.

[1] EMAP 2016 Standard 4.2.1

This strategy will continuously evolve to address current and future risk and vulnerability.

How to Use This Plan

The LMS is divided into five (5) parts:

Part 1 – The Strategy (LMS-Part 1) – Provides an overview of the LMS and identifies how the plan is implemented, updated, and informed by legal authorities. This part sets forth the goals and objectives for mitigation actions. It also includes the hazards assessment along with rationale for inclusion or omission of hazards in our strategy and information about varying jurisdictional vulnerabilities.

Part 2 – The Projects (LMS-Part 2) – Contains the methodology for how mitigation projects are submitted, prioritized,[2] and tracked. Also includes the list of projects identified by the LMS Working Group members for mitigation actions that are planned, in progress, or completed. This part also highlights case studies of projects completed within the last four years.

Part 3 – Funding (LMS-Part 3) – Identifies potential funding sources for mitigation projects.

Part 4 – Appendices (LMS-Part 4) – This section contains a number of supportive documents including:

- List of Updates made to the plan since the last adoption
- List of LMS members including Steering Committee, Working Group and Subcommittees
- Miami-Dade Resolution Adopting the LMS
- State Letter approving the LMS
- FEMA Letter approving the LMS
- Local Charter information for the Metropolitan form of Government
- Integration Document
- Municipal Integration of the LMS
- Community and Economic Profile

Part 5 – Flooding NFIP & CRS (LMS-Part 5) – Contains information specific to flood management plans and identifies activities and information in support of the CRS program.

[2] EMAP 2016 Standard 4.2.3

LMS ORGANIZATIONAL STRUCTURE

The LMS is a compilation of initiatives that are identified and supported by the LMS Chair, LMS Co-Chair, the Steering Committee (LMSSC), the Working Group (LMSWG), sub-committees and ultimately adopted by local governing bodies. A complete list of the participants of the LMS are listed in LMS-Part 4 Appendices B and C.

LMS Chair

The Miami-Dade County Department of Emergency Management (DEM) Mitigation Planner serves as the LMS Chair. The LMS Chair is responsible for updating and maintaining the LMS Plan, coordinating meetings and trainings, reviewing and archiving LMS projects, and disseminating information pertinent to the mitigation goals and objectives set forth in the LMS.

The LMS Chair also serves as the LMSSC Chair. This involves scheduling and presiding over the LMS meetings. The LMS Chair participates in workshops, trainings, and conferences throughout the year to benefit the LMS. Additionally, the LMS Chair maintains a distribution list of individuals interested in mitigation and is responsible for the website updates.

LMS Co-Chair

The LMS Co-Chair is an appointed position by the LMS Chair and assists the LMS Chair with administrative responsibilities, LMS plan updates, and mitigation initiatives as well as providing consultation to the LMS Chair. The LMS Co-Chair is also responsible to stand in for the LMS Chair in case of any unforeseen absences.

LMS Steering Committee

The LMSSC acts as a "Board-of-Directors" and is responsible for the development of policy guidance. Members of the LMSSC are representative of the organizations found within the larger Working Group (i.e. municipal, county, educational, not-for-profits, private sectors and individuals). The LMSSC acts as a review committee for the establishment of this LMS and the prioritization of the projects therein when a limited funding source is available. Membership on any committee shall be voluntary and subject to the review and approval of the LMSWG. A committee member who fails to attend a reasonable number of committee meetings may be dropped from participation in the committee by a majority vote of the other members of that committee.

Any planning and program development matters are addressed as needed in LMSSC meetings and open forums in the LMS quarterly meetings.

LMS Working Group

The LMSWG is composed of representatives from eight main groups:

- Municipalities
- County Departments
- Colleges and Universities
- Hospitals and Health Care
- Private Non-Profits
- Private Sector/Businesses
- Regional, State and Federal Partners
- Other Stakeholders, including private citizens

The makeup of the LMSWG is not limited to any organization or jurisdiction. Numerous others have expressed the desire to participate in the LMS and are welcome to do so. Each organization is encouraged to solicit participation and commentary from its citizens, employees, and members.[3]

To be considered a participant of the LMS and receive the benefits thereof, a municipality, County Department or any other organization must attend at least two (2) of the last four (4) quarterly meetings held. The agencies that are participating in the LMSWG are identified in *Part 4 Appendix B*.

[3] EMAP 2016 Standard 4.4.1(2)

Municipal Participation

Within Miami-Dade County the following municipalities are active participants of the LMS Working Group.

City of Aventura	City of Homestead	City of Opa-locka
Bal Harbour Village	Village of Key Biscayne	Village of Palmetto Bay
Town of Bay Harbor Islands	Town of Medley	Village of Pinecrest
Village of Biscayne Park	City of Miami	City of South Miami
City of Coral Gables	City of Miami Beach	City of Sunny Isles Beach
Town of Cutler Bay	City of Miami Gardens	Town of Surfside
City of Doral	Town of Miami Lakes	City of Sweetwater
Village of El Portal	Miami Shores Village	Village of Virginia Gardens
Florida City	City of Miami Springs	City of West Miami
Town of Golden Beach	City of North Miami	Indian Creek Village
City of Hialeah Gardens	North Bay Village	Miami-Dade County (unincorporated areas)
City of Hialeah	City of North Miami Beach	

For the remainder of this document municipalities will be referred to by only the name and not the full title (e.g. City of Coral Gables will be referred to as Coral Gables).

LMS Subcommittees

To streamline the LMSWG's activities, various subcommittees may be formed as needed to address an area of concern. The formation and disbandment of subcommittees is done in correlation with trending issues that are addressed by the LMSWG members. A list of possible subcommittees can be found in *Part 4 Appendix C*.

Meetings

The LMSWG meets once each calendar quarter and the LMSSC and LMS Subcommittees meet as needed. Meeting announcements are posted on the LMS webpage, and emails are sent to the LMS Distribution List which is maintained by the LMS Chair and Co-Chair.

The representatives are encouraged to notify the public or other interested parties about meeting dates at least 30-days prior to each meeting. Meeting times, dates and locations will be posted on the LMS website: https://www.miamidade.gov/global/emergency/local-mitigation-strategy.page

Meeting notes and attendance records are kept by the LMS Chair and Co-Chair and are available upon request.

PLANNING PROCESS[4]

The LMS Chair with the assistance of the LMS Steering Committee, and input from the LMSWG, LMS subcommittees, and the public, updates and maintains this plan. Updates are based on factors such as recent disaster events, changes in Local, State, and Federal policies, emerging issues such as aging infrastructure, and new development projects that impact Miami-Dade County communities.

The LMS Chair includes a listing of the revisions made to this plan in relation to these factors, which is documented in the *Part 4 Appendix A: List of LMS Changes*.

Annual Updates

The LMS is updated on an annual basis. These updates are based on reviews from the LMS Chair and input from partners regarding the effectiveness of the plan in reducing the County's vulnerability to hazards and in achieving LMS goals. Any proposed changes are reviewed for integration with the LMS and Comprehensive Emergency Management Plan (CEMP) crosswalks provided by FDEM, the Emergency Management Accreditation Program (EMAP) Standards, the Community Rating System (CRS) Coordinator's Manual, and the Threat Hazard Identification and Risk Assessment (THIRA). An annual update to the LMS is provided to the State by the last working day of January and the documents are subsequently posted on the Miami-Dade County website.

Five-Year Update

A complete State and Federal review and approval of this plan is conducted on a five-year cycle. The plan has undergone review and approval from FDEM with delegated authority from FEMA every five (5) years since 2000. The five-year review process incorporates the annual updates and a review of the FDEM LMS Crosswalk. FDEM notifies the LMS Chair 12-months in advance of the plan expiration date. The LMS Plan is updated and prepared at least eight (8) months prior to its expiration for public review and comments on the plan. Once all comments are reviewed and incorporated, the updated LMS will be submitted to FDEM by the LMS Chair for review no later than six (6) months prior to its expiration date.

FDEM will review the LMS Plan and provide comments, and if needed, the LMS Chair will make revisions to satisfy any State LMS Crosswalk deficiencies. Once the plan has been approved pending adoption by the State, individual jurisdictions and agencies must adopt the plan and provide the resolutions adopting the plan to the LMS Chair so that they may be forwarded to the State and FEMA to receive approved status.

[4] EMAP 2016 Standard 4.2.1.(2)

2025 LMS Update Management Plan (LMS-PUMP)

The planning process for the 5-year update for the LMS began at the December 14, 2023 Quarterly Meeting. At this meeting the LMS Chair presented and discussed the LMS Planning Update Management Plan (LMS-PUMP). This plan included the schedule for updating the LMS, the information that would be requested, the schedule for meetings and workshops that would discuss various elements of the plan and the expected roles and responsibilities of the entities involved in the update process.

In the LMS-PUMP, the following major milestones of the update process were presented:



The roles and responsibilities of the entities involved in the update process are as follows:

LMS Chair

Responsible for the overall update process. This includes:

- Ensures that the new plan meets all the policy requirements for a FEMA approved plan
- Provides the LMSWG with a process to update the plan and organizes all the required meetings and discussions
- Documents the meetings, discussions and updates of the plan
- Directs the meetings and discussions
- Implements the approval process

LMSSC

- Participate in all PUC meetings and quarterly LMS meetings
- Reviews plan and provides recommendations for plan updates
- Review draft edits to plan volumes, and approve changes

Plan Update Committee (PUC)

- Participates in the PUC meetings and drafts initial edits to the plan elements
- PUC members may attend all or a selection of the PUC meetings based on expertise and areas of interest

LMSWG

- Participate in all PUC meetings and quarterly LMS meetings
- Reviews plan and provides recommendations for plan updates
- Review draft edits to plan volumes, and approve changes

Jurisdictions, Special Taxing Districts and Agencies with Boards

- Must provide updates regarding how they implement the mitigation plan in their own planning efforts
- Must submit the approved plan for adoption by their boards and councils

Florida Division of Emergency Management

- Provides support regarding policy, guidance and procedures regarding the development of hazard mitigation plans and their updates
- Reviews and approves hazard mitigation plans through their 5-year cycle updates
- Provides training regarding policy, guidance and procedures regarding the development of hazard mitigation plans and the approval process
- Coordinates the review and approval process between FEMA and local governments

The LMS-PUMP describes the major elements of the LMS Plan that require discussion, collaboration, and input from the community to be updated. These elements require discussion within the Plan Update Committee (PUC) meetings. The PUC is composed of the LMS Steering Committee (LMSSC) and any LMSWG committee members that volunteer to join each individual PUC meeting. For a complete list of all the LMS Working Group members that were invited to these planning meetings, refer to Appendix B. The LMS-PUMP also states that FEMA policy requires participating jurisdictions to be part of the development of the hazard mitigation plan to receive FEMA approval and the benefits of that approval.

The following table describes the plan elements and the parties involved in their update:

Plan Element	Collaboration needed	Responsible Parties
(Part 1 – The Strategy) Policies, Ordinances and Programs Affecting Mitigation	Agencies need to provide updates regarding how the plan is implemented locally in their own planning processes	Jurisdictions, Special Taxing Districts and Agencies with Boards

Plan Element	Collaboration needed	Responsible Parties
(Part 1 – The Strategy) Analysis of all Hazards from THIRA	Hazards from the most recently updated THIRA need to be reviewed to determine consideration in the LMS	PUC will review section in advance of working meetings, and provide written edits to LMS Chair LMSWG will provide input and consensus of Hazards during quarterly meetings
(Part 1 – The Strategy) Mitigation Goals and Objectives	Mitigation goals and objectives will be evaluated to ensure alignment with community needs as well as updated Hazard analysis	PUC will review section in advance of working meetings, and provide written edits to LMS Chair LMSWG will provide input and consensus on goals and objectives during quarterly meetings
(Part 2 – The Projects) Prioritizing Mitigation Initiatives	This element focuses on the criteria for prioritizing mitigation actions and projects. The process will be reviewed to ensure actions and projects are prioritized according to need and benefit. This section also includes the mitigation project list for the county since the last plan update.	PUC will review section in advance of working meetings, and provide written edits to LMS Chair Updated criteria will be presented at quarterly meeting for LMSWG review and discussion LMS Chair will provide survey for input LMSWG members will provide responses and updates regarding their respective completed projects since the last plan update.
(Part 3 – Funding) The Funding	Section will be reviewed to ensure accurate and up to date information on all funding sources and programs, identify any potential new sources of funding, and	PUC will review section in advance of working meetings, and provide written edits to LMS Chair

Plan Element	Collaboration needed	Responsible Parties
	provide additional guidance on how to navigate these sources to maximize funding opportunities	
(Part 4: The Appendices) The Appendices – Appendix H: Integration Document	Relevant plans will be listed, plan elements will be identified for each plan, and reviews will occur to ensure significant elements and priorities from other plans align with LMS Plan. Additionally, any actions needed to bring plans into alignment will be noted.	PUC members will be assigned a plan/plans in advance. PUC members will review their respective assignment ahead of working meetings, and provide written edits to LMS Chair LMS Chair will consult with original plan authors for final consensus prior to adoption of this section.
(Part 4: The Appendices) The Appendices	Existing maps will be updated to current data. Additional mapping needs will be identified based on available research, current hazard analysis, state hazard mitigation plan, and others sources as appropriate.	LMS Chair will meet with County GIS department to make needed updates.

For meetings and discussions scheduled with topics from the LMS-PUMP, relevant materials were forwarded to PUC members ahead of the meetings to provide a better understanding of the elements that were being discussed. PUC members were given an opportunity to provide input during the meetings or in writing via email.

The following table details when the LMS Quarterly and PUC meetings were held to host discussions about the elements of LMS Plan broken down by topic:

Date	Meeting	Topics	Location
December 14, 2023	LMS Q4	• Presentation of LMS PUMP	North Dade Regional Library
February 29, 2024	PUC	• (Part 1 – The Strategy) Analysis of all Hazards from THIRA	Remote: Microsoft Teams
March 14, 2024	PUC	• (Part 1 – The Strategy) Mitigation Goals and Objectives	Remote: Microsoft Teams
March 28, 2024	LMS - Q1	• Presentation and Discussion of Hazards, Goals and Objectives	In person
April 23, 2024	PUC	• (Part 2 – The Projects) Prioritizing Mitigation Initiatives	Remote: Microsoft Teams
June 27, 2024	LMS – Q2	• Presentation and discussion of Prioritization of Projects • Deadline to provide agency updates (self-reported elements not requiring discussion), Policies, Ordinances and Programs Affecting Mitigation (See Part 1: The Strategy of the LMS Plan) • Deadline to provide survey responses for completed projects (See Part 2: The Projects)	In person
July 30, 2024	PUC	• (Part 4: The Appendices) The Appendices – Appendix H: Integration Document	Remote: Microsoft Teams
August 28, 2024	PUC	• (Part 3 – Funding) The Funding	Remote: Microsoft Teams

Review and Revision Criteria

The LMS will be updated by the LMS Chair with the assistance of the LMSSC and input from the LMSWG. Most revisions made to each section of this document were based upon the LMS-PUMP explained earlier in this document and LMSWG meetings that generally discussed the following questions:

1. Have there been any new mandates from Federal, State or Local agencies that require changes to the LMS? Any new or changing laws, policies or regulations?
2. Are there any societal developments or significant changes in the community that must be added to the current LMS? Does the LMS still reflect the concerns of the community? Are the demographics the same? Has there been any growth or development in hazard areas?
3. Have there been any changes in funding sources or requirements?
4. Should the LMS be updated to include any new forms of hazards or areas of vulnerability within Miami-Dade County communities?
5. Have there been any changes in the Comprehensive Development Master Plan (CDMP), THIRA, or any other planning documents?
6. Have any of the mitigation opportunities been implemented? Are the priorities for implementation the same?
7. What are the recommendations or lessons learned from any major incidents that have occurred during the past five-year update period?

Public Review and Comment

The latest published version of the LMS Plan is posted on the Miami-Dade County website: https://www.miamidade.gov/global/emergency/local-mitigation-strategy.page for public review and commentary. Any comments received through this medium will be incorporated through the revision process identified above. Comments can be sent to the following email address mdlms@miamidade.gov.

DEM will post messages via the different social media platforms and the Miami-Dade County website to encourage Miami-Dade community members to review and comment on the Plan.

Incorporation of Existing Plans and Strategies

As part of the planning process, the LMSWG performed a review of local policies and plans to create an Integration Document (*Part 4 Appendix H*). The LMS Chair, as part of the LMS-PUMP, coordinated a planning meeting facilitated by FEMA contractors through their BRIC Direct Technical Assistance grant program. Opportunities for plan integration of policies, ordinances and programs were discussed so that they could be memorialized in the LMS Plan. Areas for opportunity where mitigation may be better aligned are also notated.

The Integration Document in *Part 4 Appendix H* includes evaluations of the following:

- Miami-Dade County Resilient305 Strategy
- Miami-Dade County Sea Level Rise Strategy
- Miami-Dade County Thrive305 Action Plan
- Miami-Dade County DEM Post Disaster Redevelopment Plan (PDRP)
- 2050 Long Range Transportation Plan (LRTP)

- Miami-Dade County Extreme Heat Action Plan 2022
- Miami-Dade County DEM Recovery Support Function (RSF) Mitigation Annex
- Miami-Dade County DEM Flood Response Plan
- Miami-Dade County DEM Recovery Plan (July 2022)
- Southeast Florida Regional Climate Action Plan (RCAP) 3.0
- Municipal Watershed Master Plans and Stormwater Master Plans

Plan Adoption

Once the plan has been approved by FDEM and FEMA, it will be submitted to the Miami-Dade County Board of County Commissioners (BCC) for adoption. Miami-Dade County has a metropolitan form of government with its own Home Rule Charter (*Part 4 – Appendix G*). Once the BCC passes a resolution, that action automatically includes all the Municipalities within the County. In the event a Municipality does not wish to participate in the action, that Municipality must, through their own resolution, opt out. However, FEMA requires that each jurisdiction, special tax district, institution or agency governed by a board or council adopt the LMS Plan through their own resolution to receive approval and the benefits of approval.

Miami-Dade County communities that wish to utilize the LMS as their Floodplain Management Plan for credit under the CRS Program, must also adopt the LMS. Copies of the local adoption must be sent to the LMS Chair to be incorporated into *LMS-Part 4*.

A copy of the official plan adoption document can be found in *Part 4 Appendix D.*

POLICIES, ORDINANCES AND PROGRAMS AFFECTING MITIGATION [5]

There are many federal, state and county laws and policies that affect hazard mitigation and all the members of the LMSWG. Some of those are:

Federal

1. The Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93-288 as amended (The Stafford Act) is interpreted by Title 44 of the Code of Federal Regulation (44 CFR) and governs FEMA and emergency management and sets forth the federal concepts for hazard mitigation. It also defines the Coastal Barriers Resources Act (44 CFR 206 subpart J) and describes floodplain and environmental management (Parts 9 and 10).

2. The Disaster Mitigation Act of 2000 (DMA-2K) has also redefined parts of The Stafford Act and those changes have been incorporated into this document. Much of FEMA has been further redefined by the "Post-Katrina Emergency Management Reform Act of 2006," which was enacted by Congress and signed into law by the President in the fall of 2006.

3. The National Flood Insurance Program (NFIP) and the Community Rating System (CRS) FLA-15, July 1996, sets up a community rating system for flood insurance offering incentives for communities and credits for identified floodplain management activities.

4. National Fire Code, 1993 and NFPA 101 Life Safety Code define uniform fire safety standards adopted by rule by the State Fire Marshal.

5. Title 15 of the Code of Federal Regulations, which defines the Coastal Zone Management Act (15 CFR Parts 923 and 930).

6. Title 40 of the Code of Federal Regulation which defines the National Environmental Policy Act including such mitigation measures as included in the National Emission Standards for Hazardous Air Pollutants (Part 61), Toxic Substances Control Act (Part 763), the Resource Conservation and Recovery Act and CERCLA (the Superfund).

7. Title 29 of the Code of Federal Regulations that defines the Occupational Safety and Health Act containing many hazard mitigation measures.

8. Presidential Decision Directives 39 and 62 are the authorities directing the development of terrorism response.

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[5] EMAP 2016 Standard 4.2.4 (1)

9. Presidential Policy Directive (PPD) 8: National Preparedness was released in March 2011. The goal of PPD 8 is to strengthen the security and resilience of the U.S. through five (5) preparedness mission areas – Prevention, Protection, Mitigation, Response and Recovery.

    a. National Protection Framework follows the guiding principles of resilience and scalability, a risk informed culture and shared responsibility.

    b. National Mitigation Framework establishes a common platform for coordinating and addressing how the Nation manages risk through mitigation capabilities.

    c. National Response Framework includes establishing a safe and secure environment moving towards recovery.

    d. National Disaster Recovery Framework focuses on how to best restore, redevelop and revitalize the community and build a more resilient Nation.

10. National Infrastructure Protection Plan (NIPP): provides a framework for programs and initiatives for the protection of Critical Infrastructure and Key Resources (CI/KR) and ensures that resources are applied where they offer the most benefit for mitigating risk.

11. PPD – 21 Critical Infrastructure and Resilience establishes a national policy on critical infrastructure security and resilience

State

1. State of Florida Statutes which are pertinent to hazard mitigation include:

    a. Chapter 161 – Beach and Shore Preservation

    b. Chapter 163 – Conservation, Aquifer Recharge and Drainage Element

    c. Chapter 255 – Public Property and Public Buildings

    d. Chapter 373 – Water Resources

    e. Chapter 380 – FDEP Resilient Florida Program

    f. Chapter 403 – Environment Controls

2. The South Florida Water Management District is a regional government agency that oversees the water resources in the southern half of the state through managing and protecting water resources including balancing and improving water quality, flood control, natural systems and water supply.

3. South Florida Fire Prevention Code 1992-93 (adopted by the County Commission) defines standards for fire prevention and allows controlled burns as mitigation.

County

1. Board of County Commission Resolutions

    a. R-572-00, which establishes the Miami-Dade Local Mitigation Strategy as official county policy.

    b. R-710-05, which authorizes the County Manager to apply for, receive, expend and amend applications for projects listed in the Miami-Dade Local Mitigation Strategy.

    c. R-451-14, which requires all County infrastructure projects to consider potential impacts of sea level rise during all project phases.

2. Pertinent Miami-Dade County laws include codes and ordinances that govern the unincorporated and municipal activities, as follows:

    a. Chapter 8(b) of the county code, which deals with emergency management.

    b. Chapter 11(c), covering Development within Flood Hazard Districts.

    c. Chapter 17, i.e. the Housing Code, focused on maintaining the housing stock in decent safe and sanitary conditions.

    d. Chapter 18b covering right-of-way landscaping.

    e. Chapter 24 covering the activities of the Miami-Dade Division Environmental Resources Management (DERM) for permitting hazardous materials.

    f. Chapter 28 of the county code which deals with subdivision regulations.

    g. Chapter 33, covering zoning activities for approval of a development of regional impact.

    h. Floodplain Management Program sets the criteria for elevations and assesses the risks for flooding for different areas of the County.

    i. Miami-Dade County Comprehensive Emergency Management Plan (CEMP) mandates that municipalities have emergency management plans, as well as recommends the performance of hazard mitigation activities.

j. Miami-Dade County Comprehensive Land Use Plan dictates current land use and controls future land use and growth throughout the county.

k. The Public Works Manual, especially Section D5, concerning coastal construction.

l. Miami-Dade County Environmental Protection Ordinance, Coastal and Freshwater Wetlands Regulations.

3. Miami-Dade County Special Assessment Districts can provide tree-trimming programs that prevent more severe damage during windstorms.

4. On March 1, 2002, the Florida Building Code (FBC), was adopted by Miami-Dade County and all the Municipalities, consequently replacing the South Florida Building Code. The High Velocity Hurricane Zone (HVHZ) portions of the code are applicable to Miami-Dade and Broward Counties only, the HVHZ sections of the FBC in addition to the most current ASCE- 7 standard contains stricter design and construction measures, especially to protect windows, walls, and roof from wind-born debris. In 2012, the FBC was amended to include flood protection measures and use of ASCE-24.

5. The Local Law Enforcement Mutual Aid Agreement with Miami-Dade County designed to coordinate and supplement local resources.

6. The Statewide Mutual Aid Agreement for Catastrophic Disaster Response and Recovery establishes a local resource for all Working Group members that are presently signatories.

7. The Southeast Florida Regional Climate Change Compact set forth an agreement between Miami-Dade, Broward, Palm Beach and Monroe Counties to work in collaboration to address the impacts of climate change on Southeast Florida. The Climate Change Action Plan was subsequently developed to identify and pursue reduction and resiliency measures in the region.

County Programs

Stormwater Management Masterplan

This program has the responsibility of the evaluation of flood protection levels of service. The Stormwater Management (Drainage) Level of Service (LOS) Standards for Miami-Dade County contain both a Flood Protection (FPLOS) and Water Quality (WQLOS) component. The minimum acceptable Flood Protection Level of Service (FPLOS) standard for Miami-Dade County is protection from the degree of flooding that would result for a duration of one day from a ten-year storm, with exceptions in previously developed canal basins, where additional development to this base standard would pose a risk to existing development. All structures shall be constructed at, or above, the minimum floor elevation following the latest version of the Florida Building Code or as specified in Chapter 11-C

of the Miami-Dade County Code, whichever is higher. The incorporated areas of the county (municipalities) may have adopted stricter elevation standards.

Subdivision and Other Regulations

Miami-Dade County Code imposes certain developmental requirements before land is platted. These relate to the provision of water and sewer facilities, local streets, sidewalks, drainage, and open space. Before use permits or certificates of occupancy can be issued, Section 33-275 of the Miami-Dade County Code requires that adequate water, sewage and waste disposal facilities be provided.

County Flood Criteria

The County Flood Criteria sets the minimum Flood Protection Level of Service for finished grade elevation of developed sites, secondary canal banks and crown/grade of roads except as subject to higher localized standards. The County Flood Criteria are based on analysis of the flood conditions created by a 25-year/3-day and a 10-year/24-hour storm event, respectively, and a sea level rise forecast of 2 feet and above (expected to occur in year 2060).

Shoreline Review

The Shoreline Development Review Ordinance was adopted in 1985 and prescribes minimum standards for setbacks, visual corridors and, with its' accompanying resolutions, sets out a flexible review process through which architectural interest, building orientation, landscaping, shoreline use compatibility, access, and other design related elements can be negotiated with the developers and enforced by the local governing jurisdiction.

Area Plan Report

Since 1998, Area Plan Reports have emerged as a preferred planning technique for community visioning and helping to find answers to fundamental planning questions. An Area Plan Report is a practical planning technique, which blends public participation, detailed planning, and the development of implementation tools. Its principal focus is the creation of planning products (instead of processes.) Public participation is indispensable for a successful Area Plan Report. The overriding objective is the creation of a detailed plan, which resolves areas of concern identified in the Area Plan Report study area; often these concerns involve capital improvements such as roads, sewers, sidewalks, parks and other community improvements. The Planning and Zoning Divisions of the Department of Regulatory and Economic Resources implements the Area Plan Report process as a collective planning effort that develops a small area plan which incorporates the priorities of a community.

Adaptation Action Area Planning

Adaptation Action Areas (AAAs) are one of Miami-Dade County's localized responses to sea level rise, related risks of flooding and other community resilience challenges. The goal of the AAA program is to accelerate community-led, neighborhood-scale adaptation approaches in the County's most vulnerable communities. In 2011, the Florida Legislature created Adaptation Action Areas (S.163.3177 Florida Statutes). AAAs are a statutory

policy tool which is an optional designation in the County's Comprehensive Development Master Plan. The Miami-Dade AAA program collaborates across Unincorporated and municipal jurisdictions to study concentrated flood, water quality, and other risks. The core of the AAA program is its community engagement process aimed at amplifying the voices of residents and organizing the many stakeholder groups and agencies who steward our urban environment while prioritizing capital projects and funding opportunities for implementation.

Coastal Management

The Beach Restoration and Management Program is Miami-Dade County's mechanism for initiating and coordinating federal and/or State projects essential to the protection and recreational viability of Miami-Dade's ocean shoreline. Local participation in the determination of activities pertaining to beach restoration and preservation is included in the program. The County has benefited from large federal and State funding contributions and the expertise obtained because of the program. Most notably, the Miami-Dade County Beach Restoration Project now provides hurricane and erosion control protection for upland property and a vast recreational resource for public use. This project replaced a significantly eroded shoreline sustained only by bulkheads and seawalls, which offered little protective or recreational value. Implementation of erosion control projects is based on the following criteria:

1. Need for protection of public safety and property in areas threatened by coastal erosion.

2. To provide enhanced beach-related recreational opportunities for both visitors and Miami-Dade County residents.

3. To provide more effective and efficient long-term management of our natural and restored beach systems.

The Biscayne Bay Restoration and Enhancement Program objectives are to maintain or improve ecological, recreational, and aesthetic values of Biscayne Bay, its shoreline, and coastal wetlands. Projects include shoreline stabilization, mangrove and wetland habitat restoration, and bay bottom community enhancement at parks and other public lands. These contribute to erosion control, water quality, fisheries, and wildlife resources.

Future capital expenditures will be directed primarily towards maintaining and enhancing durability of restored beaches and to environmental improvement of the Biscayne Bay ecosystem. All these projects are developed and carried out based on the best scientific and technical information available to the agencies involved.

Municipalities

Each of the municipal partners has integrated mitigation into their planning processes, policies, and structures in some capacity. *Part 4 Appendix I* is a review of each municipalities' mitigation policies, ordinances, or plans that integrate Miami-Dade County's LMS. Additionally, each municipality has a designated point of contact which is updated annually utilizing LMS Working Group Contact Update Form. These individuals have the responsibility to coordinate mitigation activities with the relevant municipal agencies.

The municipal partners either through their designated point of contact or agencies have the responsibility for integrating mitigation into their respective plans and procedures. Common examples of these plans and procedures are:

- Municipal Flood Warning and Response Plans and Procedures
- Municipal Comprehensive Development Master Plans
- Protective Actions Plans and Procedures

Municipal Agencies and their Mitigation Functions

The municipalities of Miami-Dade County each have within their structure certain departments and agencies which affect and promote mitigation. While these agencies may have slightly different names from city to city, the role they perform in the mitigation function remains the same (e.g. public works or public services or community services, etc.). These departments and their functions as it relates to mitigation are listed below.

Municipal Floodplain Manager: Some of the municipalities have a designated floodplain manager. They are responsible for coordinating and directing compliance with the Community Rating System (CRS) and maintaining their municipality's flood warning and response plan.

Municipal Police and Fire Rescue Departments: Each of the municipalities except Miami Lakes, Palmetto Bay and Cutler Bay maintains its own Police Department. The cities of Coral Gables, Hialeah, Key Biscayne, Miami, and Miami Beach maintain their own fire departments, with the rest of the cities using Miami-Dade County Fire Rescue for this service. Emergency responders are essential for alert and notification, lifesaving response, prevention, and protection activities that all contribute to lessening the impact of disasters.

Municipal Code Officials/Departments: the building officials in each municipality, except for some that depend on the county's services, are responsible for interpreting and enforcing all laws, codes, ordinances, regulations, and municipal policies related to the construction, improvement, expansion, or repair of buildings within the municipality. The County Department of Regulatory and Economic Resources (RER) ensures that all new construction complies with the Florida Building Code which is a major factor to hazard mitigation. The department usually is responsible for the management of development in Special Hazard Areas; preservation of open space; general control of land use intensities; and coordination

between the capacity of public infrastructure in relation to proposals of private development. RER also ensures all proposed development in the municipality conforms to the comprehensive plans as it relates to urban design of public areas and buildings, infrastructure planning and maintenance of flood data and other statistical information.

Municipal Planning and Development Department: This is often a part of the building department and at times, a part of public works. However, several of our municipalities maintain planning and development as a separate entity which interacts with the mitigation strategy in many ways and must be involved in the LMS especially in urban land use.

Public Works Department: In most of our cities this department is responsible for construction and maintenance of roads, bridges, waterways, and storm water management including drainage system development, inspection, and maintenance. All these functions relate in various ways to hazard mitigation. Public works activities are a major component of any mitigation strategy.

MITIGATION GOALS AND OBJECTIVES[6]

Mitigation initiatives undertaken in Miami-Dade County should be consistent with the goals and objectives set forth in this plan and the individual municipalities' mitigation plans and policies, as well as public safety regulations and citizen welfare. Since the previous version of the plan, more data, changing priorities and innovative approaches to mitigation have been brought to the forefront of the mitigation efforts of the County and its participating jurisdictions and partners. Therefore, changes to goals and objectives were made to address the following:

- Recognition of all different sources of flooding
- The importance of prioritizing vulnerable populations and awareness of potential negative cascading effects disproportionately impacting them
- The importance of ensuring sustainability of proposed mitigation actions
- Recognizing the benefits of nature-based solutions and its co-benefits when designing mitigation projects
- Emphasizing the importance of regulation
- Prioritizing projects that feature whole community collaboration
- Addressing identified barriers to mitigation

Goals

1. Reduce Miami-Dade County's vulnerability to natural and man-made hazards

Objectives:

1.1. Incorporate new and more accurate data, studies and maps that demonstrate the evolution of risk in the county
1.2. Utilize a data driven process to measure efficacy of mitigation investments, methods, & techniques
1.3. Identify new and emerging mitigation methods and products for new and retrofitting construction
1.4. Identify projects that mitigate expected impacts from hazards identified in the THIRA
1.5. Promote mitigation measures to the Whole Community through outreach and education
1.6. Harden building envelope protection – including all openings – and inclusion of a continuous load path from roof to foundation on all structures within the county
1.7. Reduce compound flood risk hazards driven by rainfall, tidal flooding, sea level rise or any combination thereof
1.8. Reduce storm surge hazards and effects by encouraging greater setbacks from shorelines for new developments of waterfront properties, encouraging

[6] EMAP 2016 Standard 4.2.1.(3)

retrofitting and elevation of structures with high priority consideration for those built on waterfront properties, seeking opportunities to acquire, exchange or otherwise secure limited control of waterfront real estate

2. **Minimize future losses from all hazard impacts by reducing the risk to people and property**

   Objectives:

   2.1. Adopt land use policies that limit, prohibit or mandate development and construction standards to promote resilience and reduce risk
   2.2. Adopt building codes leading to building design criteria based on site-specific evolving and future risk
   2.3. Identify mitigation projects that reduce risk to vulnerable populations that are at greater risk from hazards
   2.4. Integrate mitigation into existing structures during regular maintenance and replacement cycles
   2.5. Consider potential unintended cascading effects of mitigation activities on vulnerable communities

3. **Implement mitigation projects that meet or exceed current codes**

   Objectives:

   3.1. Design and develop projects that address both current and future risk
   3.2. Identify projects that address cascading hazards from climate change
   3.3. Mitigation projects should be sustainable and evidence-based
   3.4. Where possible, mitigation projects should utilize nature-based solutions and provide resilience co-benefits
   3.5. Identify code amendment opportunities to increase the resilience of the built environment

4. **Prevent flood related repetitive losses from natural disasters**

   Objectives:

   4.1. Map repetitive and severe repetitive loss (RL & SRL) areas
   4.2. Identify and support projects that will mitigate flood risk in these RL and SRL areas and use social vulnerability data to prioritize
   4.3. Track mitigation projects by flood basin to see past, current and future projects and compare to flooding data
   4.4. Provide RL and SRL education and provide training opportunities
   4.5. Support regulations aimed at reducing RL and SRL

5. Promote and support the Community Rating System (CRS) for all communities in Miami-Dade

Objectives:

5.1. Incorporate measures into the LMS to help obtain uniform credit for all CRS communities
5.2. Identify and track projects in the LMS to demonstrate the role of mitigation measures in reducing flood risk
5.3. Provide outreach and educational opportunities that are innovative and coordinated through all levels of government
5.4. Develop and implement a Program for Public Information (PPI) that includes vulnerable populations

6. Promote mitigation measures for critical facilities

Objectives:

6.1. Continue to invite and work with critical facility stakeholders
6.2. Identify and track mitigation measures for existing critical facilities
6.3. Assess alternate facilities as identified in continuity of operations plans to determine if the sites are appropriately mitigated
6.4. Identify additional sites for emergency sheltering
6.5. Integrate sea level rise modeling to project and characterize expected impacts during the expected service-life of critical facilities. Protect expressways, major highways and other thoroughfares and, bridges and causeways to provide for continuous, free flowing traffic and circulation as needed for the effective and unencumbered provision of emergency services and evacuation operations

7. Provide whole community planning

Objectives:

7.1. Engage the whole community in mitigation efforts to maximize coordination and collaboration
7.2. Host mitigation workshops to educate stakeholders and community members
7.3. Initiate organizational, managerial and administrative goals to make mitigation a mainstream function of government affairs; spread the responsibilities throughout many departments and agencies to ensure continuity and a full integration of mitigation management functions in the operations of government
7.4. Enhance public information and engagement to increase awareness of hazards and problems and to educate through a widespread program of general information, media coverage and participatory involvement
7.5. Identify mitigation projects that address gaps in planning, such as technical design, engineering and long-term planning

7.6. Provide support to mitigation partners in pursuing mitigation grant funding by keeping them informed about funding opportunities, connecting them to resources and providing guidance

HAZARD IDENTIFICATION & VULNERABILITY ASSESSMENT[7]

This section explains the natural, technological, or man-made hazards that have been selected for the LMS based on the potential risks outlined in the Threat and Hazard Identification and Risk Assessment (THIRA) for Miami-Dade County. Each hazard has been described using the following categories:

- **Description:** gives an overarching picture of the hazard.
- **Location:** covers where the hazard is most likely to occur in the county; where possible, maps have been included to support the findings.
- **Extent:** discusses the most damaging effects of the hazard in terms of death, bodily harm, and/or damages. This section also describes the rating scale, if one is available (i.e., Saffir-Simpson scale, Enhanced Fujita scale, etc.).
- **Impact:** describes the potential effects and consequences of the hazard on residents, identified assets and facilities, critical infrastructure, and environment.
- **Previous Occurrence:** lists and describes the historical record of this hazard in the county. The National Climatic Data Center was used to populate this section for many natural hazards. If there were no previous examples of this hazard affecting the county, or the county was only minimally affected, other nearby geographical areas were considered.
- **Vulnerability:** indicates which aspects of the physical environment and which social populations may be impacted by the hazard. In many cases, this section was a judgement call; many different types of populations will be affected by any emergency or disaster in the county. However, some may be more vulnerable than others and those populations have been identified in this section. This category is tied to the Vulnerability Index & Assessment section of the THIRA, which explains the full methodology for arriving at the given vulnerability levels for each hazard.
- **Frequency/Probability:** provides information about the probability of future events for the identified hazards.

The updated THIRA was under development during the time of the 5-year LMS update therefore most of the information contained in this section is based on the 2020 THIRA.

[7] EMAP 2016 Standard 4.2.1 (1)

Rationale for Inclusion or Omission of Hazards in LMS

To determine which hazards would be included in the LMS, each hazard from the THIRA was analyzed using historical, current, and projected data and further discussed with LMS partners throughout the PUC meetings. During discussions, partners also considered projected population changes and land use development which due to its increase makes Miami-Dade County and all its participating jurisdictions more vulnerable to all the hazards considered below. For a map showing the areas of the county that have had more land use development in recent years, refer to Part 5 p.29. Table 2 below contains this analysis along with information from the discussions which together provide rationale for the inclusion or omission of each hazard. To make these determinations, risk was interpreted as a relative measure of the probability that a hazard event will occur in comparison to the consequences or impacts of that event. Although a hazard is marked as not considered for the LMS, new information or occurrences might necessitate we change this in future revisions.

TABLE 2. ANALYSIS OF ALL HAZARDS FROM THIRA[8]

Hazard	Further Consideration for LMS		Inclusion/Exclusion Criteria	Mitigation Measures
Natural	**Yes**	**No**		
Animal and Plant Disease		X	Historically, there have not been any occurrences of major animal disease in Miami-Dade County. There have been three new plant disease outbreaks in the last 20 years (15% probability in any one year) that have impacted the agricultural communities but have not had any impact on the physical environment. In 2015, an outbreak of the Oriental Fruit Fly, one of the world's most serious exotic fruit flies that threatens agricultural commodities, was detected in Miami-Dade County farmlands. As a result, 97-square miles of farmland was quarantined in the Redland area and an eradication program was triggered. A state of	• For plant diseases pesticides, separation/distancing, eradication of infected plants • For animal diseases, vaccinations, vector control, mosquito control, eradication of breeding grounds (e.g. standing water), public health education • Drain and Cover campaign materials to address mosquito abatement https://www.miamidade.gov/global/solidwaste/mosquito/drain-cover.page

[8] National Oceanic and Atmospheric Administration, National Climatic Data Center, Storm Events Database: https://www.ncdc.noaa.gov/stormevents/

Hazard	Further Consideration for LMS		Inclusion/Exclusion Criteria	Mitigation Measures
Natural	**Yes**	**No**		
			agricultural emergency was declared in the county by the Florida Commissioner of Agriculture, Adam H. Putman on September 15th, 2015. There were 11 rabies cases in Miami-Dade County in calendar year 2018. The cases were comprised of eight raccoons, two cats and one otter. This represented about 10% of all cases statewide, which was a considerable increase from previous years. Since the implementation of Animal Services' Wildlife Rabies Vaccine Distribution, the number of rabies cases reported in Miami-Dade County have decreased significantly, with only two cases in 2019 and one case thus far in 2020. Due to the low occurrence and limited impact, this hazard will not be further evaluated for the LMS at this time.	
Dam / Dike / Levee Failure		X	Miami-Dade County only has one levee that could affect the population, referred to as the 8.5 square mile area. This area has a pump meant to protect it from any failures, but the full required protective measures have not been decided since the levee is relatively new. The U.S. Army Corps of engineers considers all water control structures to be dams but they have confirmed there is no need for emergency plans for any of those control structures in Miami-Dade County after discussion with the County's Department of Regulatory and Economic Resources. There are several water conservation areas that have a berm of about 4 feet around them that are dry most of the year. Historically, there have been no occurrences of dam, dike or levee failures in Miami-Dade County. Modeling performed by Miami-Dade Department of	• Maintenance of structures • Reduce/minimize construction close to structures, where possible • Fortify structures where risks are identified

Hazard	Further Consideration for LMS		Inclusion/Exclusion Criteria	Mitigation Measures
Natural	**Yes**	**No**		
			Transportation and Public Works shows that there are no populated areas near these locations that could be negatively impacted if the levees were breached. Due to the low occurrence and limited impact, this hazard will not be further evaluated for the LMS at this time.	
Drought	X		Combined with rising sea level projections, droughts would become a more critical hazard for Miami-Dade County. All agencies involved with managing water supply: SFWMD, Public Works, and Water & Sewer, express concern with droughts and have emergency protocols in place for it. Irrigation becomes particularly complicated by the effects of a drought, even with ordinances already in place to regulate water usage. More specifically, saltwater intrusion would be the greatest risk if canals are too low due to a prolonged drought. Historically, there has been 62 drought events recorded between 1950 and 2024. There have been no reported dollar losses to either physical structures or crops. Although, on July 15, 2015, USDA designated Miami-Dade County as a primary natural disaster area due to the persistent drought conditions between January and July. Additionally, according to NWS, in years when South Florida experiences a drier and warmer winter season due to La Niña, there's an increased likelihood of drought development, especially during the second half of the dry season from February through early May. Each of the previous eight La Niña winters	• Water conservation • Public education and outreach • Regulatory fines • National Drought Mitigation Center http://drought.unl.edu/

Hazard	Further Consideration for LMS		Inclusion/Exclusion Criteria	Mitigation Measures
Natural	**Yes**	**No**		
			have led to moderate to severe drought by spring over at least parts of South Florida. Droughts in South Florida also typically lead to an increased threat of wildfires peaking during the latter part of the dry season. This hazard is considered further for the LMS due to many partners having a stake in its effects and seeing the need to focus on effective resource management systems, water conservation, and drought preparation and planning.	
Earthquake		X	There have been no earthquakes in Miami-Dade County. South Florida does not have any documented fault lines. The USGS shows there is a 0.279% chance of a major earthquake within 50 kilometers of Miami-Dade in the next 50 years. Therefore, this plan will not include a further evaluation of this hazard at this time.	• No Current Recommendations
Epidemic / Pandemic	X		On March 11, 2020, the Florida Department of Health (FDOH) confirmed the first COVID-19 case in Miami-Dade County. A year into the pandemic, The Florida Department of Health had reported more than 6,000 COVID-related deaths in Miami-Dade County and positive cases were still at a record high of 501,639. Miami-Dade activated its EOC to a level 2 until May 2023 in response. In 2017, Miami-Dade had 113 confirmed cases of the Zika Virus. Out of the total cases, 1 was locally acquired and 112 were travel related. The Zika virus is a disease spread primarily through the bite	• Public education and outreach • Vaccinations • Fortify pharmaceutical supplies • Surveillance, monitoring and reporting mechanisms • Quarantine/Isolation measures as needed • Ongoing training for first responders and healthcare providers on mitigating the spread of disease

Hazard	Further Consideration for LMS		Inclusion/Exclusion Criteria	Mitigation Measures
Natural	**Yes**	**No**		
			of an infected *Aedes* species mosquito, the same type of mosquito that spreads other viruses like dengue and chikungunya. A coordinated effort between Miami-Dade County Department of Solid Waste Management and the Florida Department of Health in Miami-Dade County is established to set out a strategic plan in response to the Zika Virus. There is consensus among our LMS partners that although the frequency of a pandemic is low, the widespread and compounding effects of this hazard are worth considering further for the LMS.	
Erosion	X		Coastal Erosion is a continuous problem for the Miami-Dade County coastline. It is the county's natural barrier that can help protect us from the impacts of storm surge and sea level rise. The most severe erosion occurs in relation to hurricanes and tropical storm, from June to November. Our SFWMD partners express concern for erosion impacting older roads after a storm and making them impassable as well as affecting structures that are critical to water management. Therefore, they maintain heightened monitoring of this hazard. There are 20.8 miles of beaches in Miami-Dade County that are an important factor to our economy and at risk for erosion. There are also 500 parcels that sit adjacent to the shoreline that could be at risk if erosion became severe. In 2017, Hurricane Irma caused some beach erosion throughout Miami-Dade County with the preliminary assessment estimating a loss of about 170,000 cubic yards of sand. Additionally, our partners have	• Fortify beaches through re-nourishment • Fortify dunes with vegetation or structural components • Natural barriers and living shorelines such as mangroves and coral reefs • Limit construction close to coastal areas prone to erosion • Limit re-development after disasters in coastal areas prone to erosion • Implement/enforce building code to fortify structures in coastal areas

Hazard	Further Consideration for LMS		Inclusion/Exclusion Criteria	Mitigation Measures
Natural	**Yes**	**No**		
			communicated the severity of cascading impacts from erosion. For example, unsecured construction site erosion can aggravate drainage issues and flooding for our county during a storm or rain event. Therefore, this hazard is considered further for the LMS.	
Extreme Heat	X		In the summer of 2021, the National Weather Service stated that Miami observed 60 days of temperatures at or above 90°F. Due to climate change, Miami-Dade County's minimum temperature has been warming at a rate of +0.6°F per decade since 1985 according to NOAA data. Days with a high heat index in South Florida are also projected to increase with climate change. NOAA's National Weather Service Heat Index is a measure of how the human body feels when air temperature is combined with relative humidity. If greenhouse gas emissions continue to increase, Miami-Dade is projected to have 14 "off the chart" heat index days by late century (2070-2099). "Off the chart" being over 135°F. In 2023, Miami-Dade County also received the first ever heat warning in recorded history and had 42 days that reached a heat index of 105°F or more. As a result, the peaks in heat-related emergency department visits were 100% higher than the peaks in the 5 years prior. In 2024, Miami-Dade County had 60 days at or above a heat index of 105°F and continued doubling in emergency department visits related to	• Public Education, Outreach and emergency notification • Identification, designation and opening of cooling centers for vulnerable populations, as needed. • Energy redundancy for cooling sites. • Implementation of energy redundancy in structures housing vulnerable populations. • Promotion of available resources and financing for multi and single family property owners to have adequate cooling and energy efficiency. • Implementation of projects that reduce of the urban heat effect

Hazard	Further Consideration for LMS		Inclusion/Exclusion Criteria	Mitigation Measures
Natural	**Yes**	**No**		
			heat.[9] Due to the rising concerns associated with extreme heat, especially from health and medical partners, this hazard is considered further for the LMS.	
Flooding	X		Much of Miami-Dade County is susceptible to localized flooding, particularly during the rainy season that runs from mid-May through mid-October. The mean elevation of Miami-Dade County is relatively flat at 11 feet. The County's flat terrain causes extensive "ponding" due to the lack of elevation gradients to facilitate "run-off". Of Miami-Dade's 1,250,287 acres, 44.62% of that is within the flood plain (557,871 acres). There have been 101 recorded flood events and 61 flash flood events in Miami-Dade County between 1950 and 2024. Localized flooding and "ponding" occur frequently during the rainy season. Property damages of over $542M and crop damages of over $714M have been recorded from flooding for incidents between 1950 and 2024. LMS partners are also interested in mitigation for compound flooding and groundwater flooding caused by higher tides and sea level rise. There's a heightened awareness within our county of repetitive loss properties and aging infrastructure that continues to be severely affected by these types of flooding. Due to its high frequency and the need for more	• Public education and outreach on FEMA Flood Zones, storm surge planning zones and general flood risks. • Education on Flood Insurance • Participation in NFIP and CRS • Drainage projects, green stormwater infrastructure, wet floodproofing, and home elevation to address RL and SRL areas • Reinforcing water management structures vital to hospitals • Freeboard requirements for elevation of structures above BFE • Monitoring and coordination for maintenance and mitigation projects along canal areas • Monitoring and maintenance of storm drains • Updating of infrastructure to restore flood protection level of service. • Swale, right of way, and open space protection and enhancement • Participation in the development of FEMA FIRM maps to help identify at risk areas and areas that have been mitigated

[9] Rapidly Developing a Community and Evidence-Based Heat Action Plan: https://gisweb.miamidade.gov/agolpdf/RapidlyDevelopingCommunity_EvidenceBasedHeatActionPlan.pdf

Hazard	Further Consideration for LMS		Inclusion/Exclusion Criteria	Mitigation Measures
Natural	**Yes**	**No**		
			innovative solutions, this hazard is considered further for the LMS.	
Hail		X	According to NOAA data, the annual average of hail activity in Miami-Dade County has shown some fluctuation. Between 2000 and 2014, there was an annual average of 9 hail activities in Miami Dade County. Since then, the average number of hail events has decreased. Between 2020 and 2024, there was an average of 5.75 events per year. To date, there has been zero death, injuries, and approximately no property damage associated with hail occurring in Miami-Dade County. Due to the low impacts of this hazard, it will not be considered further for the LMS at this time.	• Alert and notification of public to seek safety inside • No other current recommendations
Hurricane / Tropical Storm	X		In the past 100 years, there have been approximately 340 hurricanes that have impacted the coast of Florida. Of these hurricanes, 70 have impacted Miami-Dade County. Miami-Dade County has a 1 out of 6 chance of being hit by a hurricane, the highest likelihood in the state. 2017 was the last year that Miami-Dade was impacted by a major Hurricane (Hurricane Irma). Since then, Miami-Dade has received FEMA disaster declarations for hurricanes Dorian, Isaias, Nicole, Ian, and Milton. Due to the high impacts, this hazard is further considered for the LMS.	• Public education and outreach to match growing population, prioritizing new residents, new homeowners, and visitors • Designation of storm surge risk areas • Supportive services (evacuation and sheltering) for at risk populations • Nature based solutions and green infrastructure projects based on engineering studies • Structural hardening • See also recommendations under winds and floods
Landslides		X	Due to Miami-Dade's low average elevation, landslides are not likely to occur. There have been no reported landslides in Miami-Dade. Due to the low	• No current recommendations

Hazard	Further Consideration for LMS		Inclusion/Exclusion Criteria	Mitigation Measures
Natural	**Yes**	**No**		
			probability and low risk this hazard is not further considered for the LMS.	
Lightning		X	There were 72 reported lightning events in Miami-Dade County between 1950 and 2024 (almost 100% chance of a lighting event occurring every year). Though the probability is high, the recorded impacts of these events is low with the highest single impact being about $80K for an incident in Hialeah Gardens when a lightning struck an apartment building. The lightning strike caused a fire and four apartments suffered significant damage leaving a total of 20 residents displaced. However, due to the low impact of this hazard it will not be considered further for the LMS at this time.	• Surge protection for electrical, computer and phone systems • Lightning protection/suppression systems • Lightning detection and warning devices • Public education and outreach
Saltwater Intrusion	X		Saltwater intrusion is a continuous problem that has been occurring ever since the Everglades were drained to provide dry land for urban development and agriculture. Long periods of drought and storm surge inundation are hazards that have been attributed to increases in saltwater intrusion. It poses a threat to the drinking water supply and requires close coordination of local agencies to continuously monitor intrusion, determine appropriate pumping rates and the coordination with South Florida Water Management District for maintenance of ground water levels. SFWMD, RER, and Public Works already place a lot of effort in mitigating this hazard and have communicated the need to continue doing so. This hazard is included in the LMS for further consideration.	• Continue practices of monitoring levels, gauging pumping levels and determining future impacts and need for deeper wells

Hazard	Further Consideration for LMS		Inclusion/Exclusion Criteria	Mitigation Measures
Natural	**Yes**	**No**		
Sea Level Rise	X		Sea level rise is causing major stress on the entire water management system that we depend on even far inland in our county. Sea level rise also worsens coastal flooding during astronomical high tides and storm surge events. LMS partners from SFWMD, RER, and Public Works have communicated that sea level rise gravely affects the ability of the canals to drain standing water after rainfall events as well as reducing their water storage capacity.. Gravity based outfalls that lie below sea level have already seen impacts when saltwater flows up through the outfall system into the streets of several communities. The Unified Sea Level Rise Projection for Southeast Florida highlights three planning horizons. The first is the short-term projection, that by 2040, sea level is projected to rise 10 to 17 inches above 2000 mean sea level. The second is by 2070, sea level is projected to rise 21 to 54 inches above 2000 mean sea level. The third is that by 2120, sea level is projected to rise 40 to 136 inches above 2000 mean sea level.[10]	• Designation of Adaptation Action Areas • Additional modeling/mapping to determine areas at risk • Build with sea level rise considerations to increase future resiliency as determined by the useful lifespan of a project • Minimize development in future risk areas
Severe Storm	X		A storm is considered severe if it produces a tornado, winds of 50 knots (58 mph) or greater, and/or hail of an inch in diameter or greater. Using heavy rains and thunderstorm wind as indicators,	• Practices to mitigate against hurricanes are also applicable to severe storms. • Also see recommendations under floods

[10] 2019 Unified Sea Level Rise Projection for Southeast Florida: https://southeastfloridaclimatecompact.org/initiative/regionally-unified-sea-level-rise-projection/

Hazard	Further Consideration for LMS		Inclusion/Exclusion Criteria	Mitigation Measures
Natural	**Yes**	**No**		
			there have been 397 severe storm related events reported in the NOAA data base for Miami-Dade County between 1950 and 2024. Many of our municipalities have been severely affected by localized no name storms and they express necessity to mitigate against this hazard. RER and SFWMD also confirm that these storms often cause more flooding in their water management structures than hurricanes. Due to the high probability and intensity, this hazard is further considered in the LMS.	• Review Model Storm analyses and identify mitigation initiatives for the hardest impacted areas • Track heavy rain and subsequent flooding to identify areas for potential mitigation measures
Sinkholes		X	There is no official record of all sinkholes in Miami-Dade. The Florida Geological Survey maintains a database of all "subsidence incidents," however this only includes events that have been officially reported and includes many events that are not sinkholes. Between 1948 and 2019, only one subsidence incident was reported in Miami-Dade to the Florida Geological Survey. In 1972, a sinkhole measuring three feet by three feet, was recorded in Miami-Dade County by the Florida Geological Survey.[11] Most of the instances reported are small in extent and have not significantly impacted the built environment. Within the State of Florida for insurance claims, Miami-Dade County represented 2% of the total claims in 2010. Additional instances of sinkholes claims have been reported through insurance claim reporting data but the	• Assessment, hardening and replacement of aging infrastructure.

[11] Florida Department of Environmental Protection, Florida Geological Survey Division Subsidence Incident Reports Map: https://ca.dep.state.fl.us/mapdirect/?focus=fgssinkholes

Hazard	Further Consideration for LMS		Inclusion/Exclusion Criteria	Mitigation Measures
Natural	**Yes**	**No**		
			magnitude of each respective claim was not made available. Due to the low impact of this hazard it is not considered further for the LMS at this time.	
Space		X	There have been no space weather events specific to Miami-Dade County that have caused interference with technological components of communication or electrical systems. Due to the low probability of this hazard it is not considered further for the LMS at this time.	• Identifying redundant or alternate systems in case of outages. • Hardening of CI/KR
Tornado	X		There have been 147 occurrences of tornadoes in Miami-Dade County between 1950 and 2024. Recorded damages from tornadoes for property exceeds $202M. Due to the high probability and high impact, this hazard is included in the LMS for further consideration.	• Hardening of structures. • Identification of safe rooms and structures. Follow FEMA Safe Room guidance: https://www.fema.gov/emergency-managers/risk-management/building-science/safe-rooms/resources • Increased public awareness • Signing up for existing alert and notification systems.
Tsunami		X	There have been no tsunamis occurring in Miami-Dade County. The risk of a tsunami striking Florida is considered to be relatively low by the National Oceanographic and Atmospheric Administration. Due to the low probability of this hazard it will not be considered further at this time.	• Education for risk can be also tied to coastal communities currently at risk for Storm Surge.
Volcano (Ash/Dust)		X	There are no volcanoes in Miami-Dade County and no recorded impacts to the physical environment from volcanoes. Due to our distance to any volcanoes, there is no projected impact. The biggest concern in relation to an active volcano	• Implementation of Sheltering in Place as identified in the Miami-Dade All Hazards Protective Measures Plan.

Hazard	Further Consideration for LMS		Inclusion/Exclusion Criteria	Mitigation Measures
Natural	**Yes**	**No**		
			outside of our area would be volcanic ash that may be carried by trade winds that could limit aviation operations or possible compromise the air quality. There are no expected impacts to physical infrastructure. Due to the low probability and low impacts, this hazard will not be considered further for the LMS at this time.	
Wildfires	X		There have been 16 wildfires recorded between 1950 and 2024 in Miami-Dade County (21% chance of a wildfire occurring every year). Recorded property damages for wildfires is about $255K. Though historically there has not been a high impact on property, it is estimated that about 613,453 people, or 25% of our area population, live within the Wildland Urban Interface and could be at risk. This hazard is included for further consideration in the LMS.	• Prescribed burning programs. • Cutting brush or other fuel away from structures. • Follow National Fire Protection Association (NFPA) Firewise Communities Program https://www.nfpa.org/education-and-research/wildfire/firewise-usa • Roles in Fire-Adapted Communities http://www.usfa.fema.gov/downloads/pdf/publications/fire_adapted_communities.pdf
Windstorms		X	There were 11 high wind and 6 strong wind events on record from 1950 to 2024 (22% chance of an event occurring every year). Recorded property damages total about $48K. Mitigation strategies that address tropical storms and hurricanes would also help protect the built environment from high wind events. Due to the low impact of these events, this hazard will not be considered further for the LMS at this time.	• Building opening and glazing protection. • Hardening of roof structures. • Securing roof top equipment.
Winter Storm	X		There have been 27 occurrences of winter storm related events (cold/wind chill, extreme cold, frost/freeze) between 1950 and 2024 (36%	• Identification, designation, construction of cold weather shelters for homeless and other vulnerable populations and opening of the same during cold weather events.

Hazard	Further Consideration for LMS		Inclusion/Exclusion Criteria	Mitigation Measures
Natural	**Yes**	**No**		
			chance of an event occurring every year in Miami-Dade County). Though there have not been any recorded property damages, there has been over $300M in crop damages during these events. During these events, a demand for electricity will increase and many homes in South Florida do not have efficient heating systems, unlike their air conditioning systems, and therefore the demand on electricity can be much higher. This hazard is included in the LMS for further consideration.	• Public education and outreach • Agriculture Extension works with local growers for educational material for mitigation of crop losses. https://sfyl.ifas.ufl.edu/miami-dade/

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The following non-natural hazards are included in the THIRA and we have included suggested mitigation measures, but they are not currently further considered in the LMS.

Technological	Mitigation Measures
Coastal Oil Spill	• Vessel inspections • Compliance with safety regulations
Electric Utility Failure	• Emergency Generators • Alternate energy sources • Hardened utility lines and structures • Emergency Evacuation and Assistance Program run by the DEM to assist vulnerable populations • Public Outreach and Education
Hazardous Materials Release	• Regular onsite inspections of hazardous materials facilities • Hardening of facilities with hazardous materials • Emergency shut off valves • Public Outreach and Education • Implementation of All Hazards Protective Measures Plan
Nuclear Power Plant Release	• Hardened facilities • Public Education, Outreach and Alert and Notification process • Protective Actions to shut down facility • Turkey Point Response Plan and annual exercises
Structural Fire	• Fire suppression safety systems • Alert and notification systems • Regular Fire Drills and Inspections
Transportation Incident (i.e. Highway and/or Rail Incident)	• Inspection and maintenance of transportation corridors • Building infrastructure to future risk and capacity needs • Inspection and maintenance of trains, planes, automobiles and vessels
Water/Wastewater Incident	• Inspection and maintenance of infrastructure • Building infrastructure to future risk and capacity needs
Human Caused Hazards	
Active Shooter	• See Something, Say Something campaign • Security screening procedures
Civil Disturbance/ Civil Unrest	• Intel gathering and sharing • Community gathering points to allow for peaceful demonstrations • Public Outreach and Education

	• Increased law enforcement presence as a deterrence
Electromagnetic Pulse	• Shielding • Backup systems for communications and power • Surge protection
Food Borne Illness Incident	• Follow Public Health guidelines • Reporting systems
Mass Migration	• Intel gathering and sharing
Terrorism – Biological (Category A, B and C Agents)	• Surveillance and reporting • Follow Public Health guidance • Personal Protective Equipment • All Hazards Protective Measures Plan – implementation of Isolation/Quarantine • Public Education and Outreach
Terrorism – Chemical	• Intel gathering and sharing • See Something, Say Something campaign • Surveillance/monitoring of CI/KR sites
Terrorism – Cyber	• Intel gathering and sharing • Security procedures and passwords • Firewalls • Tamper proof infrastructure • Surveillance/monitoring of CI/KR sites • Miami-Dade created a Cyber Security Plan (April 2017)
Terrorism – Explosive	• Protective barriers (bollards, cement barriers, bullet proof glass, metal/chemical detection)
Terrorism – Radiological	• Surveillance/monitoring of CI/KR sites • Intel gathering and sharing • See Something, Say Something campaign
Terrorism – Small Arms	• Intel gathering and sharing • See Something, Say Something campaign • Surveillance/monitoring of CI/KR sites • Security screening procedures

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Impacts of Future Changes in Population and Land Use

Based on the estimations from the Bureau of Economic and Business Research (BEBR) below[12], Miami-Dade County's population has increased since 2020 which gives valid reason for concluding it will continue along this trend, with variations in municipalities across the county. Additionally, the BEBR's projections report for 2025-2050 give Miami-Dade County a medium population projection of 2.9 million and a high projection of 3.2 million for 2030.[13] According to the data below, 20 of Miami-Dade's 34 municipalities, including unincorporated Dade, are increasing in population which will naturally lead to more land use development. Therefore, with more people we can expect additional strain on our infrastructure, water management systems, utilities, and resources, making the county and all it's interdependent municipalities increasingly vulnerable to the impacts of hazards.

Municipality	Census Count 2020	Population Change 2020-2024	Population Estimate 2024
Aventura	40,242	-138	40,104
Bal Harbour	3,093	-83	3,010
Bay Harbor Islands	5,922	-129	5,793
Biscayne Park	3,117	-87	3,030
Coral Gables	49,248	1,565	50,813
Cutler Bay	45,425	-399	45,026
Doral	75,874	6,301	82,175
El Portal	1,986	250	2,236
Florida City	13,085	4,088	17,173
Golden Beach	961	20	981
Hialeah	223,109	7,466	230,575
Hialeah Gardens	23,068	-765	22,303
Homestead	80,737	3,277	84,014
Indian Creek	84	5	89
Key Biscayne	14,809	-206	14,603
Medley	1,056	-6	1,050
Miami	442,241	24,930	467,171
Miami Beach	82,890	340	83,230
Miami Gardens	111,640	3,724	115,364
Miami Lakes	30,467	389	30,856
Miami Shores	11,567	-14	11,553
Miami Springs	13,859	7	13,866

[12] Florida Estimates of Population 2024: BEBR https://edr.state.fl.us/content/population-demographics/data/Estimates2024.pdf
[13] Projections of Florida Population by County, 2025-2030: BEBR https://bebr.ufl.edu/wp-content/uploads/2024/01/projections_2024.pdf

North Bay Village	8,159	-182	7,977
North Miami	60,191	-236	59,955
North Miami Beach	43,676	-101	43,575
Opa-Locka	16,463	97	16,560
Palmetto Bay	24,439	652	25,091
Pinecrest	18,388	-84	18,304
South Miami	12,026	-8	12,018
Sunny Isles Beach	22,342	446	22,788
Surfside	5,689	-288	5,401
Sweetwater	19,363	2,030	21,393
Virginia Gardens	2,364	10	2,374
West Miami	7,233	24	7,257
Unincorporated	1,186,954	20,179	1,207,133
Totals			
Miami-Dade County	**2,701,767**	**73,074**	**2,774,841**

Land use development trends over the past five years provide significant insight into future land use plans in Miami-Dade County. In the past five years, Miami-Dade County and its participating jurisdictions have experienced development driven by population growth, housing demand, and economic expansion. The Comprehensive Development Master Plan (CDMP)[14], updated every seven years, guides development with an emphasis on sustainable growth within the determined Urban Development Boundary (UDB). The CDMP establishes a growth policy for the remaining acres of land in Miami Dade County which optimizes efficiency in public service delivery, conservation of valuable natural resources, and planning for urban centers well connected by transportation facilities, among other priorities.

As a result, in recent years high-density urban centers near transit hubs have been more common development projects. Recent initiatives have also included the transformation of underutilized areas into mixed-use developments, such as the SoLé Mia project in North Miami, Grove Central in the city of Miami, and The Underline, which when completed will run through different jurisdictions. Additionally, neighborhoods in Hialeah and Little River continue to see expansion projects centered around affordable housing.

The population trends discussed above along with land use development trends guided by the Comprehensive Development Master Plan (CDMP) and recent projects, influence vulnerability to hazards in different degrees as follows.

[14] Comprehensive Development Master Plan (CDMP): https://www.miamidade.gov/planning/cdmp.asp

1. Drought

- **Impact of Trends**: High-density urban development increases impervious surfaces reducing groundwater recharge and straining water resources during droughts. The CDMP's focus on urban infill limits sprawl but concentrates water demand in urban areas, where landscaping for new developments requires irrigation, exacerbating water scarcity. This is further complicated in areas of the county that have a substantial agricultural sector and are also experiencing population growth and development like Homestead and Florida City.
- **Vulnerability**: Moderate increase. Miami-Dade's reliance on the Biscayne Aquifer, already stressed by population growth, faces heightened pressure from urban water demands during droughts.

2. Erosion

- **Impact of Trends**: Development along the Atlantic Coastal Ridge, as developers target higher ground to avoid flooding (e.g., in Little Haiti), disrupts natural soil stability. Construction activities for large-scale projects can loosen soil, while increased stormwater runoff from impervious surfaces accelerates coastal and riverbank erosion.
- **Vulnerability**: Moderate increase. Erosion risks are localized to construction sites, river and canal banks, and coastal areas, but the CDMP's guidelines help reduce widespread land disturbance.

3. Flooding

- **Impact of Trends**: High-density development within the UDB increases impervious surfaces, reducing natural drainage and exacerbating urban flooding. While the CDMP promotes transit-oriented development to reduce sprawl, low-lying areas remain vulnerable.
- **Vulnerability**: High increase. Miami-Dade's flat topography and frequent heavy rains make flooding a significant risk, worsened by aging infrastructure and limited green infrastructure.

4. Hurricanes

- **Impact of Trends**: Many development projects concentrate populations and infrastructure in hurricane-prone areas. While the county's strict building codes (post-Hurricane Andrew) ensure structural resilience, the CDMP's focus on urban centers increases exposure of critical assets.
- **Vulnerability**: High increase. Hurricanes threaten life and property, and urban concentration amplifies potential economic and social impacts, However, code-compliant modern designs mitigate many risks.

5. Saltwater Intrusion

- **Impact of Trends**: Groundwater withdrawals for developments stress the Biscayne Aquifer, accelerating saltwater intrusion into freshwater supplies. Development on higher ground (Atlantic Coastal Ridge) reduces direct coastal exposure

but does not address aquifer overuse, a key driver of intrusion. With the saltfront advancing from the east, development along this portion of the county also has more significant risks. On the other hand, the preservation of the Everglades on the west side of the county prevents a significant amount of saltwater intrusion despite sea level rise.

- **Vulnerability**: Moderate to high increase. Miami-Dade's reliance on the aquifer, combined with rising sea levels, heightens intrusion risks, especially in the south portion of the County where the Biscayne Aquifer is shallower than in the north.

6. Sea Level Rise

- **Impact of Trends**: The CDMP's focus on development within the UDB, including low-lying areas, increases exposure to sea level rise. Projects built near the coast face long-term inundation risks. Developers' shift to higher ground mitigates some impacts but displaces vulnerable communities, creating social vulnerabilities.
- **Vulnerability**: High increase. Miami-Dade's low elevation (average 6 feet above sea level) and coastal urban concentration make sea level rise a critical threat.

7. Severe Storms

- **Impact of Trends**: Development projects like hotels and residential units add concentrated infrastructure at risk of wind and rain damage. With less rural buffers, storm impacts are focused on populated areas. Open green spaces incorporated into development plans mitigate some runoff, but surrounding structures are still vulnerable considering population increases.
- **Vulnerability**: High increase. Severe storms threaten urban infrastructure and populations, amplified by dense development patterns.

8. Tornadoes

- **Impact of Trends**: Tornadoes are rare in Miami-Dade, but high-density development increases potential damage due to higher exposure of people and property. However, all new development has to meet Florida and Miami-Dade County building which has the strictest requirements for wind mitigation in the nation and therefore decreases some of the vulnerability to damage from tornados.
- **Vulnerability**: Low to moderate increase. Tornadoes are less frequent and urban density heightens potential impacts on concentrated populations but strict building codes help to mitigate this.

9. Wildfire

- **Impact of Trends**: Miami-Dade's urban focus within the UDB reduces wildfire risk by limiting development in rural, vegetated areas like the Everglades.
- **Vulnerability**: Low increase. Wildfire risk remains low due to the county's urbanized landscape and wet climate, with development trends having minimal impact.

10. Cold Wave

- **Impact of Trends**: Cold waves are rare in Miami-Dade, and development trends have little direct impact. High-density housing may improve access to heated shelters and off-set effects of cold weather on the population.
- **Vulnerability**: Negligible increase. Cold waves pose minimal risk, and development trends do not significantly alter exposure.

11. Extreme Heat

- **Impact of Trends**: Urban development with extensive impervious surfaces exacerbates the urban heat island effect, increasing temperatures in urban cores. Green spaces provide some cooling, but their impact is limited compared to widespread concrete and asphalt. Vulnerable populations in dense housing face higher heat stress without adequate cooling infrastructure.
- **Vulnerability**: High increase. Extreme heat is a growing concern, worsened by urban intensification and limited green infrastructure in new developments.

12. Pandemic

- **Impact of Trends**: Transit-oriented developments increase population density and public transit use, potentially facilitating disease spread during pandemics. The trend of mixed-use projects with retail creates high-traffic areas, also raising disease transmission risks.
- **Vulnerability**: High increase. Dense urban environments heighten impacts of a pandemic.

Since the previous LMS plan was approved, several of Miami-Dade County's jurisdictions have had substantial increases in their development. The chart below shows the number of buildings constructed between 2020 and 2025 in each jurisdiction. According to this data, those with the highest numbers are City of Miami, Homestead, Florida City, Hialeah, Coral Gables, Doral, and Hialeah Gardens. Due to low elevation, FEMA flood zone designations, and stakeholder input regarding population demographics and infrastructure limitations, all these developments are in hazard-prone areas. Additionally, some jurisdictions would naturally have less development due to relative land mass but are nonetheless increasingly vulnerable to hazards due to other factors accounted for in the risk levels on Table 15 (p.1-52). All our coastal jurisdictions on the barrier islands (Miami Beach, Surfside, Bal Harbour, Bay Harbor Islands, Sunny Isles Beach, Golden Beach, North Bay Village, and Key Biscayne) that are undergoing development of high-rises and large apartment complexes also have significant increase in vulnerability to hazards due to limited evacuation routes.

Jurisdiction	Number of Buildings Constructed (2020–2025)
Aventura	183
Bal Harbour	22
Bay Harbor Islands	127

Biscayne Park	7
Coral Gables	1,643
Cutler Bay	448
Doral	1,601
El Portal	8
Florida City	3,284
Golden Beach	27
Hialeah	2,662
Hialeah Gardens	1,101
Homestead	4,083
Indian Creek Village	9
Key Biscayne	57
Medley	591
Miami	5,445
Miami Beach	807
Miami Gardens	923
Miami Lakes	104
Miami Shores	71
Miami Springs	60
North Bay Village	8
North Miami	308
North Miami Beach	253
Opa-Locka	901
Palmetto Bay	77
Pinecrest	342
South Miami	205
Sunny Isles Beach	728
Surfside	139
Sweetwater	213
Virginia Gardens	0
West Miami	24
Unincorporated Miami-Dade	7,734

Data from Office of the Property Appraiser- Miami-Dade County

Natural Hazards by Jurisdiction

The following chart depicts the level of overall risk, by jurisdiction, for the twelve natural hazards considered in the LMS. The measure of risk, 0-5, was determined based on a combination of factors including the National Risk Index as a default indicator, discussions with local mitigation professionals, feedback from municipal partners, and known historical impacts of hazards on population and built environment.

The following hazards were rated using the additional data sources described below:

- **Extreme Heat:** Data from Miami Dade County's Heat Vulnerability Assessment study.[15] The heat vulnerability index in this study was created by regression statistics that showed which exposure and sensitivity variables had the strongest relationship with average annual heat related illness hospitalization and emergency department rates from 2015 to 2019.[16]

- **Sea Level Rise:** GIS data gathered from the County's Office of Resilience and NOAA's Sea Level Rise mapping tool. Municipalities already affected by King Tide flooding coupled with a 1 ft sea level rise projection, were rated at very high risk. Municipalities affected by 2-4 ft of sea level rise were given a 3-4 risk level depending on additional feedback provided by municipal partners. Municipalities that were not significantly affected until the 5-6 ft sea level rise mark were rated low risk unless partners expressed particular concerns regarding their vulnerabilities to this hazard.

- **Saltwater Intrusion:** Ongoing USGS studies, which produced an updated map of Miami-Dade County depicting the approximate inland extent of saltwater at the base of the Biscayne aquifer. This map can be found in the section for saltwater intrusion.

- **Epidemic/Pandemic:** The CDC's social vulnerability index shows that Miami-Dade County has a very high susceptibility to the adverse impacts of disease outbreaks when compared to the rest of the U.S.[17] The social vulnerability index is a measure of the demographic and socioeconomic factors such as poverty, lack of access to transportation, and crowded

[15] Heat Vulnerability Assessment: Understanding Heat Exposure in Miami-Dade County
[16] Miami-Dade Extreme Heart Vulnerability Mapping Report: Vulnerability_Mapping_Deliverable_Final.pdf
[17] CDC Social Vulnerability Index: Social Vulnerability Index | Place and Health - Geospatial Research, Analysis, and Services Program (GRASP) | ATSDR

housing, that adversely affect communities that encounter all kinds of hazards. Additionally, data from the National Institute of Environmental Health Sciences indicates that Miami-Dade County's COVID-19 Pandemic Vulnerability Index (PVI) remains in the top 20% nationally as of March 2023.[18]

TABLE 15. LEVEL OF RISK TO NATURAL HAZARDS BY JURISDICTION

SCALE	
0	Negligible or No Risk
1	Very Low Risk
2	Low Risk
3	Moderate Risk
4	High Risk
5	Very High Risk

Jurisdiction	Drought	Erosion	Flooding	Hurricane/ Tropical Storm	Saltwater Intrusion	Sea Level Rise	Severe Storm	Tornado	Wildfires	Cold Wave	Extreme Heat	Epidemic/ Pandemic
Aventura	3	0	5	5	5	5	5	4	4	4	2	5
Bal Harbour	3	5	5	5	5	5	5	4	4	4	2	5
Bay Harbor	3	5	5	5	5	5	5	4	4	4	2	5
Biscayne Park	3	0	5	5	5	5	5	4	4	4	3	5
Coral Gables	3	3	4	5	5	5	5	3	1	4	4	5
Cutler Bay	2	2	4	5	5	5	3	2	1	4	3	5
Doral	3	3	5	5	4	3	5	4	1	4	5	5
El Portal	3	3	5	5	5	5	5	3	2	4	5	5
Florida City	4	3	5	5	5	5	4	4	4	4	5	5
Golden Beach	3	0	5	5	5	5	5	4	4	4	2	5
Hialeah	3	0	5	5	3	2	5	4	4	4	3	5
Hialeah Gardens	3	0	5	5	3	2	5	4	4	4	2	5
Homestead	3	3	3	5	5	5	3	3	1	4	5	5
Key Biscayne	3	5	5	5	5	5	5	4	4	4	2	5
Medley	3	0	5	5	3	2	5	4	4	4	2	5
Miami	3	0	5	5	5	5	5	4	2	4	5	5
Miami Beach	3	5	5	5	5	5	5	4	4	4	2	5

[18]COVID-19 Pandemic Vulnerability Index: National Institute of Environmental Health Sciences: COVID-19 Pandemic Vulnerability Index Quick Start Guide

Jurisdiction	Drought	Erosion	Flooding	Hurricane/ Tropical Storm	Saltwater Intrusion	Sea Level Rise	Severe Storm	Tornado	Wildfires	Cold Wave	Extreme Heat	Epidemic/ Pandemic
Miami Gardens	3	0	5	5	2	3	5	4	4	4	4	5
Miami Lakes	3	0	5	5	2	2	5	4	4	4	2	5
Miami Shores	3	0	5	5	5	4	5	4	4	4	3	5
Miami Springs	3	0	5	5	3	2	5	4	4	4	2	5
North Bay Village	3	0	5	5	5	5	5	4	4	4	2	5
North Miami	3	0	5	5	5	5	5	4	4	4	3	5
North Miami Beach	3	3	5	5	5	5	5	4	3	4	4	5
Opa-locka	2	0	5	5	2	3	5	4	0	4	4	5
Palmetto Bay	4	4	4	5	5	5	3	4	2	4	3	5
Pinecrest	3	3	5	5	5	5	5	4	4	4	2	5
South Miami	3	3	5	5	5	3	5	4	4	4	2	5
Sunny Isles	2	5	4	5	5	5	4	1	0	4	3	5
Surfside	3	5	5	5	5	5	5	4	4	4	2	5
Sweetwater	3	0	5	5	2	2	5	4	4	4	2	5
Virginia Gardens	3	0	5	5	3	2	5	4	4	4	2	5
West Miami	1	0	5	5	3	2	5	3	0	4	3	5
Unincorporated	3	3	5	5	3	4	5	4	4	4	5	5

Drought

Description

A drought is characterized as an extended period with persistent dry weather conditions in a geographic area that typically has rain fall. A drought can however be defined in several different ways depending on the geographical region and situation:

- Meteorological drought: When the normal level of precipitation has a significant measurable drop.
- Agricultural drought: When the level of soil moisture drops below the suitable range for agricultural growth.
- Hydrological drought: When the surface water and underground water supply falls below normal.
- Socioeconomic drought: When water shortages seriously interfere with human activity.

The Palmer Index, developed by Wayne Palmer in the 1960s, uses temperature and rainfall information to formulate dryness. It has become the semi-official drought index. The index is effective in determining long-term drought conditions of several months. The index sets normal conditions at 0 with drought conditions in negative values. The index can also be reversed showing the excess of precipitation where the normal conditions at 0 and positive values for amount of rainfall. The advantage of the Palmer Index is that it is standardized to local climate, so it can be applied to any part of the country to demonstrate relative drought or rainfall conditions.

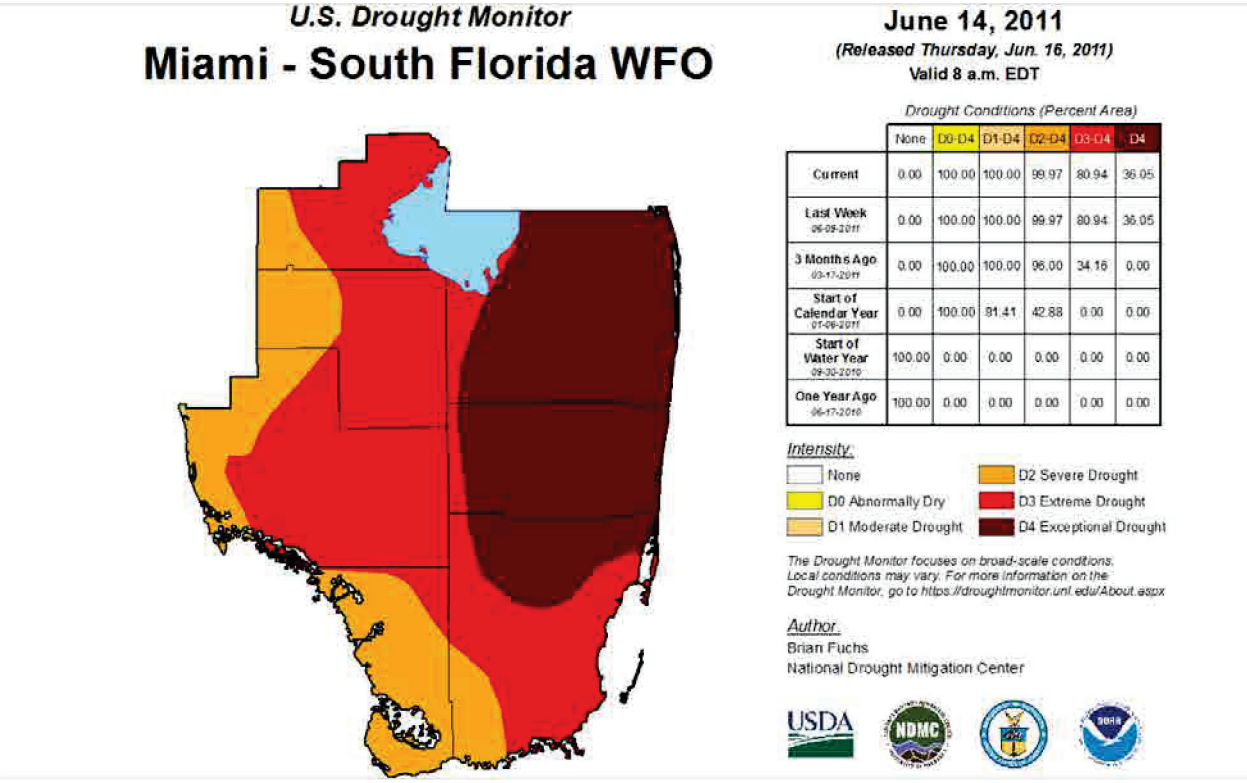
TABLE 3. NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM ALERTS FOR DROUGHTS

Alert	Criteria	Palmer Drought Index
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
D1 Moderate Drought	Some damage to crops, pastures, streams, reservoirs, or wells low, some water shortages developing or imminent, and voluntary water-use restrictions requested.	-2.0 to -2.9
D2 Severe Drought	Crop or pasture losses are likely, water shortages common and water restrictions imposed.	-3.0 to -3.9
D3 Extreme Drought	Major crop and pasture losses with widespread water shortages or restrictions.	-4.0 to -4.9
D4 Exceptional Drought	Exceptional and widespread crop and pasture loss, shortages of water in reservoirs, streams, and wells creating water emergencies.	-5.0 or less

Source: U.S. Drought Monitor Classification Scheme, from the United States Drought Monitor

Location

The entire County and all its participating jurisdictions are moderately vulnerable to drought conditions according to historical data and maps from the U.S. drought monitor. An extreme or exceptional drought could affect any part of the county, as shown by the June 2011 map below. However, the jurisdictions that have a strong agricultural sector would be most affected by these extreme drought events. These jurisdictions include Homestead, Florida City, and unincorporated areas of southwest Miami-Dade County around the Redlands Agricultural District. These areas are especially susceptible to the environmental and economic conditions resulting from a drought. To view the specific areas designated as agricultural zones, please reference Miami-Dade County's Land Use Plan Map.[19]



Source: U.S. Drought Monitor Map Archive

Extent

The worst drought in Miami-Dade County, according to the National Climatic Data Center, was in 2011 when the Palmer Drought Index peaked at D4.

[19] Comprehensive Development Master Plan- Land Use Plan Map: https://www.miamidade.gov/planning/library/reports/planning-documents/cdmp/cdmp-land-use-map-2030-2040.pdf

Impact

Impact to Miami-Dade County Residents
A drought will most likely affect those migrant farm workers who are employed by the agricultural community. Although not exhaustive, the following is a list of potential social populations that may be more heavily affected by this hazard than other groups. Although not exhaustive, the following is a list of potential social populations that may be more heavily affected by this hazard than other groups.

- Residents with limited or no English
- Low-Income/Poor
- Transient

Impact to Essential Facilities and Other Property
Farms and farmers may feel the impact of a drought before the general population. The consequence of such an incident will be dependent upon the location, scale, magnitude and extent of the incident.

Consequences related to essential facilities and property following a drought may include:

- Business/service interruption, causing an impact to the local economy as well as individual households

Impact to Critical Infrastructure
Droughts typically do not affect physical structures but may affect essential services and other key community assets, including water services.

Consequences related to critical infrastructure following a drought may include:

- Limiting usage of water for recreational/extracurricular activities such as watering lawns and washing cars

Impact to Environment
Droughts play a significant role on the impact of the environment. Dead and dry vegetation caused by droughts provide ample fuel for wildfires. Heavy accumulation of fuels, lack of strategic management programs, and inadequate fire-fighting infrastructure has further complicated Miami-Dade County's risk to wildland urban interface fires.

Consequences related to the environment following a drought may include:

- Reduced crop, rangeland, and forest productivity
- Increased fire hazards
- Reduced water levels
- Increased livestock and wildlife mortality rates
- Damage to wildlife and fish habitat
- Increased problems with insects and diseases to forests and reduced growth

Previous Occurrences

April – May 2020 – A very dry March and beginning of April led to severe drought conditions which developed over interior and western sections of southern Florida by the 3rd week of April. Several wildfires were reported in these areas. Less than three-quarters of an inch of rain fell during the first half of May across inland portions of Miami-Dade County, leading to the continuation of severe drought conditions. Surface and underground water levels dropped to around 10% of normal in some areas. Rainfall increased significantly during the second half of May, putting an end to the severe drought conditions by the end of the month.

April – mid-May, 2018 – A prolonged dry spell since February continued through the middle of May, leading to lingering severe drought conditions over interior portions of South Florida. The dry conditions coupled with near-record low groundwater levels contributed to the spread of wildfires, including the Avian Complex in eastern Collier County which burned over 82,000 acres. This prolonged period of below normal rainfall led to low groundwater levels across this area, including at Water Conservation area 3, before the onset of the rainy season in mid-May put an end to the severe drought by May 22nd.

January – September 2015 – A combination of decreased rainfall and higher than normal temperatures through Miami-Dade County resulted in drought conditions throughout the county between January and September. A persistent high-pressure system in the upper levels of the troposphere restricted cold fronts to move southward through South Florida and delivered warm subtropical air to the region during the spring months (March-May). During the summer months (June-August), this high-pressure system brought warm and dry easterly winds steering most of the typical South Florida afternoon thunderstorms to the west of the peninsula. A three-month deficit of 10-15 inches of rainfall across the County and temperatures between 0.5 and 1.5 degrees Fahrenheit above normal resulted in drought conditions throughout this period. Miami-Dade County had its peak drought condition in late July 2015 when the Palmer Drought Index peaked to extreme drought (D3) in the eastern part of the County. As a result of this event, USDA designated Miami-Dade County as a primary natural disaster area due to the damages and losses caused to the agriculture community.[20]

March – early April, 2012 –Very dry conditions continued into early April over all of South Florida as high pressure continued to provide stable atmospheric conditions.

January – August 2011 –Rainfall totals in January were near to below normal over most of southeast Florida. This resulted in the expansion of severe drought (D2) conditions over inland sections of Miami-Dade County. Rainfall deficits since October over these

[20] USDA Designates 2 Counties in Florida as Primary Natural Disaster Areas, 2015: https://southeastagnet.com/2015/07/15/usda-designates-2-counties-in-florida-as-primary-natural-disaster-areas/

areas ranged anywhere from 8 to 11 inches. Most wells across the area were running at around 10 percent of normal water levels. The level of Lake Okeechobee remained steady at about 12.5 feet, which is 2.2 feet below normal. The Keetch-Byram Drought Index (KBDI) was in the 500 to 600 range, which reflects a high fire danger and low soil moisture values.

February was a very dry month over South Florida as a high pressure dominated the region's weather pattern. Over most of Miami-Dade, February rainfall totals were less than a tenth of an inch. As a result, February 2011 was among the top 10 driest Februarys on record at Miami and Miami Beach. This led to severe drought conditions over most of South Florida, with extreme drought conditions over portions of the southeast coast. The level of Lake Okeechobee fell about a half-foot during February, from around 12.5 feet to near 12 feet. Forestry officials reported double the number of wildfires during the winter months of 2010-2011 compared to the previous year. The period of October 2010 to February 2011 was the driest on record in the 80-year history of the South Florida Water Management District's records.

Conditions remained dry and by the end of May, most of southern Florida was in an extreme (D3) drought status, except for an area of exceptional (D4) drought over eastern Palm Beach and Broward counties. This is the first time in well over a decade that any part of south Florida has been designated as being under exceptional drought conditions.

June continued the streak of below normal rainfall over most of South Florida. Little rain fell during the first 10 days of the month, with the rainy season not starting until around June 8th. Almost all the rain across the area fell in the last 2 weeks of the months. Total rainfall were only in the 2 to 4 inch range over the east coast metro areas as well as the Gulf coast areas. Miami Beach recorded its driest June on record with only 1.15 inches of rain. Inland areas of South Florida received about 6 to 8 inches, with isolated 9 to 11 inch amounts south and west of Lake Okeechobee.

The level of Lake Okeechobee dropped from around 10 feet at the beginning of June to a minimum of around 9.6 feet in late June before recovering by the end of the month. Wells and underground reservoirs remained at the lowest 10 percent of normal levels. Exceptional (D4) drought conditions extended over most of Palm Beach and Broward counties as well as far northern Miami-Dade County. Extreme (D3) drought conditions extended all the way to the southwest Florida Coast of Collier County, with severe (D2) drought conditions elsewhere over South Florida. Several wildfires broke out over South Florida in June, including a large wildfire in the Everglades of Miami-Dade County near the Miccosukee Resort and several wildfires in north-central Palm Beach County and eastern Collier County. July and August brought much needed rains. Overall, rainfall averaged near to above average over most areas, leading to gradually improving drought conditions. Lake Okeechobee remained over 3 feet below the normal level for this time of year. Underground water levels remained below normal over much of South Florida,

especially over the metro east coast sections.[21] No data was available to determine the economic impacts of this event.

November 2008 – May 2009 – The driest winter on record over many locations in Southeast Florida led to the onset of severe drought (D2) conditions. At Miami International Airport, winter season rainfall was only 0.74 inches, making it the driest winter on record. The drought continued into the spring as most of South Florida was still under severe drought (D2) conditions. April rainfall was less than an inch at most locations. Then a very dry start to the month of May prompted the issuance of extreme drought (D3) conditions over virtually all of South Florida. The onset of the rainy season around May 11 brought copious rainfall to the region as a low pressure trough in the upper levels of the atmosphere set up near South Florida, effectively ending the drought by the last week of May.[22]

Vulnerability

Based on scores from the Hazard Impact Analysis found in the THIRA and summarized on the table below, Miami-Dade County has a medium overall vulnerability to droughts.

Drought			
Category		Vulnerability*	Risk*
Social (People, etc.)	Special Populations	Minimally Vulnerable	Low
	Cultural Conditions	Minimally Vulnerable	Low
	Socioeconomic Conditions	Somewhat Vulnerable	Medium
Physical (Property, etc.)	Critical Infrastructure	Somewhat Vulnerable	Medium
	Key Resources	Somewhat Vulnerable	Medium
	Building Stock	Minimally Vulnerable	Low
Community Conditions (Environment, Operations, etc.)	Economic Conditions	Somewhat Vulnerable	Medium
	Social Conditions	Minimally Vulnerable	Low
	Environmental Conditions	Vulnerable	Medium
	Governmental Conditions (inc. Operations)	Minimally Vulnerable	Low
	Insurance Conditions	Somewhat Vulnerable	Medium
	Community Organizations	Minimally Vulnerable	Low

**Vulnerability ratings take in consideration baseline vulnerabilities described in THIRA Volume 2 with adjustment based on this specific hazard. Risk ratings consider probability & frequency, potential magnitude & scale, vulnerabilities, potential impacts, capabilities, and mitigation efforts related to this specific hazard.*

Physical Vulnerabilities

Drought is not anticipated to have any impact on the built environment (Critical Infrastructure, Key Resources, and Building Stock). It may cause economic losses to agriculture

[21]National Oceanic and Atmospheric Administration, National Climatic Data Center, Storm Events Database: https://www.ncdc.noaa.gov/stormevents/
[22] Miami-Dade 2015 Threat and Hazard Identification and Risk Assessment

and aquaculture due to loss of crops or water restrictions that inhibit normal operations. Crops most vulnerable to drought are the ones that are grown during the winter months, our dry season, and harvested in the spring months including cantaloupe, carambola, celery, cucumbers, dragon fruit, eggplant, fennel, guava, green beans, herbs, jackfruit, longyan, lychee, mushrooms, onions, papaya, passion fruit, plantains, radishes, sapodilla, spinach, squash, strawberries, sweetcorn, thyme, tomatoes and zucchini. Drought conditions can also impact the Miami-Dade County Water and Wastewater Treatment system.

Social Vulnerabilities

This hazard may impact persons employed by the agricultural community including migrant farm workers. In terms of the general population, it does not tend to affect one population over another.

Frequency/Probability

With the onset of Climate Change, Miami-Dade County may begin to see more severe droughts. As of the 2018 State of Florida Enhanced Hazard Mitigation Plan, Miami-Dade County is ranked as “medium,” one occurrence every 5-7 years, for drought compared to other counties in Florida.

Erosion

Description

Erosion is the wearing-away of land or the removal of beach or dune sediments by wave action, tidal currents, wave currents, or drainage; the wearing-away of land by the action of natural forces; on a beach, the carrying away of beach material by wave action, tidal currents, littoral currents or by deflation. Waves generated by storms cause coastal erosion, which may take the form of long-term losses of sediment and rocks, or merely in the temporary redistribution of coastal sediments.

Riverine and canal erosion are minimal within Miami-Dade County and will not be further analyzed. Coastal erosion is of greater concern and is expanded upon next. Long-shore currents move water in a direction parallel to the shoreline. Sand is moved parallel to most beaches in Florida by long-shore drift and currents. Ideally the movement of sand functions like a balanced budget. Sand is continually removed by long-shore 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.

The ability of waves to cause erosion depends on a number of factors, which include:

- The hardness or "erodibility" of the beach, cliff, or rocks, including the presence of fissures, fractures, and beds of non-cohesive materials such as silt and fine sand.
- The rate at which sediment is eroded from the foreshore is dependent on the power of the waves crossing the beach, and this energy must reach a critical level or material will not be removed from the debris lobe.
- Beaches actually help dissipate wave energy on the foreshore and can provide a measure of protection to cliffs, rocks, and other harder formations, as well as any area upland.
- The lowering of the beach or shore platform through wave action is a key factor controlling the rate of erosion. A beach is generally lowered when its profile changes shape in response to a change in the wave climate. If the beach is not lowered, the foreshore should widen and become more effective at dissipating the wave energy, so that fewer and less powerful waves affect the area.
- The near shore bathymetry controls the wave energy arriving at the coast and can have an important influence on the rate of erosion.

Beach Erosion – Beach erosion occurs when waves and currents remove sand from the beach system. The narrowing of the beach threatens coastal properties and tourism revenue in coastal counties throughout the United States.

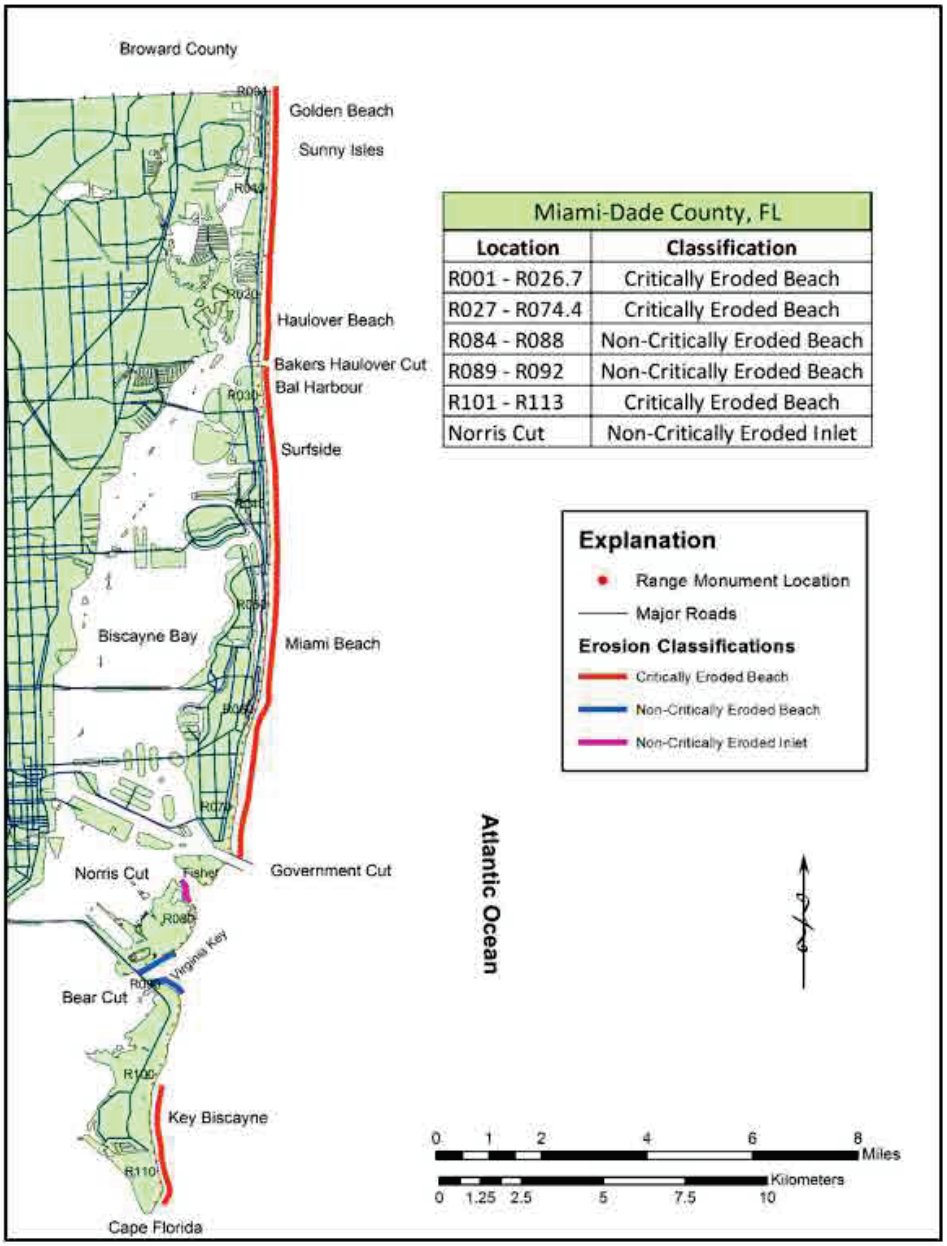
Dune Erosion – Dune erosion occurs when waves attack the front face of the sand dune, reducing the volume and elevation of the dune. Erosion of the sand dune leaves coastal properties more vulnerable to future storms.

Overwash – When waves exceed the elevation of the dune, sand is transported across the island in a process known as overwash. When overwash occurs, it often results in significant damage to coastal property.

Inundation and Island Breaching – Inundation occurs when the beach system, or the sandy profile located between the most seaward (primary) dune and the shoreline, is completely submerged under the rising storm surge. Strong currents may carve a channel in the island in a process known as island breaching.

Location

The coastal areas indicated in the map below, from the Florida Department of Environmental Protection (FDEP), are at highest risk for coastal erosion.[23] This includes areas within the municipalities of Key Biscayne, Miami, Miami Beach, Biscayne Park, Bay Harbor Islands, Bal Harbour, Sunny Isles Beach, and Golden Beach.



Source: FDEP Critically Eroded Beaches in Florida

[23] FDEP Critically Eroded Beaches in Florida- August 2024: https://floridadep.gov/sites/default/files/FDEP_Critically%20Eroded%20Beaches_08-2024_0.pdf

Extent

Coastal erosion is determined by the Florida Department of Environmental Protection (FDEP) on a scale of critically eroded or non-critically eroded. A critically eroded beach is defined by FDEP as "a segment of the shoreline where natural processes or human activity have caused or contributed to erosion and recession of the beach or dune system to such a degree that upland development, recreational interests, wildlife habitat, or important cultural resources are threatened or lost. Critically eroded shorelines may also include peripheral segments or gaps between identified critically eroded 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."[24] A non-critically eroded beach would be considered any segment of the coastline that does not meet the criteria for critically eroded stated above. That is, erosion has not progressed to a degree that threatens upland development, recreational interests, wildlife habitats, or cultural resources.

Erosion is a major concern for all beaches in Miami-Dade County and has been identified in many areas along the coast of the county. Erosion can happen at any time throughout the year. Large pieces of land may erode more quickly during storms, and therefore, more erosion may take place during stormy seasons. Erosion is often a slow onset disaster and can be a concern for many years. Unless action is taken to stop the erosion or replenish areas (such as beaches), erosion is a permanent fixture. Coastal erosion is expected to increase with sea level rise and storm frequency and severity. However, Miami-Dade County's Division of Environmental Resources Management has a program for monitoring and renourishment of the severely eroded areas.[25]

Impact

Impact to Miami-Dade County Residents

Certain population groups may be impacted and/or more vulnerable based on any number of social or economic factors, including those who may unknowingly purchase a home in a high-risk area for erosion. Residents who live on the coast, will most likely be affected by a reduction in their property value. Like all hazards, the actual consequence of such an incident will be dependent upon the location, scale, magnitude and extent of the incident.

Although not exhaustive, the following is a list of potential social populations that may be more heavily affected by this hazard than other groups.

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[24] FDEP Critically Eroded Beaches in Florida- August 2024: https://floridadep.gov/sites/default/files/FDEP_Critically%20Eroded%20Beaches_08-2024_0.pdf

[25] Miami-Dade County Beach Erosion Control Master Plan: https://www.miamidade.gov/environment/library/reports/beach-renourishment-doc.pdf

- Children
- Disabled
- Elderly
- Residents with limited or no English

Consequences towards the public as a result of erosion may include:

- Temporary/permanent loss of residence, causing an increased need for shelter, short-term or long-term housing
- Temporary/permanent loss of transportation, causing a need for replacement or alternative forms of transportation
- Temporary/permanent loss of employment/business income, causing an increased need for loans
- Temporary loss of services/utilities, requiring alternate means to address immediate needs

Impact to Essential Facilities and Other Property

All essential facilities along the coastline of Miami-Dade County are vulnerable to erosion. An essential facility will encounter many of the same impacts as any other building on the shoreline. These impacts will vary based on the magnitude of erosion with exposure of foundation of buildings, destruction of buildings, coastal roads, harbors, jetties and beaches.

Consequences related to essential facilities and property by erosion may include:

- Loss of building function (e.g., damaged home will no longer be habitable, causing residents to seek shelter)
- Business/service interruption, causing an impact to the local economy as well as individual households

Impact to Critical Infrastructure

Impacts to critical infrastructure include broken, failed, or impassable roadways, bridges could fail or become impassable, causing risk to traffic, and possible washing away of jetties due to erosion.

Consequences related to critical infrastructure following erosions may include:

- Disruption in the transportation of goods
- Disruption in the public transportation
- Loss of tourism industry

Impact to Environment

Erosion can impact the environment greatly in Miami-Dade County. Plants and wildlife that depend on the coastal ecosystem will begin to decline with loss of habitat, as coastal

ecosystems will deteriorate. Additionally, erosion can also impact the fishing industry as damage to areas of fish spawning will cause a major waning in commercial fishing.

Consequences related to the environment following erosion may include:

- Loss of habitat for plants and animals dependent on the coastal ecosystem
- Decline in the fish population

Previous Occurrences

Erosion is an on-going threat, and although certain events like a hurricane or strong storm may increase erosion for a period, erosion continues to occur during calm periods.

The long-term average erosion rates (over 40+ years) for our beaches are as follows:

- Sunny Isles Beach - 10,800 CY/YR
- Bal Harbour - 39,900 CY/YR
- Surfside - 14,500 CY/YR
- Miami Beach 65th Street Hotspot - 10,000 CY/YR
- Miami Beach 55th Street Hotspot - 12,000 CY/YR
- Miami Beach 44th Street Hotspot - 11,000 CY/YR
- Miami Beach 27th Street Hotspot - 27,600 CY/YR

November 2022 – Beach erosion losses after Hurricane Nicole were severe enough to trigger a Flood Control and Coastal Emergencies (FCCE) funding request. The Army Corps estimated the sand loss at 70,500 CY based on the Regulatory and Economic Resources DERM Water Management Division Beach Assessment Reports.

September 2017 – Hurricane Irma caused some beach erosion throughout Miami-Dade County. The preliminary damage assessments estimated a loss of 170,000 cubic yards of sand. The money amount in damages has not been determined.

October 2016 – Hurricane Matthew caused minor beach erosion, as it travelled northward parallel to Florida's east coast. Miami-Dade County agencies and municipalities estimated close to $1M in damages due to coastal erosion.

October 2012 – Hurricane Sandy never made landfall but paralleled the coast causing moderate to major beach erosion from central Florida southward to Miami-Dade County. There were reports of waves up to 10 feet in Miami-Dade. Hurricane Sandy was estimated to cause over $2M in damages to beaches including the following:

- Miami Beach 26th – 29th Street – approximately 10,000 cubic yards
- Miami Beach 44th – 46th Street – approximately 2,500 cubic yards
- Miami Beach 53rd – 56th Street – approximately 3,000 cubic yards
- Miami Beach 63rd – 66th Street – approximately 5,000 cubic yards
- Bal Harbour 99th – 103rd Street – approximately 2,600 cubic yards
- Key Biscayne – unknown cubic yards estimated at $1.2M [26]



October 2005 – Hurricane Wilma, caused in general only minor beach (Condition I) erosion to the majority of beaches in Miami-Dade but dune erosion (Condition II) occurred at the Bill Baggs Cape Florida State Park.[27] No major structural damage was observed seaward of the Coastal Construction Control Line (CCCL) or within the Coastal Building Zone (CBZ). Most of the damage near the coast occurred north of Bakers Haulover Inlet. At Cape Florida, a concrete seawall and rock revetment sustained level three damage.

September 2005 – Hurricane Rita caused only minor beach erosion (Condition I) north of Government Cut from Miami Beach to Broward County. Virginia Key also had minor beach erosion (Condition I) but also experienced overtopping, resulting in a wash over deposit of sand. Portions of Key Biscayne experience moderate beach and dune erosion (Condition III) and south of Sonesta Beach Resort had minor dune erosion (Condition II). No structural damages were sustained along the Miami-Dade County coast seaward of the CCCL or within the CBZ during the passage of Hurricane Rita.

August 2005 – Hurricane Katrina caused minor beach erosion (Condition I) to the northern beaches in Miami-Dade. No structural damages were sustained along the Dade County coast seaward of the CCCL or within the CBZ; however, a number of single-family dwellings were flooded on Key Biscayne forcing their evacuation.

[26] Miami-Dade Emergency Operations Center Damages Report
[27] Florida Department of Environmental Protection Post-Storm Reports

Vulnerability

Based on scores from the Hazard Impact Analysis found in the THIRA and summarized on the table below, Miami-Dade County has a medium overall vulnerability to droughts.

Erosion			
Category		Vulnerability*	Risk*
Social (People, etc.)	Special Populations	Minimally Vulnerable	Low
	Cultural Conditions	Minimally Vulnerable	Low
	Socioeconomic Conditions	Somewhat Vulnerable	Medium
Physical (Property, etc.)	Critical Infrastructure	Vulnerable	Medium
	Key Resources	Somewhat Vulnerable	Medium
	Building Stock	Somewhat Vulnerable	Medium
Community Conditions (Environment, Operations, etc.)	Economic Conditions	Somewhat Vulnerable	Medium
	Social Conditions	Minimally Vulnerable	Low
	Environmental Conditions	Vulnerable	Medium
	Governmental Conditions (inc. Operations)	Minimally Vulnerable	Low
	Insurance Conditions	Minimally Vulnerable	Low
	Community Organizations	Minimally Vulnerable	Low

**Vulnerability ratings take in consideration baseline vulnerabilities described in THIRA Volume 2 with adjustment based on this specific hazard. Risk ratings consider probability & frequency, potential magnitude & scale, vulnerabilities, potential impacts, capabilities, and mitigation efforts related to this specific hazard.*

Physical Vulnerabilities

The entire built environment (Critical Infrastructure, Key Resources, Building Stock) and natural environment (beaches) are vulnerable to erosion primarily along coastal areas. According to a GIS analysis there are approximately 500 parcels in the property appraiser database that intersect with the CCCL. Though the beaches have been fortified over the years and are much wider than they used to be, constant erosion could put structures in these areas at risk. The map to the right shows the status of erosion classifications for Miami-Dade County's coastal areas. Severe erosion can exacerbate storm surge inundation by minimizing the protection offered by beaches and seawalls as they are compromised. Structures such as boardwalks or piers that have pilings in coastal areas may suffer collapse or complete destruction. Beaches in Miami-Dade, such as South Beach and Biscayne National Park, are cited as the number one reason tourists come to Miami-Dade.

There are two piers in Miami-Dade County that extend into the Atlantic Ocean and Government Cut, the Newport Beach Fishing Pier in Sunny Isles Beach and the South Pointe Pier in Miami Beach. The Newport Beach Pier was rebuilt and reopened in 2013 after being destroyed by Hurricane Wilma in 2005 and the South Point Pier was rebuilt and reopened in 2014 after being closed in 2004 due to deterioration.

Social Vulnerabilities

This hazard does not tend to affect one population over another.

Frequency/Probability

Erosion is an ongoing threat in Miami-Dade County. Hurricanes increase the risk of erosion to an annual significant occurrence affecting at least some of our coastal areas. However, erosion can occur at any time. Projected erosion rates in Miami-Dade County's coastline to increase, as beaches north of the Government Cut are already critically eroded.

Flooding

Description

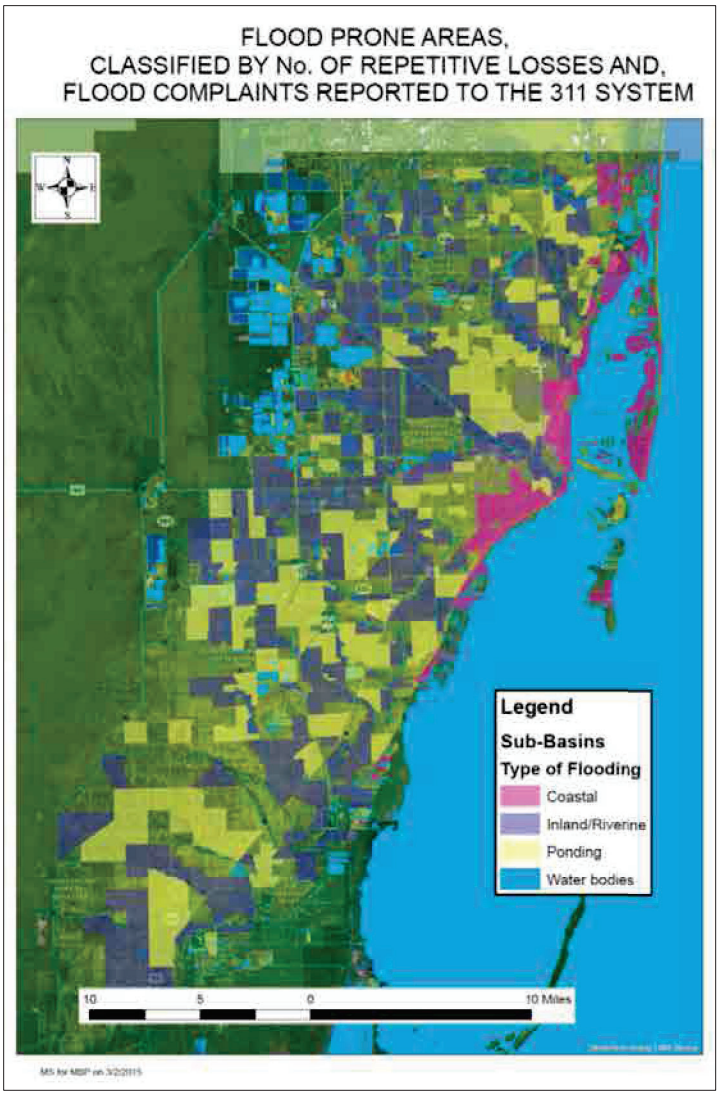
Global statistics show that floods are the most frequently recorded destructive events, accounting for about 30% of the world's disasters each year. Flooding is a complicated hazard because there are many different factors that contribute to flooding. Also, there are several different types of flooding. Flooding is an overflowing of water onto land that is normally dry. It can happen during heavy rains or when ocean waves come onshore. Flooding may happen with only a few inches of water, or it may happen with several feet of water. A single flooding incident can affect many different communities covering several states.

TABLE 4. COMMON FLOOD TYPES

Category	Criteria
River or Canal Overbank Flooding	When water levels rise in a river due to excessive rain from tropical systems making landfall, persistent thunderstorms over the same area for extended periods of time.
Ponding	When water levels rise in a land locked area, lake or detention basin due to excessive rain from tropical systems making landfall, persistent thunderstorms over the same area for extended periods of time. In South Florida, some of the severe localized thunderstorms frequently exceed 3 inches/hour, exhausting the storage and infiltration capacity of the drainage system.
Coastal Flooding	When a hurricane, tropical storm, or tropical depression produces a deadly storm surge that overwhelms coastal areas as it makes landfall. Storm surge is water pushed on shore by the force of the winds swirling around the storm. This advancing surge combines with the normal tides to create the hurricane storm tide, which can increase the average water level, 15 feet or more. The greatest natural disaster in the United States, in terms of loss of life, was caused by a storm surge and associated coastal flooding from the great Galveston, Texas, hurricane of 1900. At least 8,000 people lost their lives.
Inland or Riverine Flooding	When tropical cyclones move inland, they are typically accompanied by torrential rain. If the decaying storm moves slowly over land, it can produce rainfall amounts of 20 to 40 inches over several days. Widespread flash flooding and river flooding can result. In the 1970s, '80s, and '90s, inland flooding was responsible for more than half of the deaths associated with tropical cyclones in the United States. The state of Florida has nearly 121,000 census blocks potentially threatened by riverine flooding, translating to nearly $880 billion in property.
Flash Flooding	A rapid rise of water along a stream or low-lying urban area. Flash flooding occurs within six hours of a significant rain event and is usually caused by intense storms that produce heavy rainfall in a short amount of time. Excessive rainfall that causes rivers and streams to swell rapidly and

Category	Criteria
	overflow their banks is frequently associated with hurricanes and tropical storms, large clusters of thunderstorms, supercells, or squall lines. Other types of flash floods can occur from dam or levee failures.
High Tide Flooding	When local sea level temporarily rises above an identified threshold height for flooding, in the absence of storm surge or riverine flooding.[28] High tide flooding, sometimes referred to as nuisance flooding, sunny-day flooding, or king tide flooding, is occurring more frequently every year as sea levels continue to rise. King Tides normally occur a few times per year. More severe flooding may result if King Tides coincide with bad weather conditions such as heavy rains, strong winds or big waves.

Much of Miami-Dade County is susceptible to localized flooding, particularly during the rainy season from June through October, see the map on this page. The mean elevation of Miami-Dade County is relatively low at 6 feet above mean sea level. The county's flat terrain causes extensive "ponding" due to the lack of elevation gradients to facilitate "run-off". Of Miami-Dade's 1,250,287 acres, 44.62% of that is within the flood plain (557,871 acres). One area in particular experiences flooding on a regular basis. Known as the 8½ square mile area, it is located west of the L-31N Levee, between SW 104th Street on the north and SW 168th Street on the south.



Our community is interlaced with an intricate system of canals that play an integral role in our groundwater saturation levels. When the levels are too high or the canal structures cannot be opened, this can lead to localized flooding during rain events. Agricultural interests can be impacted by levels that are too high or too low. If the control structures

[28] High-Tide Flooding: https://toolkit.climate.gov/high-tide-flooding

release the fresh water at a rapid rate this can also lead to environmental concerns where the fresh water is released. When the control structures fail or are damaged and cannot be operated, alleviation of any localized flooding may require pumping until the canal structures can be re-opened or fixed. Inability to be able to close the salinity structures within the canals could also increase the risk of saltwater intrusion during high tide and storm surge. Part 5 of the LMS provide greater detail as to the canal system within the county and the relation to drainage basins.

The most predominant type of flood hazard is Inland/Riverine. Table 6A-21 shows the percentage of the drainage system service areas subject to the different types of flooding.

TABLE 6A-23 FLOOD CATEGORIES IN MIAMI-DADE COUNTY

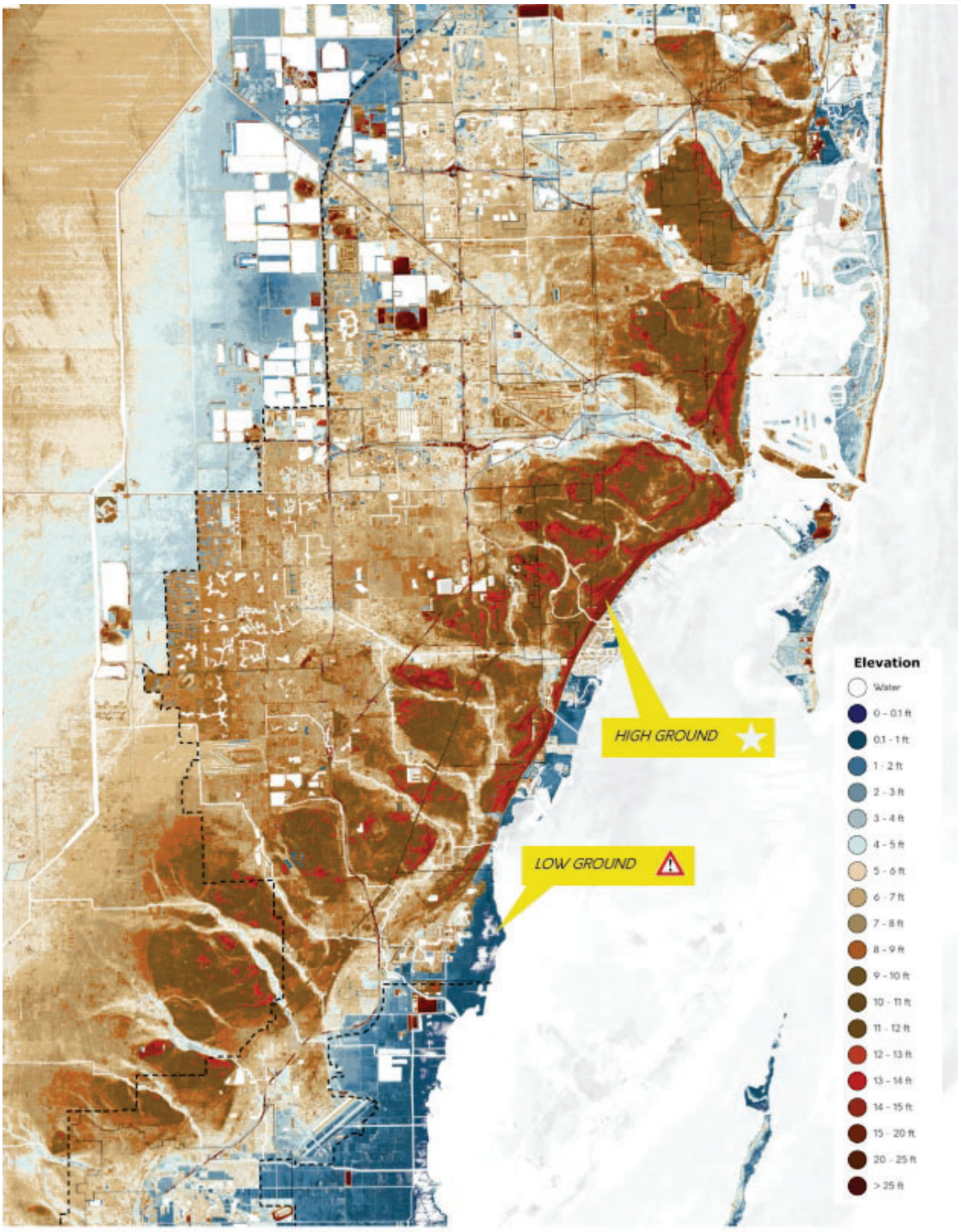
Type of Flooding	Area, Acres	%
Coastal	18,314	10%
Inland/Riverine	103,960	57%
Ponding	60,993	33%
Total Service Area	183,267	100%

Source: Miami-Dade County

Considering that the most widespread type of flooding is Inland/Riverine, followed by Ponding, Miami-Dade County began the development of a countywide storm water management program in 1992 for all Primary Canal Basins (see Map 6A-16). The Department of Regulatory and Economic Resources (RER) - Division of Environmental Resources Management (DERM) published the 2021 Stormwater Management Program (SWMP) Master Plan. The SWMP Master Plan update provides the most current representation of the behavior of the interconnected stormwater management system for existing and future hydrologic and hydraulic conditions for Miami-Dade County. The Master Plan provides details of the numerical modeling used to evaluate the impact of sea level rise and climate change and addresses the protection of natural channels. It also provides a basis to develop an estimate for dedicated funding sources used for SWMP strategies. The SWMP Master Plan is in the process of being updated again for 2026.

Location

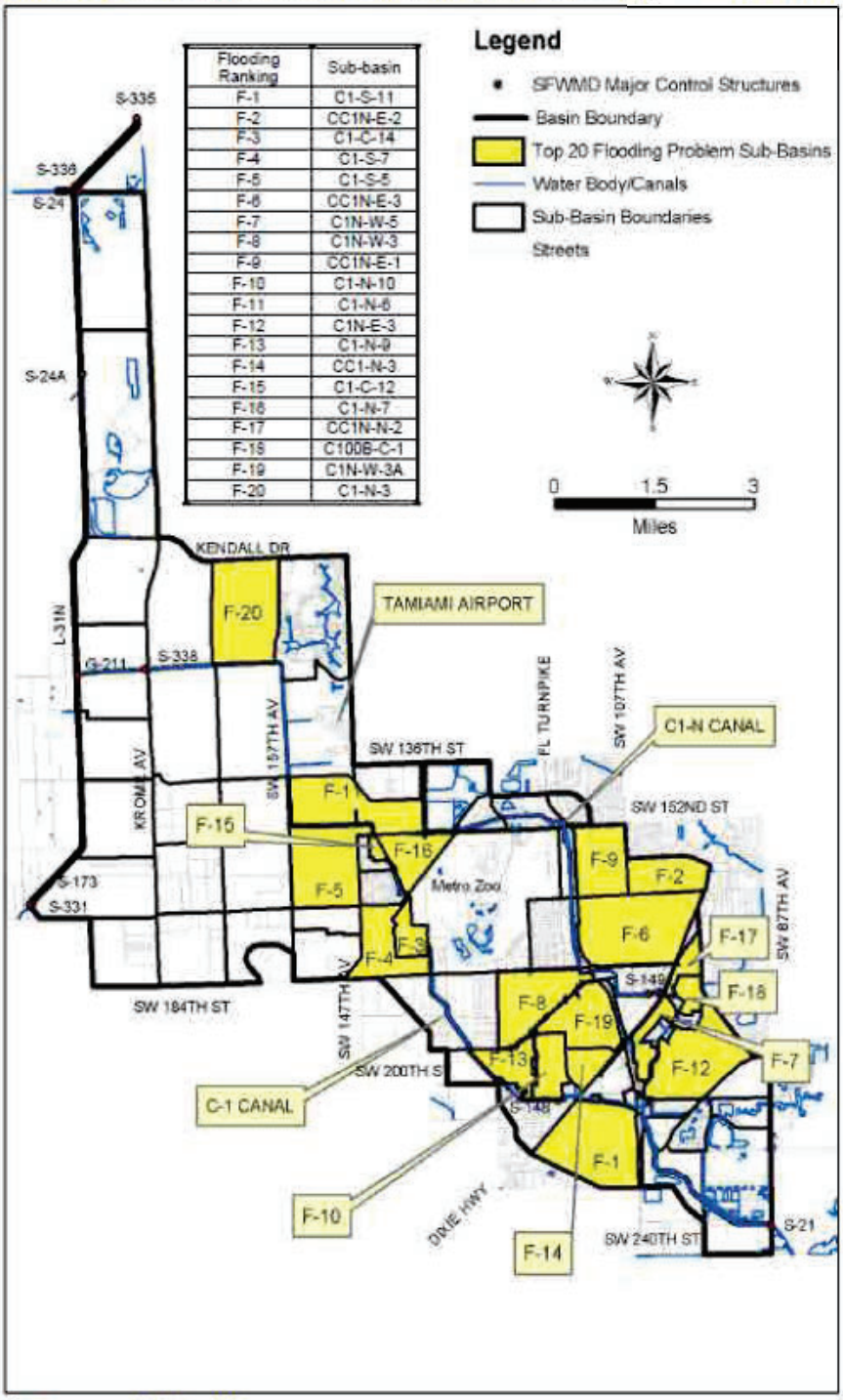
The entire county is vulnerable to flooding; however, some areas are more prone to flooding than others due to elevation levels and location within basins. The next map is an elevation map of the county showing the highest elevation areas in dark red and brown, referred to as “the ridge,” and the lowest elevation areas in blue. The maps after show the top 20 flooding problem service areas in each of the Canal Basins of Miami-Dade County.



Elevation map of Miami-Dade County

Source: Miami-Dade County Office of Resilience- Sea Level Rise Strategy Ch. 1

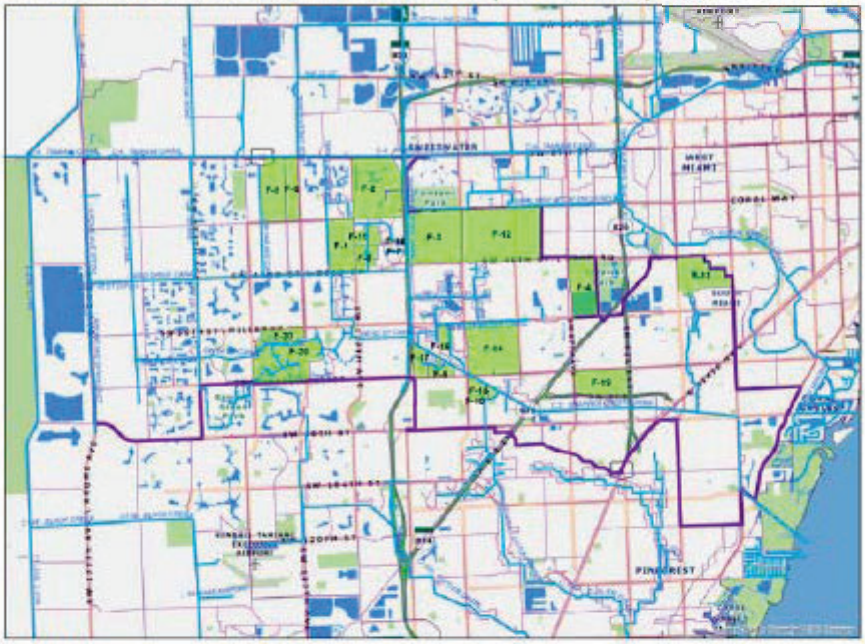
MAP 6A-15 – C-1 BASIN
TOP 20 FLOODING PROBLEM SERVICE AREAS (SUB-BASINS), BASED ON THE FPLOS



Flooding Ranking	Sub-basin
F-1	C1-S-11
F-2	CC1N-E-2
F-3	C1-C-14
F-4	C1-S-7
F-5	C1-S-5
F-6	CC1N-E-3
F-7	C1N-W-5
F-8	C1N-W-3
F-9	CC1N-E-1
F-10	C1-N-10
F-11	C1-N-6
F-12	C1N-E-3
F-13	C1-N-9
F-14	CC1-N-3
F-15	C1-C-12
F-16	C1-N-7
F-17	CC1N-N-2
F-18	C100B-C-1
F-19	C1N-W-3A
F-20	C1-N-3

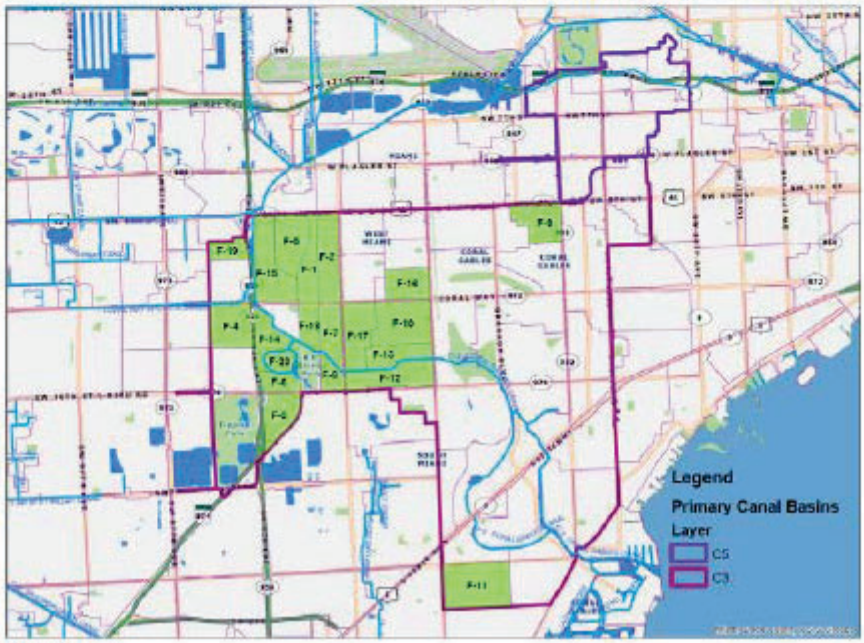
Source: Storm water Management Masterplan

MAP 6A-16 – C-2 BASIN
TOP 20 FLOODING PROBLEM SERVICE AREAS (SUB-BASINS), BASED ON THE FPLOS



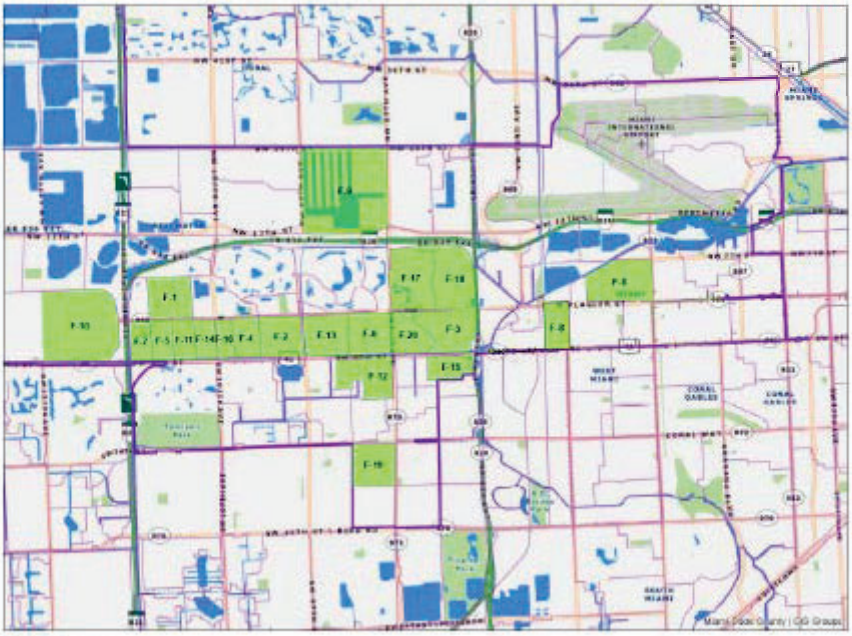
Source: Miami-Dade County

MAP 6A-17 – C-3 AND C-5 BASINS
TOP 20 FLOODING PROBLEM SERVICE AREAS (SUB-BASINS), BASED ON THE FPLOS



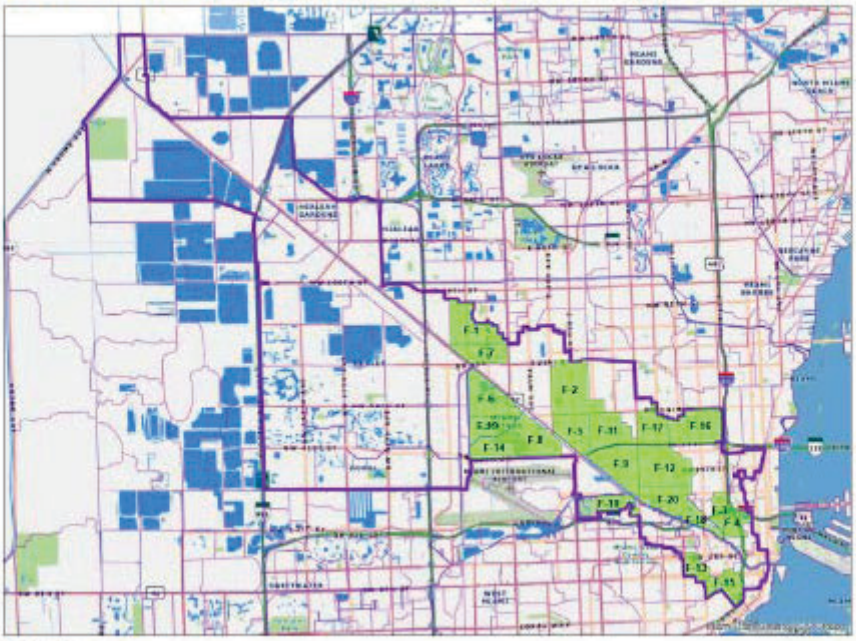
Source: Miami-Dade County

MAP 6A-18 – C-4 BASIN
TOP 20 FLOODING PROBLEM SERVICE AREAS (SUB-BASINS), BASED ON THE FPLOS



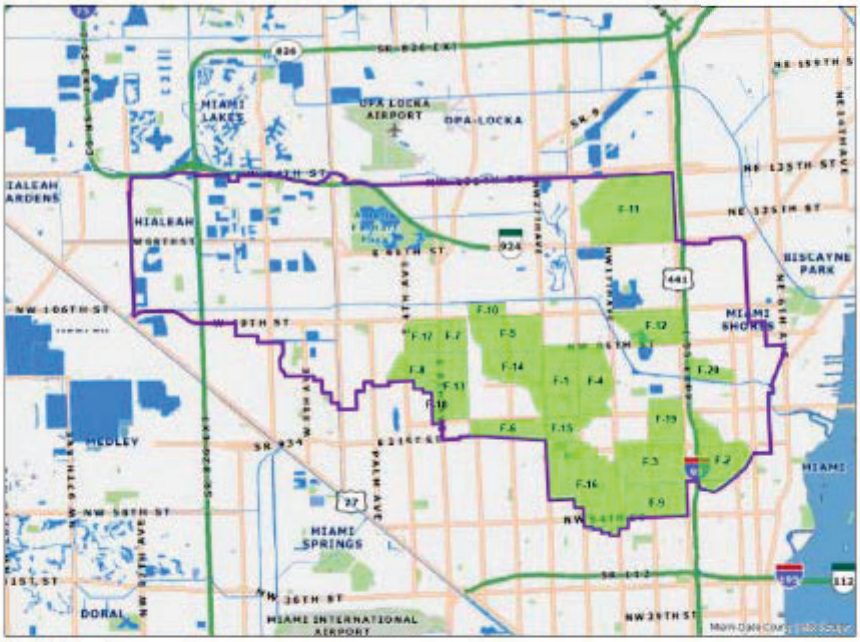
Source: Miami-Dade County

MAP 6A-19 – C-6 BASIN
TOP 20 FLOODING PROBLEM SERVICE AREAS (SUB-BASINS), BASED ON THE FPLOS



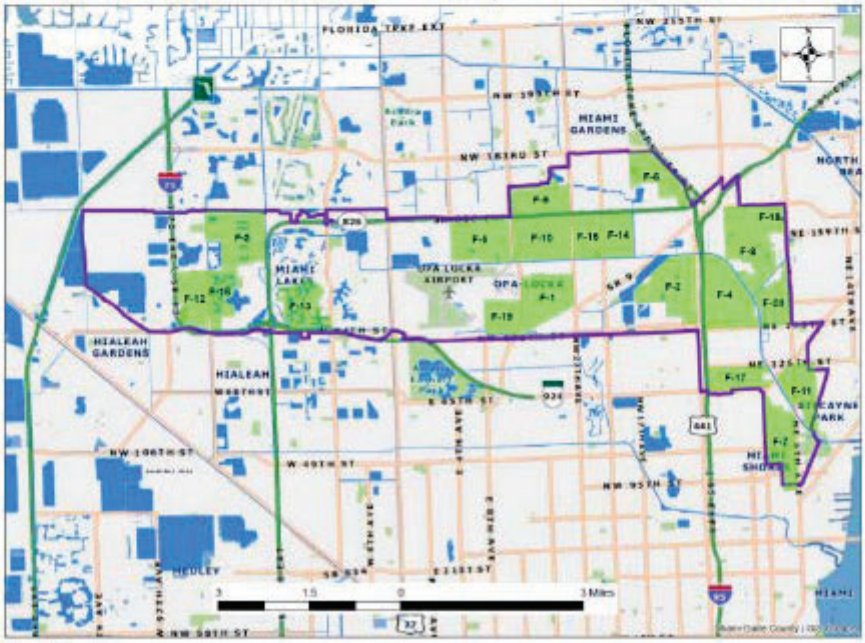
Source: Miami-Dade County

MAP 6A-20 – C-7 BASIN
TOP 20 FLOODING PROBLEM SERVICE AREAS (SUB-BASINS), BASED ON THE FPLOS



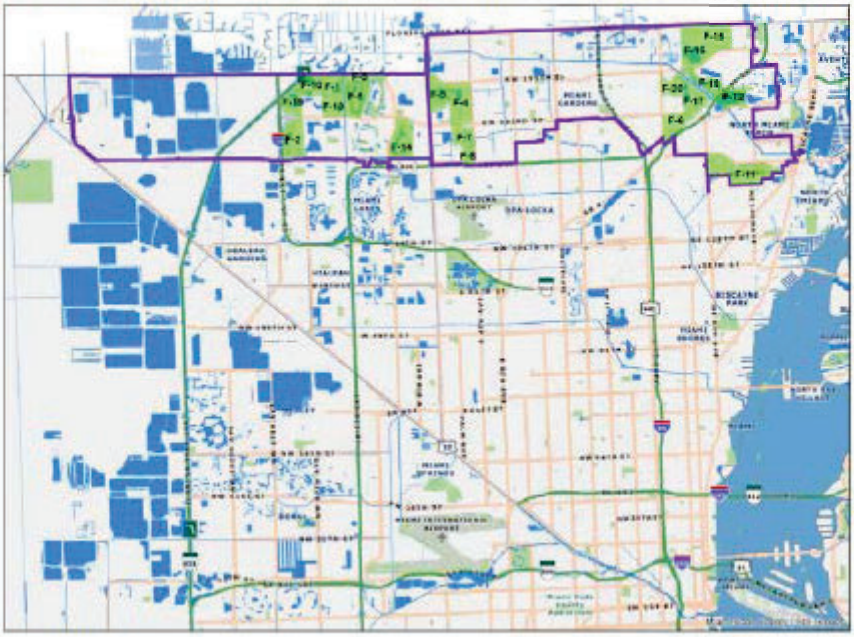
Source: Miami-Dade County

MAP 6A-21 – C-8 BASIN
TOP 20 FLOODING PROBLEM SERVICE AREAS (SUB-BASINS), BASED ON THE FPLOS



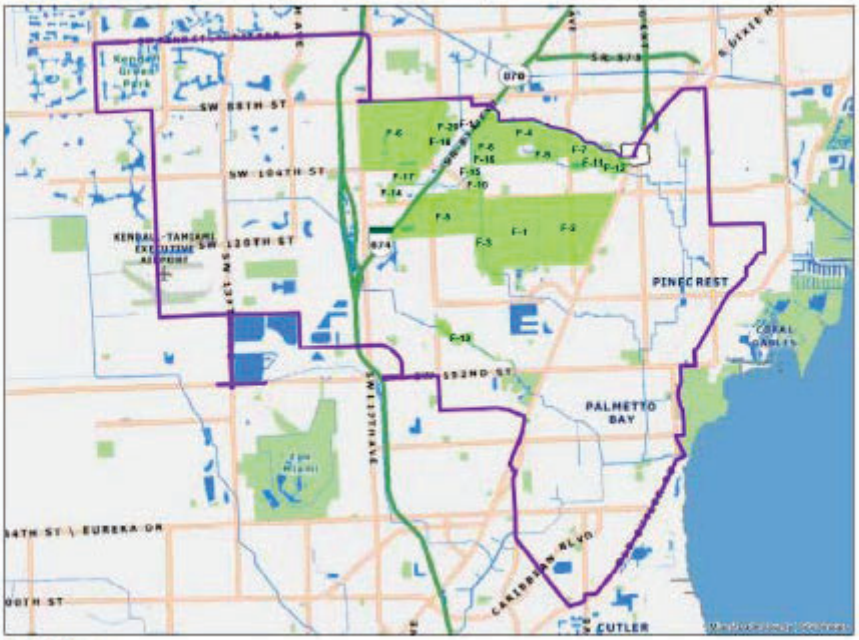
Source: Miami-Dade County

MAP 6A-22 – C-9 BASIN
TOP 20 FLOODING PROBLEM SERVICE AREAS (SUB-BASINS), BASED ON THE FPLOS



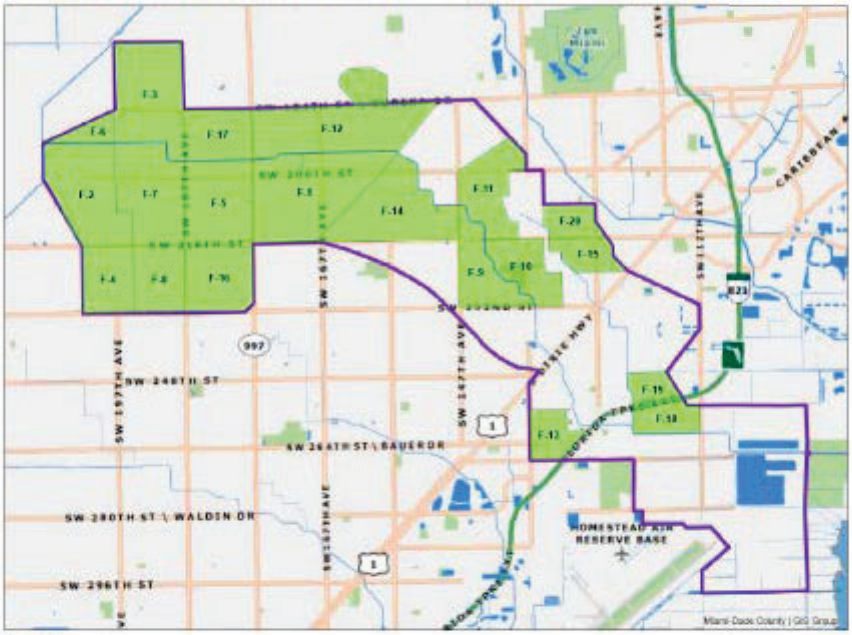
Source: Miami-Dade County

MAP 6A-23 – C-100 BASIN
TOP 20 FLOODING PROBLEM SERVICE AREAS (SUB-BASINS), BASED ON THE FPLOS



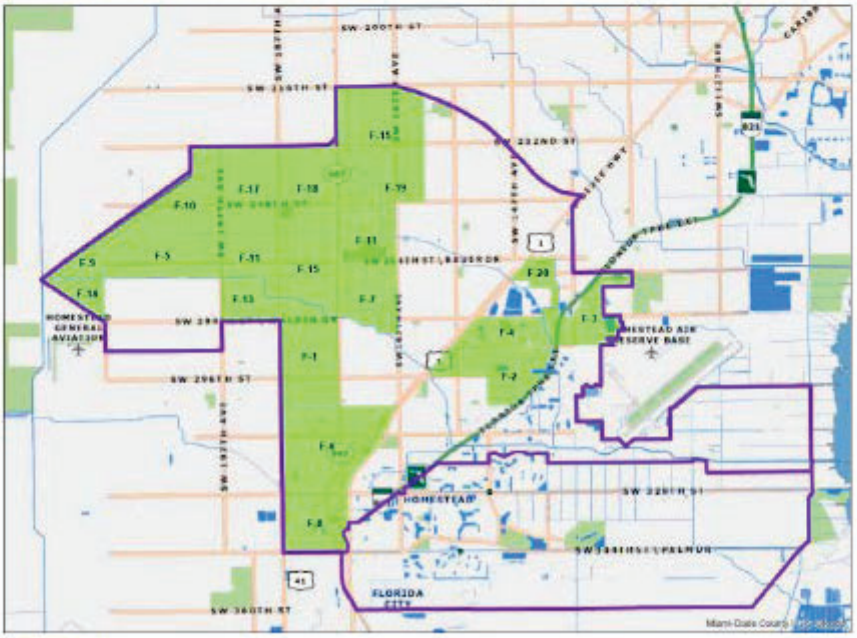
Source: Miami-Dade County

MAP 6A-24 – C-102 BASIN
TOP 20 FLOODING PROBLEM SERVICE AREAS (SUB-BASINS), BASED ON THE FPLOS



Source: Miami-Dade County

MAP 6A-25 – C-103, FLORIDA CITY AND NORTH CANAL BASINS
TOP 20 FLOODING PROBLEM SERVICE AREAS (SUB-BASINS), BASED ON THE FPLOS



Source: Miami-Dade County

Extent

Flooding, especially flash flooding, can occur any moment during any time period or season. Flooding and storm surge from hurricanes and tropical storms is likely to occur during hurricane season (June 1 - November 30 in the Atlantic). Strong thunderstorms can also produce heavy flooding in a short period of time. Although storm surge presents the potential for loss of life, a study conducted from 1970 to 1999 by the National Hurricane Center found that freshwater flooding accounted for more than half (59%) of the tropical cyclone deaths in the United States. FEMA estimates that about 41% of Florida is flood prone, which is the highest percentage of all 50 states. Because of the potential for flood damage, Florida has the most flood insurance policies required by the National Flood Insurance Program than any other state.

The extent of flooding varies depending on region, soil conditions, weather, and a large host of manmade factors such as land use and levees among others. Several factors can independently influence the cause-and-effect relation between rainfall and flooding. During large meteorological storms the term "100-year flood" may be used in an attempt to simplify the definition of a flood so severe that it statistically has a 1-percent chance of occurring in any given year. This percent is often misunderstood to mean that a 100-year flood refers to a flood that can only happen once every 100 years. However, a 100-year flood can occur in consecutive years despite that probability being very low.

A universal method for classifying the extent of flooding events has not been adopted by the scientific community, but Miami-Dade County relies on the flood products issued by the NWS as well as the resulting damages reported to determine the severity of a flash flood event. Currently, the NWS local office issues flood advisories, watches, and warnings, which are described below.

A. Flood Advisory – issued when forecast rainfall may result in street flooding (nuisance flooding), but no major impacts on roadways is expected. A Flood Advisory can be issued within an hour of expected conditions.

B. Flood Watch – issued when there is a possibility of significant flooding that can lead to warning conditions. A Flood Watch can be issued within six (6) to 12 hours of expected conditions.

C. Flood and Flash Flood Warning – issued when flooding is imminent or occurring, threatening, or entering structures and/or major roadways are being impacted (e.g., road closures). A Flood/Flash Flood Warning is issued within an hour of expected conditions.

Additionally, Miami-Dade has created action categories for flood events based on rainfall forecasts which also serves as a scale of severity.

Roadway Inundation

Miami-Dade County Action Levels
Localized Flood Events Due to Rainfall

Forecast of Depth of Inundation above normal stage	MDC Action Categories	Actions	Rainfall Intensity Forecast	24-h Rainfall Forecast
Above 3.0'	Major Flood Stage	Gate and pump operations in flood mode; general evacuation of residents in the affected area.	Over 6 inches/h	Over 10 inches
Between 1.0' and 3.0'	Significant Flood Stage	Gate and pump operations in flood mode; evacuation of older subdivisions and non-compliant structures.	Between 3in/h to 6 in/h	Between 6 to 10 in
From 0.5' to 1.0'	Flood Stage	Gate and pump operations in flood mode; flood inspections on all affected areas.	From 2 in/h to 3 in/h	From 4 to 6 in
Between 0.0 and 0.5'	Action Stage	Review canal operations; review of complaints and need for flood inspections	From 1 in/h to 2in/h	From 2 to 4 in
0.0' or less	Below Flood Stage	No Action	Less than 1 in/h	Less than 2 in

Note: some of these events may trigger evacuation calls by County Emergency Management Officials

Matches up well with 2-3"/hour rate as guideline for Flood Advisory, with duration at least one hour.
Flash Flood Warning: Greater than 3"/hour rate as guideline, lasting over an hour and keeping 24-hour amount of 6" or greater in mind. 1' or greater roadway inundation considered as "flood".
Most local roadways are designed to handle 5-year 24-hour events (-7"). Most arterial roadways are designed to handle 10-year 24-hour events (-8.5").

Impact

Impact to Miami-Dade County Residents
A flooding event will most likely affect the disabled, elderly, homeless, transient, and low-income communities that reside in areas prone to flooding. Residents may be displaced depending on location and severity of the flooding. The elderly and disabled population may need evacuation assistance from flooding due to mobility issues. Transient groups may experience delays in travel and may not be aware of flooded areas.

Although not exhaustive, the following is a list of potential social populations that may be more heavily affected by this hazard than other groups.

- Low-Income/Poor
- Transient
- Children

- Elderly

Consequences for the public as a result of a flooding incident may include:

- Temporary/permanent loss of employment/business income, causing an increased need for loans.
- Temporary loss of water services/utilities, requiring alternate means to address immediate needs.
- Temporary/permanent loss of residence, causing an increased need for shelter, short-term or long-term housing.
- Temporary/permanent loss of transportation, causing a need for replacement or alternative forms of transportation.

Impact to Essential Facilities and Other Property

Essential facilities may experience an interruption in daily operations due to flooding causing economic losses. For example, medical facilities, banks, and grocery stores may temporarily close due to flooding, which can even cause some electrical issues as well. Any physical structure located in a flooded area is likely to sustain some amount of damage.

Consequences related to essential facilities and property following a flooding event may include:

- Business/service interruption, causing an impact to the local economy as well as individual households.
- Loss of building function (e.g., damaged homes will no longer be habitable, causing residents to seek shelter).

Impact to Critical Infrastructure

All structures in flood prone areas are vulnerable to flooding. Critical Infrastructure including airports, waterways, utility services, police and fire operations all are impacted by flooding. The consequence will be dependent upon the location, scale, magnitude and extent of the incident in addition to the existing vulnerabilities and community conditions.

Consequences related to critical infrastructure following a flooding event may include:

- Disruption in the transportation of goods
- Disruption in the public transportation
- Shortage of fuel or other essential materials
- Loss of power due to power outage

Impact to Environment

Flooding can significantly impact the environment. It can uproot trees, kill plants, and erode sediment. Floodwater running into bodies of water can affect water quality, create algae, and damage ecosystems. Farms may feel the impact of flooding before the general population, depending on where the crops are located in a flood zone.

Consequences related to the environment following a flooding event may include:

- Reduced crop, rangeland, and forest productivity
- Contaminated drinking water
- Alter landscapes leading to unhabitable locations
- Increased livestock and wildlife mortality rates
- Damage to wildlife and fish habitat

Previous Occurrences

June 11-13, 2024 – A plume of deep tropical moisture streamed into South Florida during the week of June 10 through 15th as the region remained south of a stationary boundary and near a weak tropical disturbance. Multiple mesoscale convective systems developed to the south of this boundary over Central Florida and gradually pivoted southward into South Florida during the morning and afternoon hours of June 11th, 12th, and 13th, 2024. With a very moist and warm atmospheric composition, rainfall rates were efficient and tropical in nature. Flooding from the heavy rainfall event lingered for several days across portions of NE Miami-Dade County. This included neighborhoods across Miami Beach, Miami Shores, North Miami, North Miami Beach, and Aventura. A total of 34 people required evacuation from vehicles stalled in deep flood waters. Damage assessments report 160 structures with major damage, and 81 with minor damage. A maximum 2-day rainfall total of 20 was recorded in Sunny Isles Beach, with 10-20 inches from Miami Shores and Miami Beach to North Miami and Aventura. Total damages were estimated at 3.8 million.

November 15, 2023 – A strengthening low-pressure system moving across the Florida Keys brought widespread heavy rainfall to much of South Florida from the afternoon of November 15th to the early morning hours of November 16th. Numerous reports of standing water, stranded vehicles, and road closures in the downtown Miami area due to heavy rainfall after continuous rounds of showers moved across the area. Several roads had 6-12 inches of standing water and stranded vehicles, including Biscayne Boulevard near Northeast 6th Street in Miami, Brickell Avenue near Southeast 14th Street in Brickell, and Alton Road near Interstate-195 in Miami Beach. There were no reports of structures being impacted. Up to 8 inches of rain was estimated to have fallen in the area within a 3-hour period, with 12-hour rainfall amounts of 10-12 inches.

June 19, 2023 – A warm and moist S to SW wind flow combined with low pressure aloft over the SE United States led to the development of afternoon showers and thunderstorms across SE Florida, some of which were severe over Miami-Dade County. West Flagler Street was reported almost impassable between NW 82nd Avenue and NW 84th Avenue with multiple stalled cars along the street. Other reports indicated southbound lanes of the Palmetto Expressway flooded, as well as the exit ramp from State Road 836 (Dolphin Expressway) to the Palmetto Expressway. Rainfall estimates of 4 to 5 inches in the area during the time of the flooding.

April 10, 2023 – Lingering moisture from a cold front passage and coastal convergence supported the development of scattered showers and thunderstorms the afternoon of April 10th. There were numerous rounds of heavy downpours across the eastern metro corridor. The City of Miami Police Department reported flooding across multiple roadways in downtown Miami due to heavy rainfall in the area. Several cars were stranded along secondary streets near I-395 near Biscayne Boulevard. Measured rainfall in the area was between 3-5 inches, most of it falling in 4 hours or less.

June 9, 2022 – Moist south to southwest wind flow continued to provide the necessary ingredients for heavy showers and thunderstorms to form across SE Florida during the afternoon. Saturated grounds from previous rainfall contributed to the flash flooding. Media reported significant street and neighborhood flooding in Cutler Bay, mainly along Old Cutler Road from SW 216 Street to SW 224 Street, as well as in Silver Palms near SW 232 Street and SW 112 Avenue. Cars were reported to be stranded and water reaching the upper part of car tires. Observed rainfall was as high as 4 inches in this area, most of which fell in less than 2 hours and aggravated pre-existing flooding in the area from recent heavy rainfall.

May 29, 2022 – A mid/upper-level low pressure area over the eastern Gulf of Mexico helped to draw high moisture levels across South Florida. Light winds and the formation of sea breezes helped to focus numerous showers and thunderstorms over the interior and eastern parts of South Florida, causing gusty thunderstorm winds, hail, and flooding over parts of the area. Significant flooding was reported in Hialeah. Water covered multiple lanes of the Palmetto Expressway (SR 826) near W 49th Street, rising to the base of vehicles. Water also rose to the base of an SUV's door in a nearby residential street, with water over 6 inches deep on the street. Measured rainfall in the area was between 3-5 inches, most of it falling in 2 hours or less.

November 18, 2021 – A mid-upper-level disturbance across the FL Straits continued to push northward towards South FL which allowed for a deepening moist layer across the Florida east coast. This favored widespread showers and thunderstorms with gusty wind, heavy rainfall, and flooding. Significant flooding was reported across the downtown and midtown areas of Miami. Significant flooding of roadways with stalled vehicles in the flood waters along the Biscayne Boulevard corridor from NE 15th Street to NE 9th Street. Rainfall measurements from nearby rain gauges was around 3 inches, most of which fell in a very short period.

September 13, 2020 – A low pressure system, turned tropical disturbance, moving across the western Atlantic and over the Bahamas abruptly formed into Tropical Depression Nineteen on September 11th. Tropical Depression Nineteen gradually continued westward and the center passed about 10 to 20 miles SSE of Miami, Florida during the morning of September 12th. As Tropical Depression Nineteen moved westward over the South Florida peninsula, it continued to strengthen into a Tropical Storm known as Tropical Storm Sally. Rainfall flooding impacts were moderate to significant across South Florida with around 3 to almost 8 inches across portions of Miami-Dade County.

Several broadcast media reports of significant street flooding from Coconut Grove to Brickell and Downtown Miami, and possibly extending into Little Havana. U.S. Highway 1 in Coconut Grove and Brickell was covered in water up to knee-high in places, leading to a number of stalled vehicles.

August 15, 2019 – Thunderstorms produced very heavy rainfall that measured over 7 inches in about 3 hours across portions of Kendall. This heavy rainfall resulted in flash flooding which resulted in water intrusions in numerous structures and impassable roadways.[29]

October 3-7, 2017 – A combination of high tide and heavy rainfall led to flooding across portions of Miami-Dade County. There were reports of coastal and street flooding in the vicinity of Biscayne Blvd from I-395 to NE 30th Street.

August 24-27, 2017 – A tropical wave (Invest 97L) was located near the central Bahamas on August 21st, 2017 and forecast to move northwestward over Florida. Wind shear and dry air hindered further development of this system, but the National Weather Service forecast an excessive rainfall threat for the remainder of the week. Rainfall amounts of 2 to 4 inches, with locally higher amounts possible, were forecast for the region. As a result, a Flood Watch was in effect for Miami-Dade County from August 24th through the 27th.

Between August 24th and 26th, rainfall amounts ranged between 1 and 4 inches through the county. Rainfall amounts of up to 4.5 inches were recorded in the northeast portion of the county between August 26th and 28th. The only significant report received by the National Weather Service was of Okeechobee Road flooded in Hialeah and a spotter in the area recorded 6.62 inches of rain in a single afternoon on August 27th.

August 1, 2017 – Tropical Storm Emily formed west of Tampa Bay on July 31st, and moved across central Florida, just north of Lake Okeechobee. On August 1st, Tropical Storm Emily was located over the Atlantic and moving away from Florida. Although no direct impacts were reported for Miami-Dade County, a trough extending from the tropical system was over southeastern Florida. A combination of the frontal boundary and daytime heating, a band of thunderstorms developed off the coast and moved west. At around 2 pm, the band became nearly stationary over Miami Beach, Key Biscayne and Downtown Miami. A Flash Flood Warning was issued at 3:47pm until 9:45pm. Later in the afternoon, the same band of thunderstorms redeveloped over The Redland, Kendall, Palmetto Bay and Pinecrest area. Rainfall amounts in these areas ranged between 4 and 6 inches with isolated amounts between 7 and 8 inches. The rainfall rates of 2 to 4 inches an hour lasted 2 to 3 hours, and around the same time as high tide.

Significant flooding was reported in Miami Beach and the Brickell area in the City of Miami. Vehicles were stalled in streets with up to 2 feet of water and some streets had to

[29] National Oceanic and Atmospheric Administration, National Climatic Data Center, Storm Events Database: https://www.ncdc.noaa.gov/stormevents/

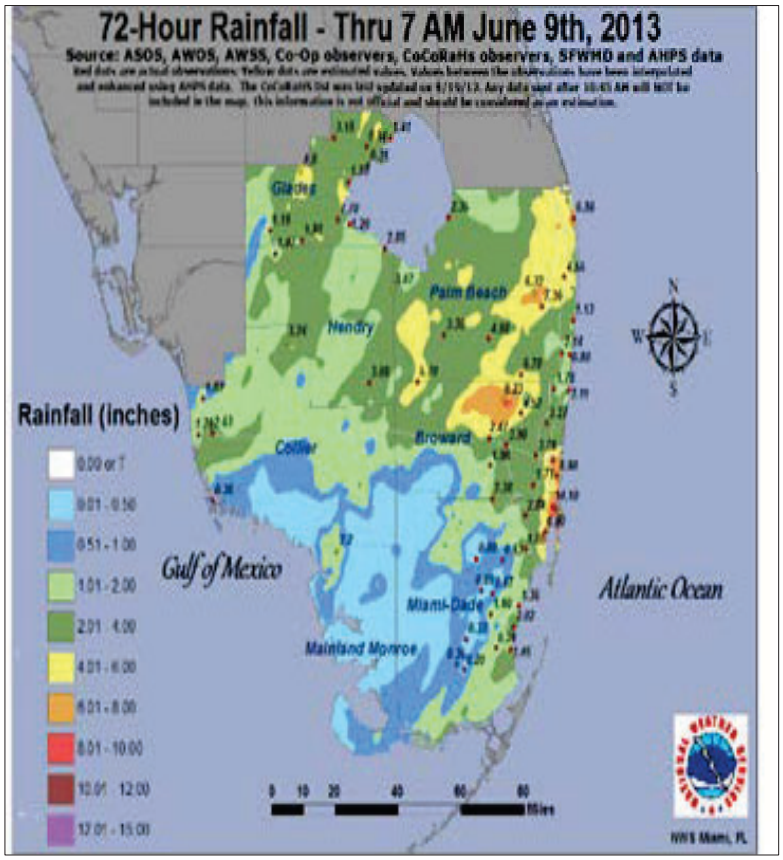
be closed due to deep standing water. In Miami Beach, 1 to 2 feet of water was reported on streets in South Beach including Purdy Avenue, West Avenue, Alton Road, Pennsylvania Avenue, Meridian Avenue, Collins Avenue, Washington Avenue and Indian Creek Drive. Water entered business, homes, apartment lobbies and parking garages. In Mary Brickell Village, more than 10 businesses and buildings had 1 to 4 inches of water inside the structures.

June 7, 2017 – An area of low pressure over the Gulf of Mexico, brought tropical moisture across South Florida during the week of June 5th. Widespread showers and thunderstorms, with the potential of heavy rainfall was forecast for the rest of the week. On June 7th, a Flood Watch was issued for Miami-Dade County until 8 pm. Aside from minor flooding on roadways, no significant issued were reported.

December 2015 – A cold front moved into South Florida during on December 3rd, and stalled across the far southern end of the peninsula and upper Florida Keys on December 4th and 5th. Several rounds of heavy rainfall fell across Southern Miami-Dade County. Rainfall amounts near 15 inches fell across Homestead, the Redlands, and western Kendall, with four (4) to eight (8) inches reported across the remainder of Miami-Dade County, most of which occurred on December 5th. This rainfall led to significant flooding in Miami-Dade County with numerous road closures and cars stalling in flood waters. An estimated $1 Million in damage impacted the County's fall and winter crops and also resulted in multiple day closures at Zoo Miami.[30]

[30] National Oceanic and Atmospheric Administration, National Climatic Data Center, Storm Events Database: https://www.ncdc.noaa.gov/stormevents/

June 7-8, 2013 – On June 6th, Tropical Storm Andrea made landfall in northern Florida, but southern Florida received torrential rain from the tail of the storm. A South Florida Water Management District rain gauge recorded 13.15 inches of rain in North Miami Beach at 5:53 PM EDT with storm total at the same gauge by 9 PM EDT recording 13.94 inches. Other rainfall reports received were 11.71 inches at the FIU Biscayne Campus in North Miami Beach and 9.89 inches at North Miami/Keystone Point. Over 50 vehicles were reported as being stranded in impassable roads in Aventura and additional roads had similar problems in North Miami and Golden Beach. The picture to the right, shows 72-hour rainfall amounts ending on the morning of June 9th, 2013.



Vulnerability

Based on scores from the Hazard Impact Analysis found in the THIRA and summarized on the table below, Miami-Dade County has a high overall vulnerability to flooding.

Flooding			
Category		Vulnerability*	Risk*
Social (People, etc.)	Special Populations	Vulnerable	High
	Cultural Conditions	Somewhat Vulnerable	Medium
	Socioeconomic Conditions	Vulnerable	High
Physical (Property, etc.)	Critical Infrastructure	Somewhat Vulnerable	Medium
	Key Resources	Somewhat Vulnerable	Medium
	Building Stock	Somewhat Vulnerable	Medium
Community Conditions (Environment, Operations, etc.)	Economic Conditions	Vulnerable	High
	Social Conditions	Somewhat Vulnerable	Medium
	Environmental Conditions	Vulnerable	High
	Governmental Conditions (inc. Operations)	Somewhat Vulnerable	Medium
	Insurance Conditions	Somewhat Vulnerable	Medium
	Community Organizations	Somewhat Vulnerable	Medium

**Vulnerability ratings take in consideration baseline vulnerabilities described in THIRA Volume 2 with adjustment based on this specific hazard. Risk ratings consider probability & frequency, potential magnitude & scale, vulnerabilities, potential impacts, capabilities, and mitigation efforts related to this specific hazard.*

Physical Vulnerabilities

The entire built environment (Critical Infrastructure, Key Resources, Building Stock) may be vulnerable to flooding especially in low lying, storm surge planning zones, areas close to canals and structures that were built prior to flood plain regulations. Structures in areas where there has been repetitive losses and no mitigation may also be at a higher risk but past flooding events do not necessarily indicate future flooding problems. Part 5 provides additional analysis of residential structures by date of flood regulations within Miami-Dade County.

On the following page is a chart showing how many structures within each jurisdiction are within FEMA Flood Zones.

TABLE 5. NUMBER OF BUILDINGS BY JURISDICTION IN FEMA FLOOD ZONES

Jurisdiction	A	AE	AH	D	VE	X
Aventura		24,861				172
Bal Harbour		642				3,192
Bay Harbor		2,906				
Biscayne Park		1,116				93
Coral Gables		2,977	1,414		65	16,097
Cutler Bay		8,902	2,009			4,343
Doral		166	7,311			19,729
El Portal		10	111			755
Florida City	2	21	1,899			2,072
Golden Beach		269				136
Hialeah		4,478	21,569			40,678
Hialeah Gardens		139	429			5,895
Homestead		770	12,137			9,556
Indian Creek Village		51				20
Key Biscayne		7,298				
Medley		9	456			1,159
City of Miami		51,416	7,084		3,864	84,868
Miami Beach		51,701				3,939
Miami Gardens		14,024				20,227
Miami Lakes		8,934				1,341
Miami Shores		843			24	3,277
Miami Springs		48	2,338			2,486
North Bay Village		3,659				
North Miami		8,579			139	8,580
North Miami Beach		6,458				8,285
Opa-Locka		951	569			3,104
Palmetto Bay		4,802			44	3,857
Pinecrest		2,260	67			4,618
South Miami		1	825			3,977
Sunny Isles Beach		11,971			1	7,719
Surfside		1,562				1,767
Sweetwater		11	3,410			1,103
Virginia Gardens			132			592
West Miami						1,823
Unincorporated	921	53,113	113,619	1	100	217,268
TOTAL	**923**	**233,368**	**164,534**	**1**	**4,172**	**438,347**

Heavy rainfall events tend to be measured by the amount of rain during a certain duration to give you what would equate to the chances of this type of storm which is typically categorized by terminology such as a 100 year or 500-year storm.

To help local communities determine if a rain event is considered significant the following site and chart from the National Oceanic and Atmospheric Administration (NOAA) Hydro meteorological Design Studies Center maintains the Precipitation Frequency Data Server (PFDS) which is a point-and-click interface developed to deliver NOAA Atlas 14 precipitation frequency estimates and associated information. To determine the amounts and rates of rain that could create a various internal rain event (e.g. 100 year or 500 year) this website provides local information.
http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=fl

Social Vulnerabilities

People who live in areas prone to flooding and who may be uninsured or underinsured are at greatest risk. The cost of insurance may be prohibitive and people who live outside of a flood zone may believe they are not at risk. People who rent properties may not be aware of their flood risk as it may not be disclosed by the owner or they may not know the history of the area.

Frequency/Probability

There have been 47 recorded flooding events in Miami-Dade County since 2015, averaging out to approximately six and a half per year. Each flooding event lasted for multiple days.

As a result of sea level rise, flooding from just high tide events is becoming more common and has even caused the National Weather Service to issue a coastal flood warning from a 2013 high tide event in Miami-Dade.

A warmer atmosphere holds more water vapor and, therefore, can result in heavier and more long-lasting rainfall events. The expected global pattern is for arid areas to get drier and moist areas to get wetter. Where precipitation is enhanced, strong storms are expected to get stronger with the result that rainfall events with a given recurrence frequency, e.g. the 25-year storm, will happen more often.

Hurricanes and Tropical Storms

Description

A tropical cyclone is a collection of weather systems classified by the varying wind speeds and intensities, including tropical depression, tropical storm, and hurricane. Tropical weather systems form over subtropical or tropical waters with lowered pressure and the combination of wind circulation at the center. A tropical depression is a weather system with a defined surface circulation and maximum sustained surface winds between 23 mph – 38 mph. A tropical storm develops from a tropical depression, and has a well-defined surface circulation and maximum sustained surface winds of 39 mph – 73 mph.

A hurricane develops from a tropical storm. The term hurricane is used for tropical cyclones in the Northern Hemisphere and east of the International Dateline. A hurricane is a weather system with well-defined surface circulation and maximum sustained surface winds of 74 mph or higher.

Hurricanes are considered one of the most damaging and deadly weather events that occur in the United States, with violent winds, waves reaching heights of 40 feet, torrential rains, and flooding. According to the National Oceanic and Atmospheric Administration (NOAA) there are an average 11 tropical storms that form over the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico regions each year, and on average 6 of the tropical storms develop into hurricanes. The United States experiences a hurricane strike on land about once every year and a half. The strike zone can potentially extend anywhere from Maine to South Texas.

Hurricanes are classified according to the strength of the winds using the Saffir-Simpson Hurricane Scale. The scale is a ranking system from 1 – 5, with 5 being the most severe. The scale also provides examples of the type of damage and impacts in the United States. It is important to recognize that the Saffir-Simpson scale is solely based on wind speed, and not storm surge. The following table shows the Saffir-Simpson Scale:

TABLE 6A-34 SAFFIR-SIMPSON SCALE

Category		Sustained Winds	Criteria
Pre Saffir-Simpson	Tropical Depression	38 mph or less	A tropical cyclone in which the maximum sustained surface wind speed (using the U.S. 1-minute average) is 33 knots (38 mph or 62 km/hr.) or less.
	Tropical Storm	39-73 mph	A tropical cyclone in which the maximum sustained surface wind speed (using the U.S. 1-minute average) ranges from 34 knots (39 mph or 63 km/hr.) to 63 knots (73 mph or 118 km/hr.).
Saffir-Simpson Scale	Category 1	74-95 mph	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.
	Category 2	96-110 mph	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.
	Category 3	111-129 mph	Devastating damage will occur: Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
	Category 4	130-156 mph	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.
	Category 5	157 mph or higher	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

Storm Surge

From a hurricane, storm surge is often the greatest threat to life and property along the coast. Storm surge is an abnormal rise of water generated by a storm, over and above the predicted astronomical tide. Storm surge is produced when the force of the winds moving around the storm push water towards the shore and this surge can travel several miles inland.[31] Predictions for storm surge are made through a variety of means, including the Sea, Lake and Overland Surges from Hurricanes (SLOSH) models.

[31] National Hurricane Center, Storm Surge Overview

Storm surge inundation is modeled in two zones: the high-velocity zone where wave action and debris can severely damage structures, and farther inland, where the primary concern is flooding as opposed to structural damage. Storm surge can create flooding that can destroy buildings and carry debris miles inland, into canals and rivers, the intercostal waterways and out to sea. The water can also pool in low-lying areas impeding response and recovery activities.

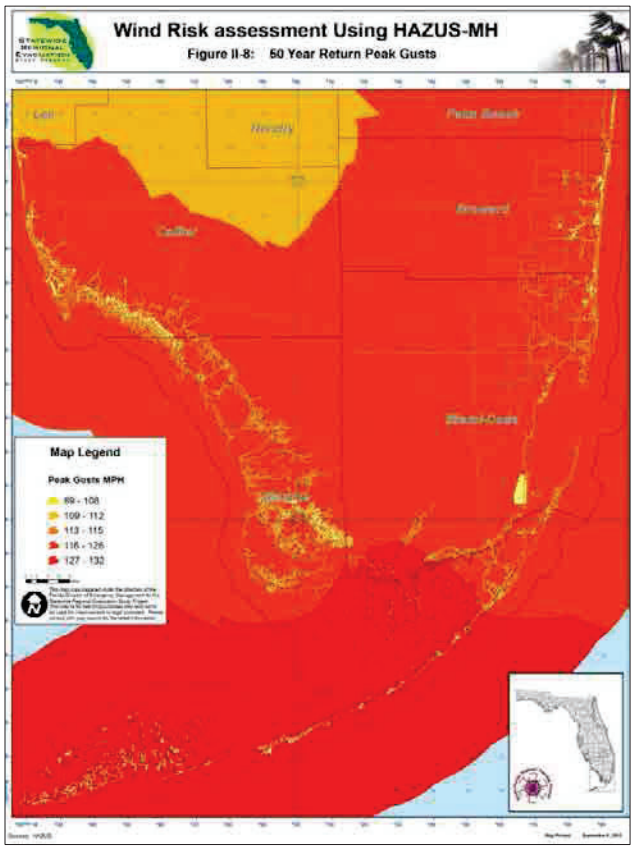
Damages associated with storm surge include but are not limited to:

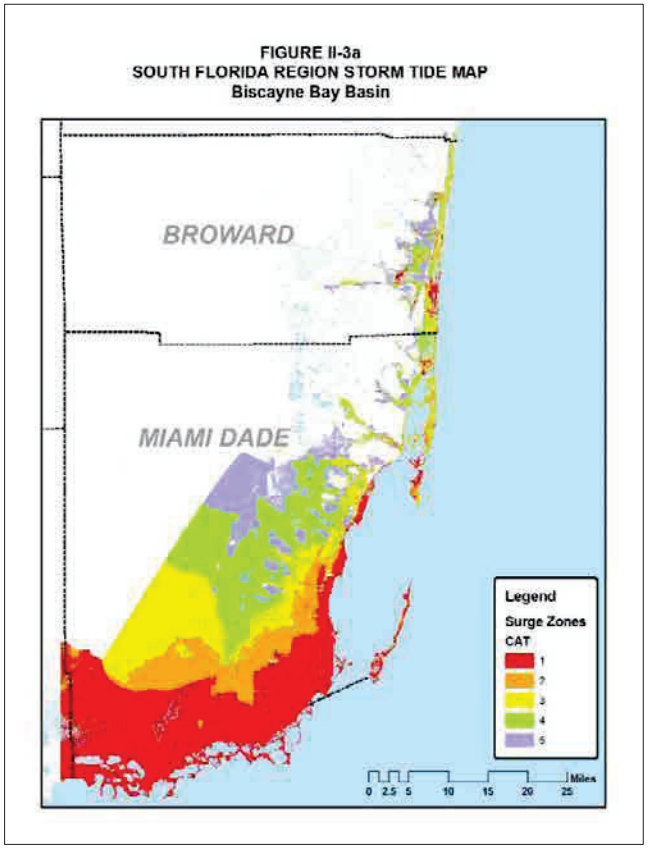
- Extreme flooding in coastal areas
- Inundation along rivers and canals
- Beach erosion
- Undermining of foundations of structures or roadways along the coastline (erosion or scour)
- In confined harbors and rivers, severely damaged marinas and boats
- Sunken vessels or underwater hazards in navigable waterways

Location

The entire County is vulnerable to hurricanes and tropical storms. In 2010 The State of Florida provided new Sea Lake Overland Surge from Hurricanes (SLOSH) data to Miami-Dade County that included higher resolution basin data and grid configurations. Faster computer speeds allowed additional hypothetical storms to be run for creation of the maximum potential storm surge values for each category of storms. The State also mapped the areas using remote-sensing laser terrain mapping (Light Imaging Detection and Ranging) (LIDAR).

Figure 5. 50 year return for maximum sustained winds (Left) & Potential storm surge for storms modeled within the Biscayne Bay basin (right)





Extent

The most recent Category 5 hurricane to hit Miami-Dade County was Hurricane Andrew in 1992.

The Atlantic hurricane season is June 1 – November 30; the peak of the season is from mid-August to late October. The majority of hurricanes and tropical storms occur during this time period, however storms can form before or after the season. Most hurricanes live no more than a few weeks. They will break apart within a few days upon traveling over cold water or land.

Hurricanes and tropical storms can usually be predicted several days before making land-fall. A tropical storm or hurricane watch is issued 48 hours in advance of anticipated onset of tropical storm or hurricane force winds; dangerous conditions are possible within the specified area. A tropical storm or hurricane warning is issued 36 hours in advance of anticipated tropical storm or hurricane force winds; dangerous conditions are expected within the specified area. This advance warning time allows for the community to prepare for the potential event and engage in protective measures to reduce the impact.

Impact

Impact to Miami-Dade County Residents

Because Miami-Dade County has the highest likelihood in the state for being hit by a hurricane, the entire county population is vulnerable. Specifically, mobile/manufactured home residents, electric dependent, functional needs and persons who may not have adequate resources to protect their homes or access to evacuation resources are at greatest risk for this hazard. Visitors and persons who are new to this area may also be more vulnerable as they may not be familiar with what to do in case an evacuation order is given. Prolonged power outages and gas shortages cause additional challenges to businesses and service providers and can disproportionately impact persons who rely upon regular home services such as medical services or food delivery.

Consequences related to the public following a hurricane or tropical storm may include:

- Temporary/permanent loss of employment/business income, causing an increased need for loans
- Temporary loss of water services/utilities, requiring alternate means to address immediate needs
- Increased need for medical care, causing a potential surge at local hospitals
- Temporary/permanent loss of residence, causing an increased need for shelter, short-term or long-term housing

Impact to Essential Facilities and Other Property

The entire built environment (Critical Infrastructure, Key Resources, and Building Stock) may be vulnerable to hurricanes and tropical storms due to wind, rain and/or storm surge damages. Structures that do not have impact resistant features or protection that can be installed may be more vulnerable to winds. Mobile/manufactured homes and high-rise buildings may also be more vulnerable to wind impacts. Coastal areas and areas along canals and rivers, as depicted in the storm surge map, may be more vulnerable to surge. Coastal areas are at greater risk for high velocity surge and erosion. Low lying areas are more vulnerable to flooding if a storm brings a lot of rain. Uprooted trees can cause damages to underground and overhead utilities. Hurricanes and tropical storms may also cause flying debris that cause additional damages. These storms can also impact natural and agricultural resources as well, causing severe coastal erosion and flooding or wind damage to agricultural assets. The extent of debris and infrastructure outages and restoration times can complicate and increase response and recovery timelines.

Consequences related to essential facilities and property following a hurricane or tropical storm may include:

- Business/service interruption, causing an impact to the local economy as well as individual households.
- Loss of building function (e.g., damaged homes will no longer be habitable, causing residents to seek shelter).

Impact to Critical Infrastructure

During a hurricane or tropical storm, the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Because the county's entire infrastructure is equally vulnerable, it is important to emphasize that any number of these structures could become damaged during a hurricane or tropical storm. The impacts to these structures include broken, failed, or impassable roadways, broken or failed utility lines (e.g., loss of power or gas to community), and railway failure from broken or impassable railways. Bridges could fail or become impassable, causing risk to traffic.

Consequences related to critical infrastructure following a hurricane or tropical storm may include:

- Disruption in the transportation of goods
- Disruption in the public transportation
- Shortage of fuel or other essential materials

Impact to Environment

Hurricanes and tropical storms play a significant role on the impact of the environment. The strong winds and flooding that this natural hazard produces can uproot plants, harm wildlife, and devastating natural landscape. These storms can damage or destroy energy, chemical, gas facilities, and other businesses that can cause a release of harmful contaminants.

Consequences related to the environment following a hurricane or tropical storm may include:

- Trees and plants can be uprooted and diseases in the soil are spread, impacting wildlife and their habitat.
- Polluted waters cause unsafe drinkable water.
- Increased livestock and wildlife mortality rates.

Previous Occurrences

August 2020 – A low pressure system moving across the tropical Atlantic into the eastern Caribbean Sea formed into Tropical Storm Isaias on July 28th. While the system briefly became a hurricane near Great Inagua Island on July 30th, it was downgraded back to a Tropical Storm as it moved over Andros Island on August 1st with a minimum central pressure of 993 mb. Isaias gradually turned to the N-NW and the center passed about 30-40 miles east of the Palm Beach County coast during the morning of August 2nd with a minimum central pressure of 995 mb and maximum sustained winds of 65 to 70 mph. Sustained Tropical Storm force winds were felt across portions of Palm Beach, Broward, and Miami-Dade Counties. Rainfall flooding impacts were minor across South Florida with 2 to 2.6 inches measured mainly across Miami-Dade and Broward counties. Almost 3,000 customers lost power during the event, almost all of them in Palm Beach County.

October 2017 – Tropical Storm Philippe was a disorganized storm as it moved across the Florida Straits on October 28th, making landfall in extreme South Florida along the Florida Bay on October 29th as a minimal tropical storm.

The storm brought widespread rainfall across all South Florida, with average amounts of 2 to 4 inches across the region. The wind impacts of Philippe were limited to the east coast of South Florida. This storm produced maximum sustained winds generally between 25 and 35 mph across Miami-Dade County on October 28th. A peak gust of 41 mph was measured at Miami International Airport. Minor tree damage was reported across the area, with no significant property damage reported.[32]

September 2017 – On August 30th, Tropical Storm Irma formed over the eastern Atlantic Ocean with maximum sustained winds of 50 mph. As the day progressed, Tropical Storm Irma continued strengthening and was expected to become a hurricane the following day. Irma's rapid intensification began in the early morning of August 31st, when the maximum sustained winds increased from 70 mph to 115 mph in less than 12 hours. Hurricane Irma, now a category 3 storm, continued its track across the Atlantic Ocean, as it headed towards the Leeward Islands. In the afternoon of September 4th, Miami-Dade County was within the 5-day forecast cone of a major hurricane. Due to the potentially catastrophic hurricane heading to Miami-Dade County, Miami-Dade DEM initiated preparations and activated the Emergency Operations Center (EOC) on September 5th. By the evening, Miami-Dade County was within the 3-day forecast cone.

In the morning of September 5th, less than 300 miles east of the Leeward Islands, Irma became a category 5 hurricane with maximum sustained winds of 175 mph. Catastrophic Hurricane Irma reached its peak strength later that day, with maximum sustained winds

[32] National Oceanic and Atmospheric Administration, National Climatic Data Center, Storm Events Database: https://www.ncdc.noaa.gov/stormevents/

of 185 mph. For the next couple of days, Hurricane Irma wreaked havoc in Barbuda, Saint Barthélemy, Saint Martin, Anguilla and the Virgin Islands at its peak intensity causing catastrophic damage. Hurricane Irma continued its course through the Caribbean causing widespread damage in Puerto Rico, Hispaniola, Turks and Caicos, the Bahamas and Cuba. At 11pm on September 7th, Miami-Dade County was under a Hurricane Warning and Storm Surge Warning.

On Sunday, September 10th, category 4 Hurricane Irma made its first Florida landfall at Cudjoe Key in the lower Florida Keys at 9:10am. Hurricane Irma continued its northward track and made its second Florida landfall at Marco Island at 3:35pm as a category 3 hurricane. Widespread wind damage, heavy rainfall and storm surge was reported throughout Miami-Dade County. Hurricane and tropical storm force sustained winds were measured throughout the county and resulted in mostly tree damage. Rainfall amounts from September 9th through September 11th were between 5 and 10 inches. Recorded storm surge on Biscayne Bay (from south of Miami to Homestead) was between 4 and 6 feet, and on the east coast was between 2 and 4 feet. Also, an estimated $255 M in agricultural damage was reported in the county. Hurricane Irma was the first hurricane to make landfall in South Florida since Hurricane Wilma in 2005.

October 2016 – In the morning of September 28th, 2016, Tropical Storm Matthew formed over the Windward Islands with a high potential of strengthening. Matthew continued a westward track through the Caribbean and strengthening into a hurricane the next day on September 29th. On the forecast track, Hurricane Matthew would move west followed by a northwest turn and a then continue a northward track through western Haiti and eastern Cuba. On the evening of September 30th, Miami-Dade County was within the 5-day forecast cone of Category 5 Hurricane Matthew. Two days later, Miami-Dade County was not within the cone, but Miami-Dade DEM continued to be vigilant due to the storm's track potential to shift west. On Monday, October 3rd, the forecast track took a drastic westward shift putting Miami-Dade County within the 3-day forecast cone of a major hurricane. The following day, Miami-Dade County was under a Tropical Storm Warning.

Ultimately, the county was affected by the outside bands of Hurricane Matthew, as it continued its paralleled track along the Florida east coast. Rainfall amounts of up to 1.5 inches were recorded throughout the County. Although, no significant damage was reported, Miami-Dade agencies and municipalities estimated $10M for public assistance eligible categories.

August 2012 – Tropical Storm Isaac moved across the Florida Keys and Miami-Dade experienced a storm surge measured at 1.3 feet and sustained winds measuring 29 mph at the Miami International Airport. In a 72-hour period portions of the county received between 2-10 inches of rain. Wind damage in southern Florida was minor and mostly limited to downed trees and power lines.[33] Approximately 26,000 customers lost power in Miami-Dade. There was no Presidential Declaration for damages within Miami-Dade.

[33] National Hurricane Center, Tropical Cyclone Report Hurricane Isaac (AL092012)

Miami-Dade agencies and municipalities estimated $5.5 M for public assistance eligible categories.[34]

October 2012 – Hurricane Sandy never made landfall locally, but paralleled the coast causing coastal erosion with reports of waves up to 10 feet in Miami-Dade. There was no Presidential Declaration for damages within Miami-Dade. It was estimated by the Miami-Dade Regulatory and Economic Resources Department that there was approximately $2M in damages from coastal erosion.[35]

October 2005 – Hurricane Wilma, made landfall in southwestern Florida on October 24th as a Category 3, crossing Florida in less than 5 hours.[36] Wilma caused structural damage from hurricane force winds out to the west and southwest. Widespread light to moderate wind damage was sustained throughout the county. In downtown Miami, numerous high-rise office buildings were severely impacted by hurricane force winds. The Miami Metromover was closed due to falling debris from a neighboring high-rise building. Power outages occurred county-wide for three weeks due to damaged power lines and utility poles. Power losses to service station fuel pumps caused a major but temporary impact on recovery operations. Wind damage to trees and shrubs (native and ornamental) was extensive throughout the county. Ficus trees and Australian Pines sustained most of the tree damage, while palms appeared to fare well. Throughout the Biscayne Bay area there was significant marine damage. Many boats were blown up into bulkheads, docks, and overpasses. Some vessels were freed from their moorings and deposited hundreds of feet from where they were originally docked. The Port of Miami sustained damage to roughly 2,000 feet of bulkheads and a cruise terminal lost a section of its roof. The Sunny Isles Marina dry storage facility collapsed, damaging close to 300 vessels. Numerous docks and pilings throughout the county were severely damaged by the battering of vessels that were moored to them. On the barrier islands, there was sporadic minor to moderate wind damage to ocean front high-rise condominiums, low-rise motels, commercial buildings, and single-family dwellings. The typical wind damages were broken windows, damaged hurricane shutters, and minor roofing losses.

August 2005 – Hurricane Katrina, made landfall in Miami-Dade County on August 25th. Rainfall amounts were excessive across portions of south Miami-Dade County causing flooding of structures, vehicles, crop lands and nurseries. A maximum storm total amount of 16.33 inches, of which 15.10 inches fell in a 24-hour period, was measured by a cooperative observed in Perrine. Other heavy storm total amounts in south Miami-Dade County included 14.04 inches at Homestead Air Reserve Base, 12.25 inches near Florida City and 11.13 inches near Cutler Ridge. Most of the remainder of metropolitan Miami-Dade County generally received rain amounts of two to four inches. Total damage in south Florida was estimated at around $100 million. Between 100 and 200 houses suffered significant damage, mainly in south Miami-Dade County due to flooding. Wind

[34] Miami-Dade County EOC Activation Archive
[35] Miami-Dade County EOC Activation Archive
[36] National Hurricane Center, Tropical Cyclone Report Hurricane Wilma

damage was mainly to vegetation, signs, and watercraft. Winds and flooding combined caused an estimated $423 million in losses to agriculture and nurseries. A total of six persons are known to have died directly because of the winds and water, all in Miami-Dade County. Three of those were associated with drowning, two on boats and one under unknown circumstances.

August 1992 – Hurricane Andrew, which was reclassified as a Category 5 in 2002, made landfall in Miami-Dade County on August 24th, 1992. Damage was estimated at $25 billion, with 25,524 homes destroyed and 101,241 damaged. 90% of all mobile homes in the southern portion of the county were destroyed. The Miami Herald reported $.5 billion losses for boats. The powerful seas extensively damaged offshore structures, including the artificial reef system.[37]

TABLE 6A-42 PRESIDENTIALLY DECLARED HURRICANE AND TROPICAL STORM EVENTS IN MIAMI-DADE COUNTY

Disaster Type	Disaster Number	Title	Incident Begin Date	Declaration Date	Incident End Date	Disaster Close Out Date
DR	209	HURRICANE BETSY	9/14/1965	9/14/1965	9/14/1965	5/18/1967
DR	955	HURRICANE ANDREW	8/24/1992	8/24/1992	8/25/1992	5/5/2009
EM	3131	HURRICANE GRORGES	9/25/1998	9/25/1998	10/2/1998	5/5/2009
EM	3143	HURRICANE FLOYD EMERGENCY DECLARATIONS	9/14/1999	9/14/1999	9/16/1999	5/15/2012
DR	1306	FL-HURRICANE IRENE-DR-REQ	10/14/1999	10/20/1999	10/24/1999	
EM	3150	TROPICAL STORM IRENE	10/14/1999	10/15/1999	10/19/1999	4/26/2010
DR	1539	TROPICAL STORM BONNIE AND HURRICANE CHARLEY	8/11/2004	8/13/2004	8/30/2004	
DR	1545	HURRICANE FRANCES	9/3/2004	9/4/2004	10/8/2004	
DR	1561	HURRICANE JEANNE	9/24/2004	9/26/2004	11/17/2004	
DR	1602	HURRICANE KATRINA	8/24/2005	8/28/2005	9/6/2005	
EM	3220	HURRICANE KATRINA EVACUATION	8/29/2005	9/5/2005	10/1/2005	7/3/2012
EM	3259	TROPICAL STORM RITA	9/18/2005	9/20/2005	10/23/2005	
DR	1609	HURRICANE WILMA	10/23/2005	10/24/2005	11/18/2005	
EM	3377	HURRICANE MATHEW	10/3/2016	10/6/2016	10/19/2016	
DR	4337	HURRICANE IRMA	9/4/2017	9/10/2017	10/18/2017	
EM	3385	HURRICANE IRMA	9/4/2017	9/5/2017	10/18/2017	
EM	3419	HURRICANE DORIAN	8/28/2019	8/30/2019	9/9/2019	

[37] National Hurricane Center, Preliminary Report Hurricane Andrew

Disaster Type	Disaster Number	Title	Incident Begin Date	Declaration Date	Incident End Date	Disaster Close Out Date
EM	3533	HURRICANE ISAIAS	7/31/2020	8/1/2020	8/4/2020	
DR	4680	HURRICANE NICOLE	11/7/2022	12/13/2022	11/30/2022	
DR	4673	HURRICANE IAN	9/23/2022	9/29/2022	11/4/2022	
DR	4834	HURRICANE MILTON	10/5/2024	10/11/2024	11/2/2024	

Source: data.gov, FEMA Disaster Declarations Summary

Vulnerability

Based on scores from the Hazard Impact Analysis found in the THIRA and summarized on the table below, Miami-Dade County has a high overall vulnerability to hurricanes.

Hurricane/Tropical Storm			
Category		Vulnerability*	Risk*
Social (People, etc.)	Special Populations	Vulnerable	High
	Cultural Conditions	Somewhat Vulnerable	Medium
	Socioeconomic Conditions	Vulnerable	High
Physical (Property, etc.)	Critical Infrastructure	Somewhat Vulnerable	Medium
	Key Resources	Vulnerable	High
	Building Stock	Vulnerable	High
Community Conditions (Environment, Operations, etc.)	Economic Conditions	Vulnerable	High
	Social Conditions	Vulnerable	High
	Environmental Conditions	Somewhat Vulnerable	Medium
	Governmental Conditions (inc. Operations)	Somewhat Vulnerable	Medium
	Insurance Conditions	Somewhat Vulnerable	Medium
	Community Organizations	Vulnerable	High

**Vulnerability ratings take in consideration baseline vulnerabilities described in THIRA Volume 2 with adjustment based on this specific hazard. Risk ratings consider probability & frequency, potential magnitude & scale, vulnerabilities, potential impacts, capabilities, and mitigation efforts related to this specific hazard.*

Physical Vulnerabilities

The entire built environment (Critical Infrastructure, Key Resources, and Building Stock) may be vulnerable to hurricanes and tropical storms due to wind, rain and/or storm surge damages. Structures that do not have impact resistant features or protection that can be installed may be more vulnerable to winds. Homes that were built under older building codes and standards may be more vulnerable to wind damages. Per the HAZUS conducted by the State of Florida in 2018, Miami-Dade has the following physical vulnerabilities.

HAZUS estimates that in 2019 there are 575,844 buildings in the region which have an aggregate total replacement value of $213 billion. Table 8 presents the relative distribution of value with respect to the general types of occupancies.

Coastal areas and areas along canals and rivers, as depicted in the storm surge map, are more vulnerable to surge. Coastal areas are at greater risk for high velocity surge and erosion. Low lying areas are more vulnerable to flooding if a storm brings significant rainfall. Uprooted trees can cause damage to underground and overhead utilities. Hurricanes and tropical storms may also cause flying debris that cause additional damage. These storms can also impact natural and agricultural resources as well, causing severe coastal erosion and flooding or wind damage to agricultural assets. The extent of debris and infrastructure outages and restoration times can complicate and increase response and recovery timelines. Part 5 provides tables that show how many Commercial, Industrial, Residential and Other types of structures are within Storm Surge Planning Zones.

TABLE 8. BUILDING EXPOSURE BY OCCUPANCY TYPE

Occupancy	Exposure ($1,000)	Percent of Total
Residential	140,918,020	66.1%
Commercial	36,916,484	17.3%
Industrial	2,273,279	1.1%
Agricultural	905,243	0.4%
Religious	2,731,747	1.3%
Government	20,608,864	9.7%
Education	8,935,765	4.2%
Total	**213,289,402**	**100.0%**

Essential Facility Inventory

For essential facilities, there are 38 hospitals in the region with a total bed capacity of 10,829 beds. There are 512 schools, 109 fire stations, 67 police stations and 6 emergency operation facilities.[38]

Mobile/Manufactured Homes

There are currently 59 mobile home parks within Miami-Dade County. On an annual basis the Miami-Dade County Office of Emergency Management assesses these sites. This assessment verifies their location and the total number of mobile homes are on-site.

TABLE 9. MOBILE HOME PARKS IN MIAMI-DADE COUNTY[39]

NAME	ADDRESS	CITY	ZIP CODE	PHONE	TOTAL UNITS	TYPE
All Star 36th Street Mobile	3010 NW 36 ST	Miami-Dade	33142	305-557-1122	53	MHP

[38] 2018 HAZUS Report for Miami-Dade County
[39] Miami-Dade DEM 2019 Mobile Home List

NAME	ADDRESS	CITY	ZIP CODE	PHONE	TOTAL UNITS	TYPE
Americana Village Mobile Home Park	19800 SW 180TH AVE	Miami-Dade	33187	305-253-6025	525	MHP
Aquarius Mobile Home Park	451 SE 8TH ST	Homestead	33030	305-248-9383	190	MHP
Biscayne Breeze Trailer Park	11380 BIS-CAYNE BLVD	Miami-Dade	33181	786-220-7482	61	MHP
Blue Belle Trailer Park	3586 NW 41ST ST	Miami-Dade	33142	305-635-1755	150	MHP
Boardwalk Mobile Home Park	100 NE 6TH AVE	Homestead	33030	305-248-2487	166	MHP
Carleys Mobile Home Park	4111 NW 37TH AVE	Miami-Dade	33142	305-315-8311	70	MHP
Cocowalk Estates Trailer Park	220 NE 12TH AVE	Homestead	33030	305-246-5867	218	MHP
Colonial Acres Mo-bile Home Park	9674 NW 10TH AVE	Miami-Dade	33150	305-696-6231	296	MHP
Courtly Manor Mo-bile Home Park	12401 W OKEECHOBEE RD	Hialeah Gar-dens	33018	305-821-1400	525	MHP
Gables Trailer Park	825 SW 44TH AVE	Miami-Dade	33134	305-903-2000	95	MHP
Gateway Estates Mobile Home Park	35250 SW 177TH CT	Miami-Dade	33034	305-247-8500	222	MHP
Gateway West Mobile Home Park	35303 SW 180TH AVE	Miami-Dade	33034	305-246-5867	120	MHP
Gator Park RV Campground	24050 SW 8TH ST	Miami-Dade	33194	305-559-2255	30	RV
Goldcoaster Mo-bile Home Park	34850 SW 187TH AVE	Homestead	33034	305-248-5462	547	MHP
Hibiscus Trailer Park	3131 W 16TH AVE	Hialeah	33012	305-755-3942	34	MHP
Highland Village Park Mobile Home Park	13621 HIGH-LANDS DR	North Miami Beach	33181	305-948-2928	500	MHP
Holiday Acres Mo-bile Home Park	1401 W 29TH ST	Hialeah	33012	305-822-4611	84	MHP
Homestead Trailer Park	31 SE 2ND RD	Homestead	33030	305-247-4021	50	MHP
Honey Hill Mobile Home Park	4955 NW 199TH ST	Miami-Dade	33055	305-625-9255	438	MHP
J Bar J Trailer Ranch	2980 NW 79TH ST	Miami-Dade	33147	305-691-2432	99	MHP
Jones Fishing Camp Trailer Park	14601 NW 185TH ST	Miami-Dade	33018	954-536-7400	52	MHP
Larry and Penny Thompson Memo-rial Park	12451 SW 184TH ST	Miami-Dade	33177	305-232-1049	240	RV
Lil' Abner Mobile Home Park	11239 NW 4TH TER	Sweetwater	33172	305-221-7174	908	MHP

NAME	ADDRESS	CITY	ZIP CODE	PHONE	TOTAL UNITS	TYPE
Little River Mobile Home Park	215 NW 79th ST	Miami-Dade	33150	786-766-9385	76	MHP
Medley Lakeside Mobile Home Park	10601 NW 105TH WAY	Medley	33178	305-888-3322	86	MHP
Medley Mobile Home Park,	8181 NW SOUTH RIVER DR	Medley	33166	305-885-7070	206	MHP
Miami Everglades Campground	20675 SW 162ND AVE	Miami-Dade	33187	305-233-5300	330	RV
Miami Heights Mobile Home Park	3520 NW 79TH ST	Miami-Dade	33147	305-691-2969	140	MHP
Miami Soar Mobile Home Park	8202 NW Miami CT	Miami-Dade	33150	754-465-5410	352	MHP
Palm Garden Mobile Home Park	28501 SW 152ND AVE	Miami-Dade	33033	305-247-8915	275	MHP
Palm Garden RV Park	28300 SW 147TH AVE	Miami-Dade	33033	305-247-8915	39	RV
Palm Lake Mobile Home Park	7600 NW 27TH AVE	Miami-Dade	33147	305-696-1920	118	MHP
Palmetto Estates Mobile Home Park	3205 W 16TH AVE	Hialeah	33012	754-219-9217	95	RV
Princetonian Mobile Home Park	12900 SW 253RD TER	Miami-Dade	33032	305-257-3251	200	MHP
Redlands Mobile Home Park	17360 SW 232ND ST	Miami-Dade	33170	305-247-7707	80	MHP
Riviera Mobile Home Park	19900 NW 37TH AVE	Miami Gardens	33055	305-624-5888	162	MHP
Rovell Trailer Park	939 NW 81ST ST	Miami-Dade	33150	305-586-7045	138	MHP
Royal Country Trailer Park	5555 NW 202ND TER	Miami Gardens	33055	305-621-2270	864	MHP
Royal Duke Trailer Park	3620 NW 30TH AVE	Miami-Dade	33142	786-719-8990	99	MHP
Shady Oaks Mobile Home Park	14701 NE 6TH AVE	Miami-Dade	33161	305-507-7528	25	MHP
Silver Court Trailer Park	3170 SW 8TH ST	Miami	33135	305-649-8941	236	MHP
Silver Palm Place Mobile Home Park	17350 SW 232ND ST	Miami-Dade	33170	941-202-1484	112	MHP
Sixth Ave Trailer Park	14752 NE 6TH AVE	Miami-Dade	33161	305-582-0867	22	MHP
Southern Comfort RV Resort	345 E PALM DR	Florida City	33034	305-248-6909	300	RV
Sunnyside Trailer Park	6024 SW 8TH ST	West Miami	33144	305-266-1727	105	MHP
University Lakes Mobile Home Park	12850 SW 14TH ST	Miami-Dade	33184	305-226-4251	1153	MHP
Westhaven Court Mobile Home Park	6020 SW 8TH ST	West Miami	33144	305-903-4791	21	MHP

NAME	ADDRESS	CITY	ZIP CODE	PHONE	TOTAL UNITS	TYPE
Westland Mobile Home Park	1175 NW 79TH ST	Miami-Dade	33150	305-557-1122	114	MHP
Wynken Blynken And Nod Mobile Home Park	2775 W OKEE-CHOBEE RD	Hialeah	33010	305-887-6570	186	MHP

Social Vulnerabilities

Mobile/manufactured home residents, electric dependent, functional needs and persons who may not have adequate resources to protect their homes or access to evacuation resources are at greatest risk for this hazard. Visitors and persons who are new to this area may also be more vulnerable as they may not be familiar with what to do in case an evacuation order is given. Prolonged power outages and gas shortages cause additional challenges to businesses and service providers and can disproportionately impact persons whom rely upon regular home services such as medical services or food delivery.

Frequency/Probability

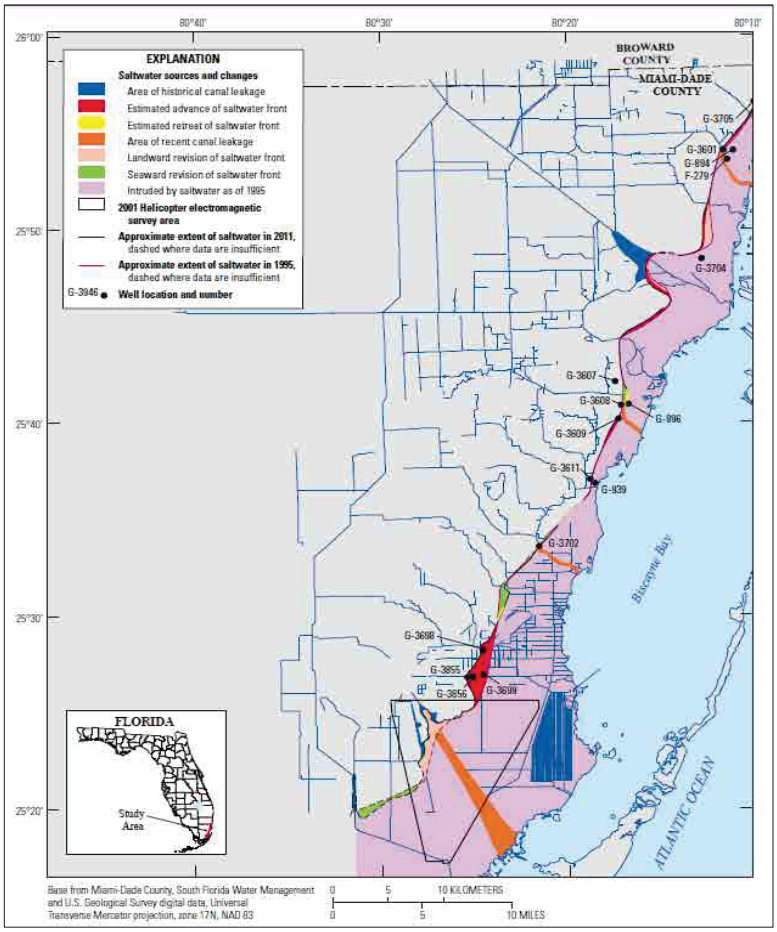
In the past 100 years, there have been approximately 340 hurricanes that have impacted the coast of Florida. Of these hurricanes, 70 have impacted Miami-Dade County. Miami-Dade County has a 1 out of 6 chance of being hit by a hurricane, the highest likelihood in the state. Florida not only leads the nation in number of hurricanes making landfall, but also the severity of those storms. Since 2015, there have been 4 Tropical Storms, 17 Tropical Depressions, and 2 Storm Surge incidents recorded in Miami-Dade County. This averaged out to approximately 4 and a half per year. Each hurricane and tropical storm event lasted for up to 2 to 6 days.

Saltwater Intrusion

Description

According to the United States Geological Survey (USGS), saltwater intrusion is a generic term referring to an influx of saltwater through various pathways into an aquifer. The South Florida Water Management District defines it as chloride concentrations exceeding drinking water standards of 250 mg/1. Saltwater Intrusion is a major threat to the freshwater resources of the coastal areas in southeastern Florida.

There are three primary mechanisms by which saltwater contaminates the freshwater reservoir in the unconfined, surficial aquifers of the region: (1) encroachment of saltwater from the ocean along the base of the aquifer; (2) infiltration of saltwater from coastal saltwater mangrove marshes: and (3) the flow of saltwater inland through canals where it leaked into the aquifer.



Saltwater intrusion has been a concern in Miami-Dade County since the early 1930s. The USGS has been monitoring saltwater intrusion in the county since 1939. The salt front was mapped in 1995 and again in 2011 (Prinos et al, 2014). Miami-Dade County is vulnerable to saltwater intrusion because the county "has low land-surface altitude and a low topographic gradient and is bordered to the east and south by sources of saltwater in the Atlantic Ocean, Biscayne Bay, and Florida Bay" (Prinos et al, 2014). The limestone beneath Miami-Dade is part of the unconfined, shallow and highly transmissive Biscayne Aquifer, and is highly vulnerable to contaminants, especially saltwater, along coastal areas and canals.

The inland movement of the saltwater interface into the Biscayne Aquifer is primarily due to the drainage of the Everglades by the canal system, which began in the early 20th century to make way for development, agriculture, and flood control (Leach et al, 1972),

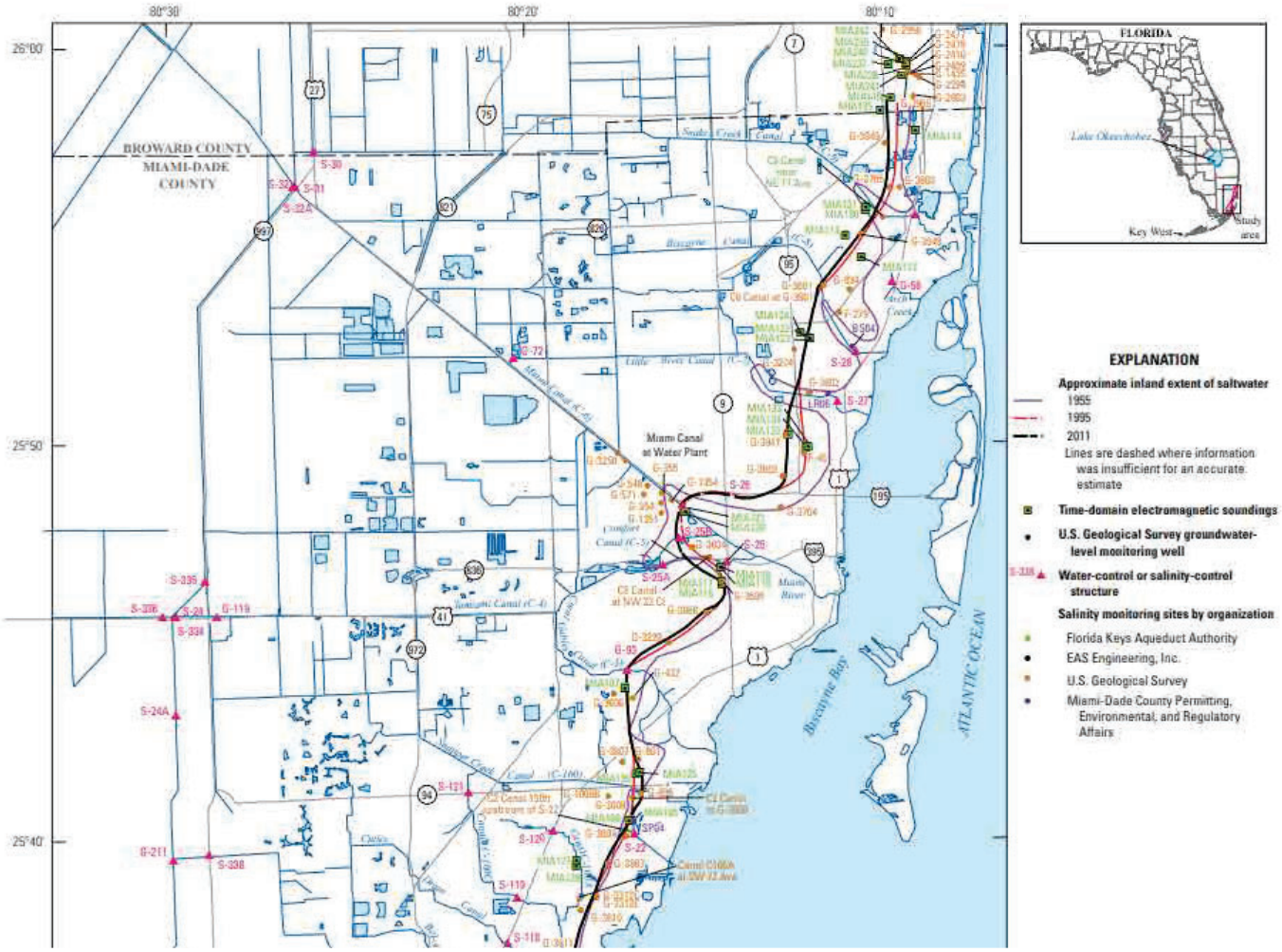
however other mechanisms also come into play including: “the upconing of relict or residual saltwater that had been incorporated in relatively impermeable sediments during previous sea-level high stands occurring during interglacial periods; the gradual encroachment of saltwater from the ocean along the base of the aquifer resulting from reductions in freshwater head relative to sea level rise; and the infiltration of saltwater from coastal saltwater mangrove marshes” (Prinos et al, 2014). The combined effects of natural and human factors are resulting in a diminishing freshwater supply and threatening the habitability of this region.

The Biscayne Aquifer supplies 99% of all groundwater withdrawn in Miami-Dade County to support the county’s growing population (Marella, 2009). As the population in Miami-Dade County grew in the 1970s and 1980s, groundwater withdrawals increased. However, beginning in the 1990s, groundwater withdrawals maintained at a constant level even as the population grew. Since the mid-2000s, Miami-Dade County’s population has continued to grow but groundwater withdrawals have actually decreased. This may be due to stricter water use policies that were enacted in May 2007 when water levels in Lake Okeechobee reached record lows.

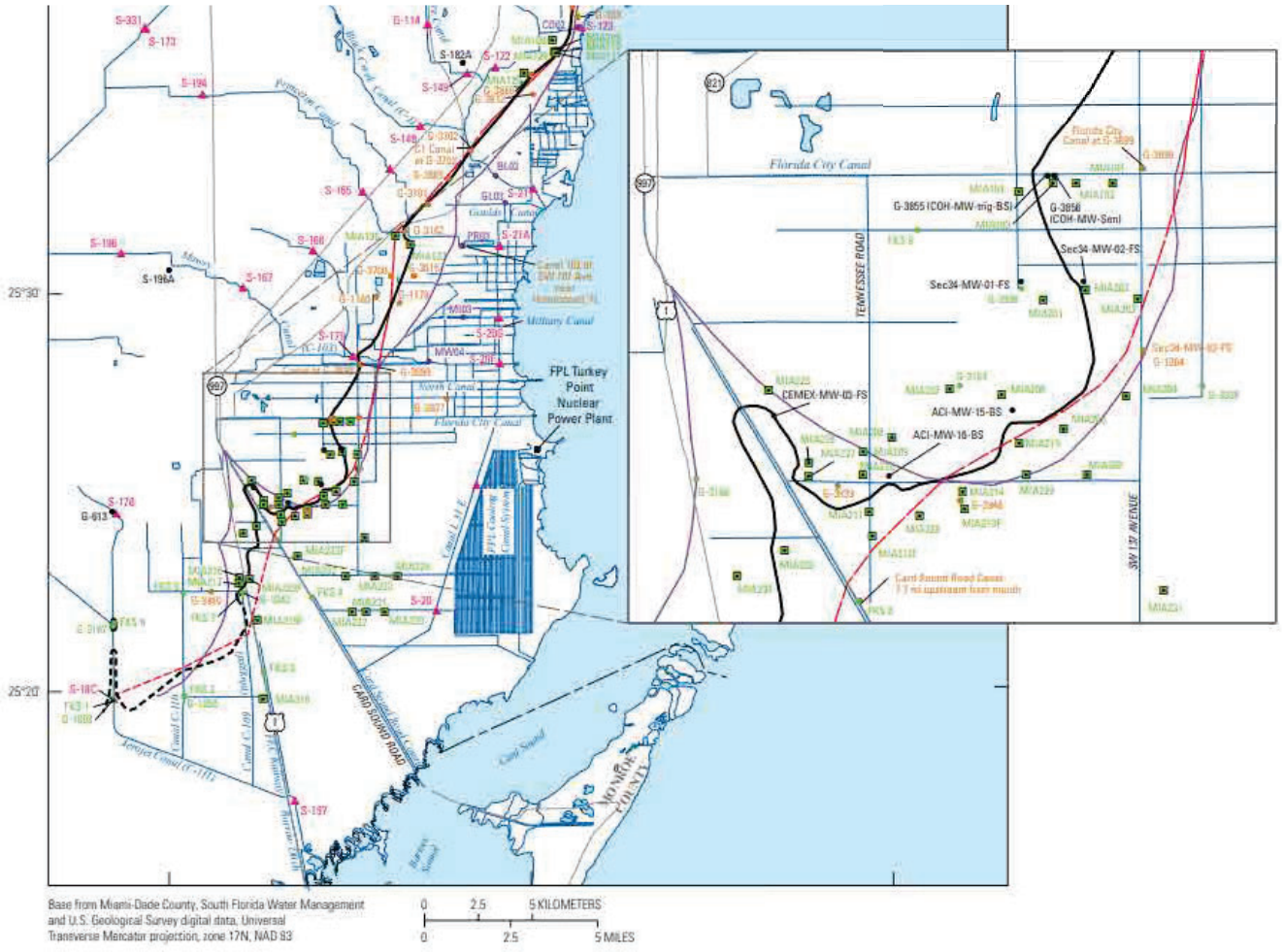
Location

The salt front is the farthest inland extent of saltwater intrusion in the aquifer. As show in Map 6A-40 on the next two pages, the salt front is not equally intruding along the coast of Miami-Dade County.

Map 6A-40


80°30'
80°20'
80°10'
26°00'
25°50'
25°40'
BROWARD COUNTY
MIAMI-DADE COUNTY
Miami Canal at Water Plant
Biscayne Bay
ATLANTIC OCEAN
FLORIDA
Lake Okeechobee
Key West
Study area
EXPLANATION
Approximate inland extent of saltwater
1955
1995
2011
Lines are dashed where information was insufficient for an accurate estimate
Time-domain electromagnetic soundings
U.S. Geological Survey groundwater-level monitoring well
Water-control or salinity-control structure
Salinity monitoring sites by organization
Florida Keys Aqueduct Authority
EAS Engineering, Inc.
U.S. Geological Survey
Miami-Dade County Permitting, Environmental, and Regulatory Affairs

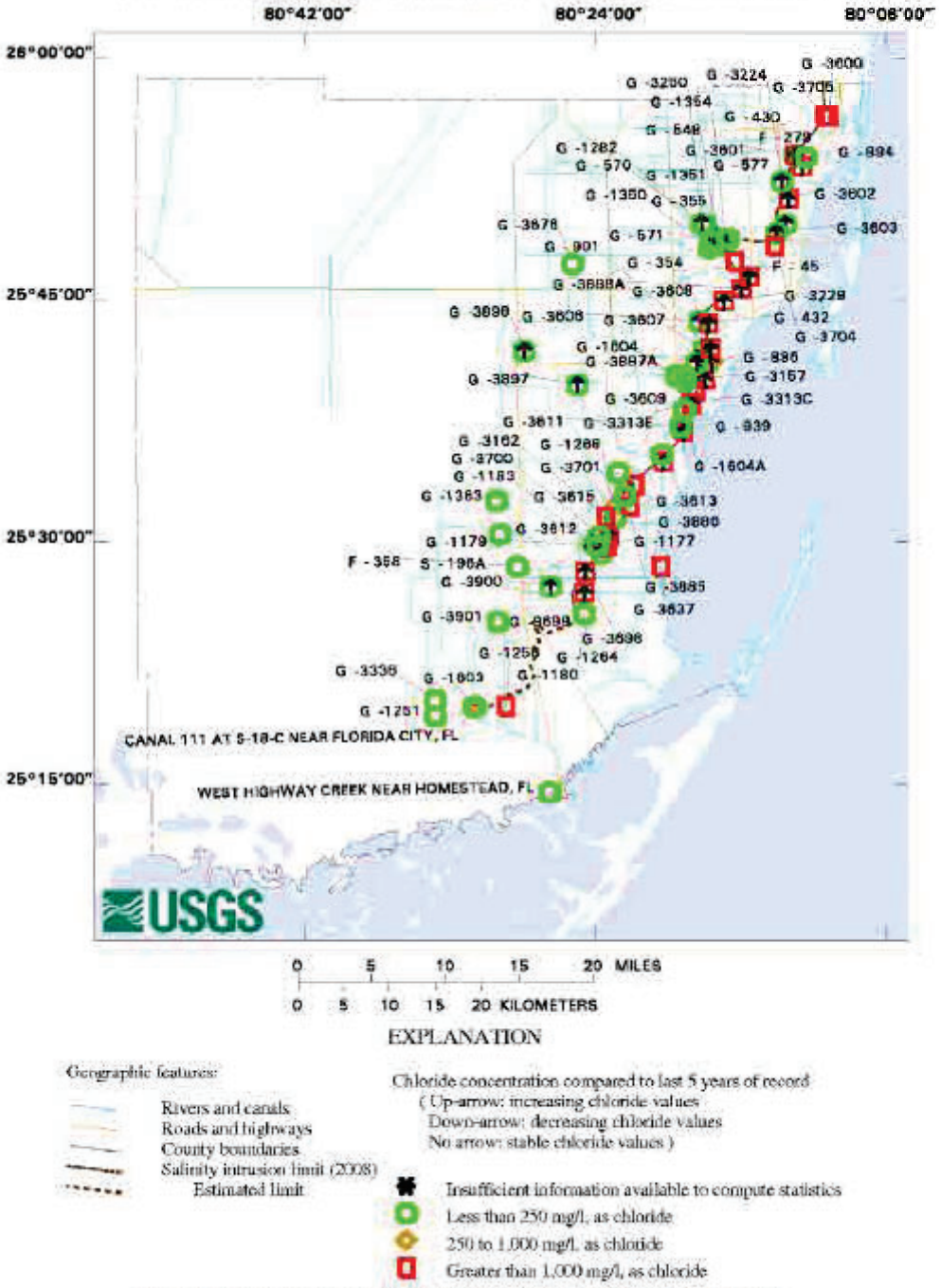
Map 6A-40



Map 6A-40: Locations of salinity monitoring sites, time-domain electromagnetic soundings, groundwater-level monitoring wells, and the mapped approximations of the inland extent of saltwater in the Biscayne aquifer in Miami-Dade and southern Broward Counties in 1955, 1995, and 2011.[40]

[40] USGS Origins and Delineation of Saltwater Intrusion in the Biscayne Aquifer and Changes in the Distribution of Saltwater in Miami-Dade County, Florida: https://pubs.usgs.gov/sir/2014/5025/pdf/sir2014-5025.pdf

MAP 6A-41 SALINITY AND CHLORIDE DATA IN MIAMI-DADE COUNTY



Chloride data from selected sites in Miami-Dade County, Florida,
Based on PROVISIONAL DATA, as of August 31, 2012.

Source: USGS, South Florida Water Management District

Extent

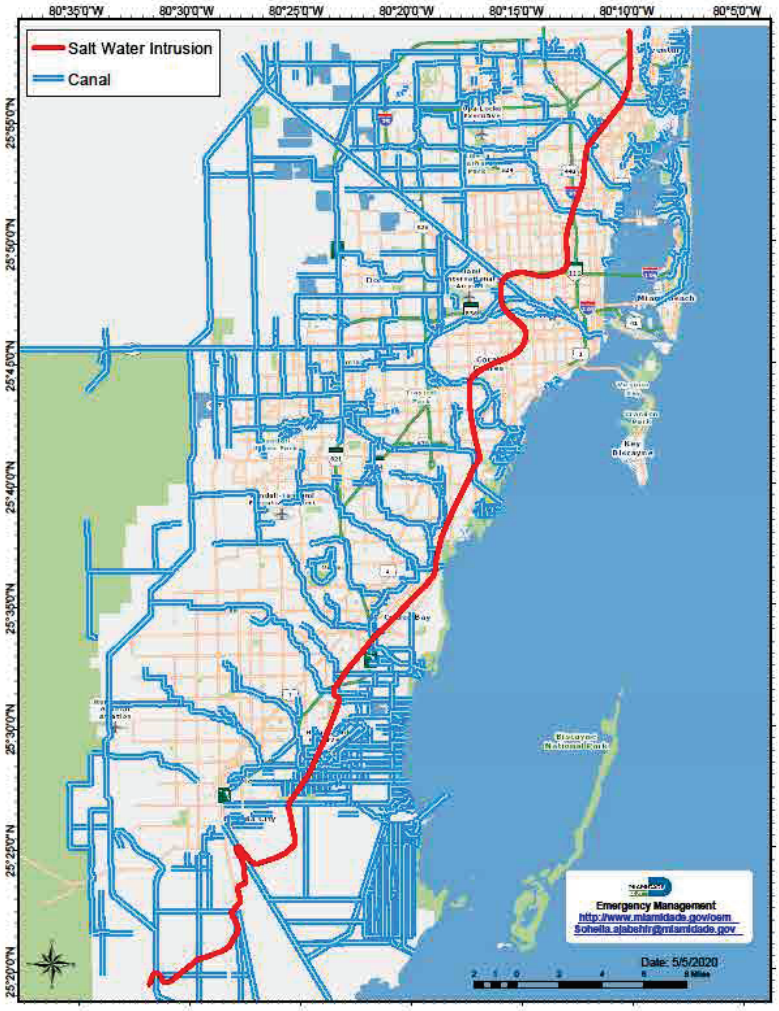
According to a 2011 USGS study, approximately 1,200 square kilometers of the mainland Biscayne aquifer has been intruded by salt water, however this intrusion has not been equally distributed around the county, with some areas experiencing increased intrusion and others receding salinity levels. Increased saltwater intrusion occurs most often during April or early May when water levels are typically at their lowest in Miami-Dade County. Additionally, there is a close correspondence between drought and saltwater intrusion (Prinos et al, 2014).

Since the 2011 USGS study, the saltwater inface continued to move inland and an updated map produced in 2016 depicts the approximate inland extent of saltwater at the base of the Biscayne aquifer. Miami-Dade County and the USGS are working together to monitor the saltwater intrusion extent inland along the east part of the county in order to be able to timely and effectively respond as needed.

Impact

Miami-Dade County is vulnerable to saltwater intrusion because the county "has low land-surface altitude and a low topographic gradient and is bordered to the east and south by sources of saltwater in the Atlantic Ocean, Biscayne Bay, and Florida Bay" (Prinos et al, 2014). Saltwater intrusion can affect the freshwater supply throughout the county dependent on the magnitude of intrusion.

This hazard typically does not affect essential facilities or critical infrastructure and other properties, however it may impact the amount and types of water control structures in the area to prevent saltwater intrusion.



Impact to Environment

According to the EPA, saltwater intrusion can and may diminish drinking water sources. Saltwater

intrusion can lead to groundwater degradation, causing water utilities to increase water treatment.

Consequences related to the environment following saltwater intrusion may include:

- The hazard may diminish the availability or quality of water sources for drinking water.

Previous Occurrences

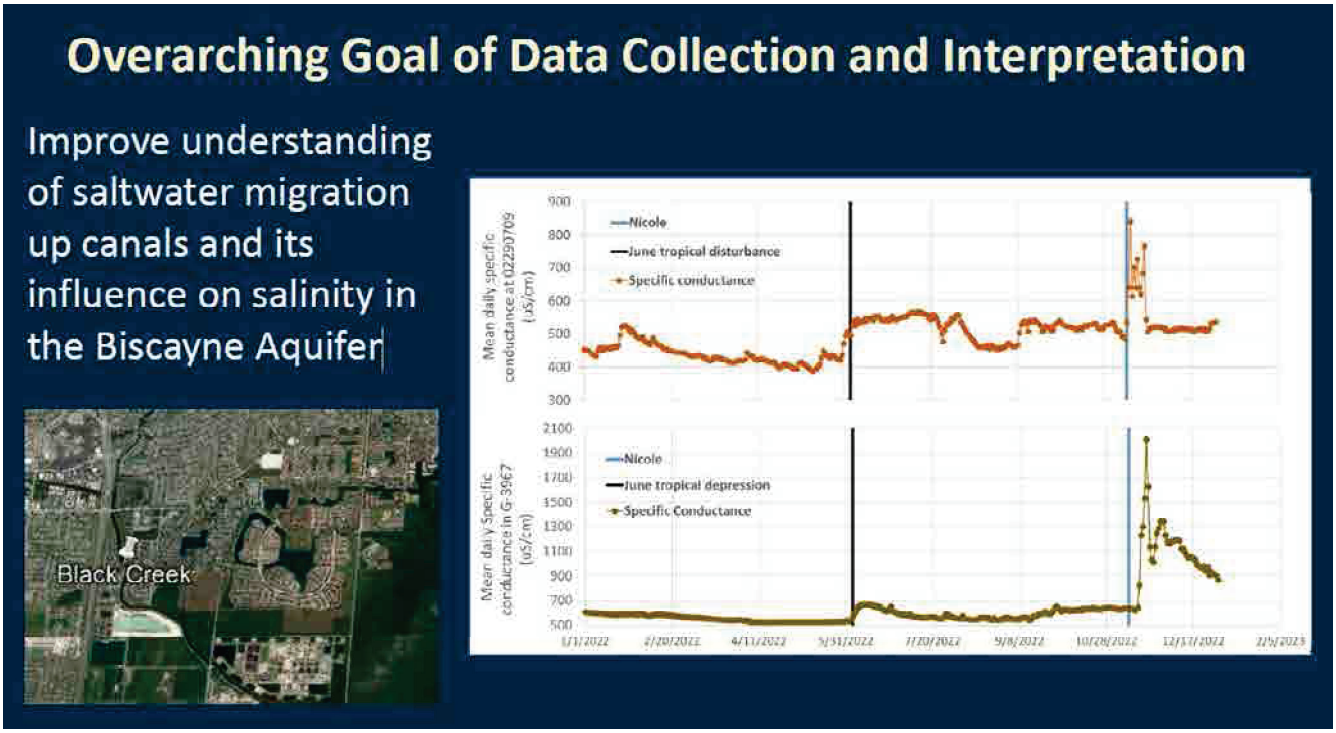
Saltwater intrusion has been monitored by the USGS since 1939. Per the USGS "in 1904 (prior to any human-induced drainage), the saltwater interface was estimated to be at or near the coast because of the very high-water levels which occurred naturally in the Everglades. Freshwater was reported to seep from the Biscayne aquifer offshore into Biscayne Bay in sufficient quantities to be used as a supply of freshwater for ships. Beginning in 1909 with the extension of the Miami River and continuing through the 1930's, construction of drainage canals (with no control structures) and pumpage from coastal well fields resulted in the lowering of water levels in the Biscayne aquifer, thereby inducing the inland movement of saltwater into the aquifer. Additionally, seawater driven by tides flowed inland in the drainage canals, resulting in the seepage of saltwater into the Biscayne aquifer from the canals. By 1946, salinity-control structures had been installed in all primary canals as far seaward as possible. These controls prevented saltwater driven by tidal changes from moving upstream in the canals beyond the controls. The controls also served to backup freshwater which maintained higher water levels in the Biscayne aquifer near the coastline. These water levels are higher than those that occurred during the period of uncontrolled drainage. The inland migration of saltwater in northern Miami-Dade County slowed or reversed in some areas because of the effects of these controls on water levels.

In the early 1960's, the existing canal system in southern Miami-Dade County was expanded to provide flood control. The canals were equipped with flow-regulation structures both near the coast and inland, allowing water levels to be stepped down from structure to structure to prevent excessive drainage. However, the design and operation of this system lowered freshwater levels in the Biscayne aquifer, especially near the coast, allowing for the inland movement of saltwater during the drought years of 1970 and 1971. In 1976, additional water was routed to southern Miami-Dade County, raising water levels along the coast and slowing or reversing the inland movement of the saltwater interface.

Since 1984, additional events have occurred which have affected water levels in the Biscayne aquifer and, hence, the movement of the saltwater interface. Among these events are the initial operation of the Northwest Well Field and a consequent reduction in pumping from the Hialeah-Miami Springs Well Field, expansion of the Southwest Well Field, and changes in the delivery schedule of water to southern Dade County and Everglades National Park. Future changes in water levels might occur as a result of changes in the

management of the ecosystem of south Florida. These changes will be based on the results of studies being conducted as part of the U.S. Geological Survey South Florida Ecosystem Program and other studies.

Per the USGS paper referenced previously, "some saltwater likely leaked from canals prior to the installation of water control structures. Near the Miami Canal northwest of the water control structure S-26, this saltwater is gradually mixing with the groundwater and salinity is gradually decreasing. Modern leakage of saltwater likely is occurring along the Card Sound Road canal and upstream of salinity control structures in the Biscayne, Black Creek and Snapper Creek Canals. Saltwater also may have leaked from the Princeton Canal and the canal adjacent to well G-3698, although this leakage could not be confirmed or refuted with available information." To better understand the saltwater infiltration through the canals, the USGS in cooperation with Miami-Dade, continues monitoring the salinity collecting data from canals, before, during and after weather events. There are known and documented peaks of saltwater moving in and out through the canals due to strong whether events. The graph below represents a USGS study done on the Black Creek Canal, which clearly shows peaks in salinity after two storms.



Vulnerability

Based on scores from the Hazard Impact Analysis found in the THIRA and summarized on the table below, Miami-Dade County has a medium overall vulnerability to saltwater intrusion.

Saltwater Instrusion			
Category		Vulnerability	Risk
Social (People, etc.)	Special Populations	Somewhat Vulnerable	Medium
	Cultural Conditions	Minimally Vulnerable	Low
	Socioeconomic Conditions	Minimally Vulnerable	Low
Physical (Property, etc.)	Critical Infrastructure	Minimally Vulnerable	Low
	Key Resources	Somewhat Vulnerable	Medium
	Building Stock	Minimally Vulnerable	Low
Community Conditions (Environment, Operations, etc.)	Economic Conditions	Minimally Vulnerable	Low
	Social Conditions	Minimally Vulnerable	Low
	Environmental Conditions	Vulnerable	Medium
	Governmental Conditions (inc. Operations)	Minimally Vulnerable	Low
	Insurance Conditions	Minimally Vulnerable	Low
	Community Organizations	Minimally Vulnerable	Low

**Vulnerability ratings take in consideration baseline vulnerabilities described in THIRA Volume 2 with adjustment based on this specific hazard. Risk ratings consider probability & frequency, potential magnitude & scale, vulnerabilities, potential impacts, capabilities, and mitigation efforts related to this specific hazard.*

Physical Vulnerabilities

The eastern part of Miami-Dade County is most vulnerable; however the salt front is not equally intruding along the coast of Miami-Dade County.

The SFWMD has identified “Utilities at Risk” for salt water intrusion, which include utilities with well fields near the saltwater/freshwater interface that do not have an inland well field, have not developed adequate alternative sources of water, and have limited ability to meet user needs through interconnects with other utilities; and “Utilities of Concern”, which include utilities having well fields near the saltwater/freshwater interface, the ability to shift pumps to an inland well field, or an alternative source that is not impacted by the drought (SFWMD, 2007). Miami-Dade WASD well fields included as “Utility at Risk” are South Miami-Dade Well fields (Newton, Elevated Tank, Naranja, Leisure City, Roberta Hunter Park and Caribbean Park). MDWASD Utilities of Concern include the North and Central Miami-Dade Well fields (Hialeah-Preston and Alexander Orr).

Well fields are at risk and as such protection areas have been delineated and are monitored. Saltwater intrusion can impact the rates at which groundwater is pumped to supply drinking water supplies and may require deeper wells to be drilled. Agricultural crops may be impacted by the salinity levels. Saltwater intrusion can also displace the fresh groundwater thereby impacting the water-table elevations in urban areas levels that could increase localized flooding.

Social Vulnerabilities

This hazard does not tend to affect one population over another.

Frequency/Probability

Since 2016, the inland extent of saltwater at the base of the Biscayne aquifer continues to move inland. Increased saltwater intrusion occurs most often during April or early May when water levels are typically at their lowest in Miami-Dade County.

Sea Level Rise

Description

Sea Level Rise refers to the increase currently observed in the average Global Sea Level Trend, which is primarily attributed to changes in ocean volume due to two factors: ice melt and thermal expansion. Melting of glaciers and continental ice masses, such as the Greenland ice sheet, which are linked to changes in atmospheric temperature, can contribute significant amounts of freshwater input to the Earth's oceans. Additionally, a steady increase in global atmospheric temperature creates an expansion of saline sea water (i.e., salt water) molecules (called thermal expansion), thereby increasing ocean volume.

Sea level rise is occurring due to three main factors, all of which are occurring due to global climate change:

- Thermal Expansion: As with all water, when the ocean heats up, it expands. About 50% of the sea level rise in the past 100 years is because the ocean is warmer, and therefore takes up more space.
- Glacier and Polar Ice Cap Melting: Although glaciers and polar ice caps naturally melt a little each summer, they usually regain lost area during the winter. However, warmer winters have meant less opportunity to regrow this ice, resulting in more melted water remaining in the oceans, contributing to sea level rise.
- Greenland and West Antarctic Ice Loss: Similar to what is happening with glaciers and the polar ice cap, the huge ice sheets that cover Greenland and Antarctica are melting.

Sea level rise hazards include:

- Increased risk of high tide flooding in coastal areas. According to NOAA, the national annual high tide flooding frequency reached four days on average in 2022, equaling the previous year and just shy of the record of five days set in 2018. High tide flooding is now rising and/or accelerating at nearly all NOAA tide gauge locations.[41]
- Tropical systems may become stronger because of climate change. This could lead to increased storm surge and wave heights during hurricanes. As South Florida drainage systems are gravity based and reliant upon the ability of South Florida Water Management District to release water from the canals into the bay this could compromise the ability to drain low-lying interior areas.
- Higher storm surge, increased evacuation areas, reduced shelter capabilities and increased evacuation time frames.
- Destruction of natural resource habitats that could impact ecosystems and agriculture and challenge the adaptive capabilities of flora and fauna.

[41] High Tide Flooding: https://coast.noaa.gov/states/fast-facts/recurrent-tidal-flooding.html

- Increased potential for saltwater intrusion. If saltwater migrates farther inland, higher salinity could impair both ground and surface water, affecting ecosystems, agricultural land and the Biscayne Aquifer, the primary source of drinking water for Southeast Florida.
- Impacts on the growth and productivity of crops. Prolonged periods of drought, severe weather or potential for saltwater intrusion could negatively impact the local agricultural economy.
- Increased shoreline erosion and inundation of land. Increased sea levels can lead to increased shoreline erosion from intense storms and higher storm surges.
- Loss of infrastructure and existing development. As sea level continues to rise, deeper water near the shore will translate to higher storm surge, faster flow, higher waves, greater hydro-dynamic pressure, and wave impact loads on buildings near the shoreline which may increase infrastructure damage.

According to the Environmental Protection Agency (EPA) sea level is rising faster in certain parts of the world due to natural events such as wind patterns, ocean currents, and other factors. Florida, particularly Southeast Florida, is vulnerable to sea level rise given its extensive shoreline and low elevation. The so-called "relative sea level" that is measured by a tide gauge at a particular location, is a function of both changes in the elevation of the sea's surface due to changes in the volume of water in the ocean (eustatic sea level) and vertical movement of the land upon which the tide gauge sits due to subsidence or tectonic movement of the earth's crust.

Based on past and current emissions, all projection curves assume a growing greenhouse gas emission concentration scenario, in which emissions continue to increase until the end of the century, consistent with the IPCC Fifth Assessment Report's (AR5) Representative Concentration Pathways (RCP 8.5). Estimates of sea level rise are provided from a baseline year of 2000, and the planning horizon has been extended to 2120, in response to the release of climate scenarios extending beyond the year 2100 by federal agencies (NOAA and the U.S. Army Corps of Engineers) and the need for planning for infrastructure with design lives greater than 50 years.

In the short-term, sea-level rise is projected to be 10 to 17 inches by 2040 and 21 to 54 inches by 2070 (above the 2000 mean sea level in Key West, Florida). In the long-term, sea-level rise is projected to be 40 to 136 inches by 2120. Projected sea level rise, especially beyond 2070, has a significant range of variation because of uncertainty in future greenhouse gas emissions reduction efforts and resulting geophysical effects.

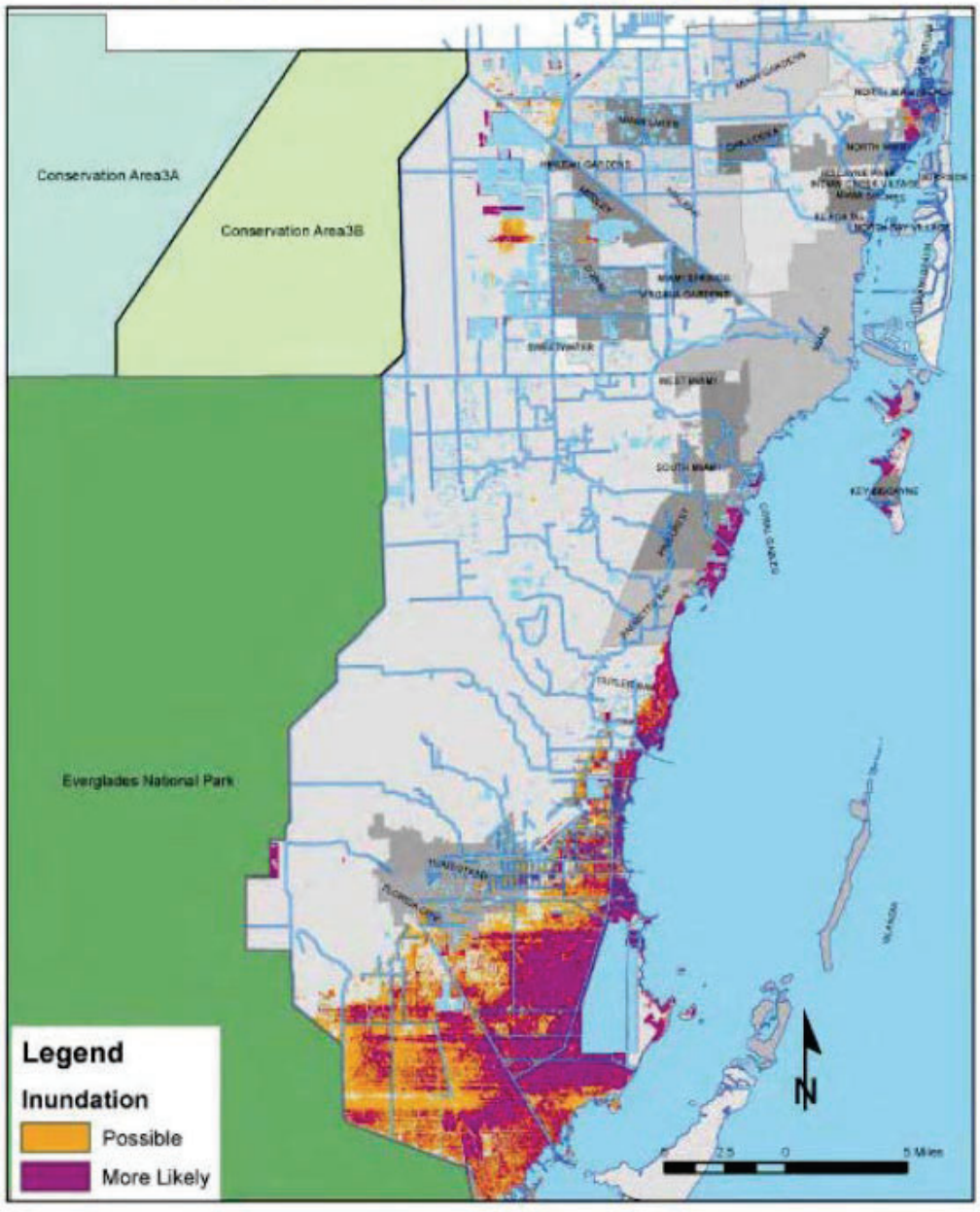
In 2021, Miami-Dade County published its first Sea Level Rise Strategy outlining adaptation approaches, key actions, summary of impacts, and local and regional projects addressing increased flood risk.[42]

[42]Miami-Dade County Sea Level Rise Strategy: https://miami-dade-county-sea-level-rise-strategy-draft-mdc.hub.arcgis.com/

Location

The entire County is being affected by rising sea levels. Low-lying areas, both urban and undeveloped wetland areas, are being impacted. The potential extent of impact is widest in the Southern portion of the County, but all areas, including inland areas, are being impacted by changing water levels.

MAP 6A-42 1-FOOT SEA LEVEL RISE IN MIAMI-DADE COUNTY



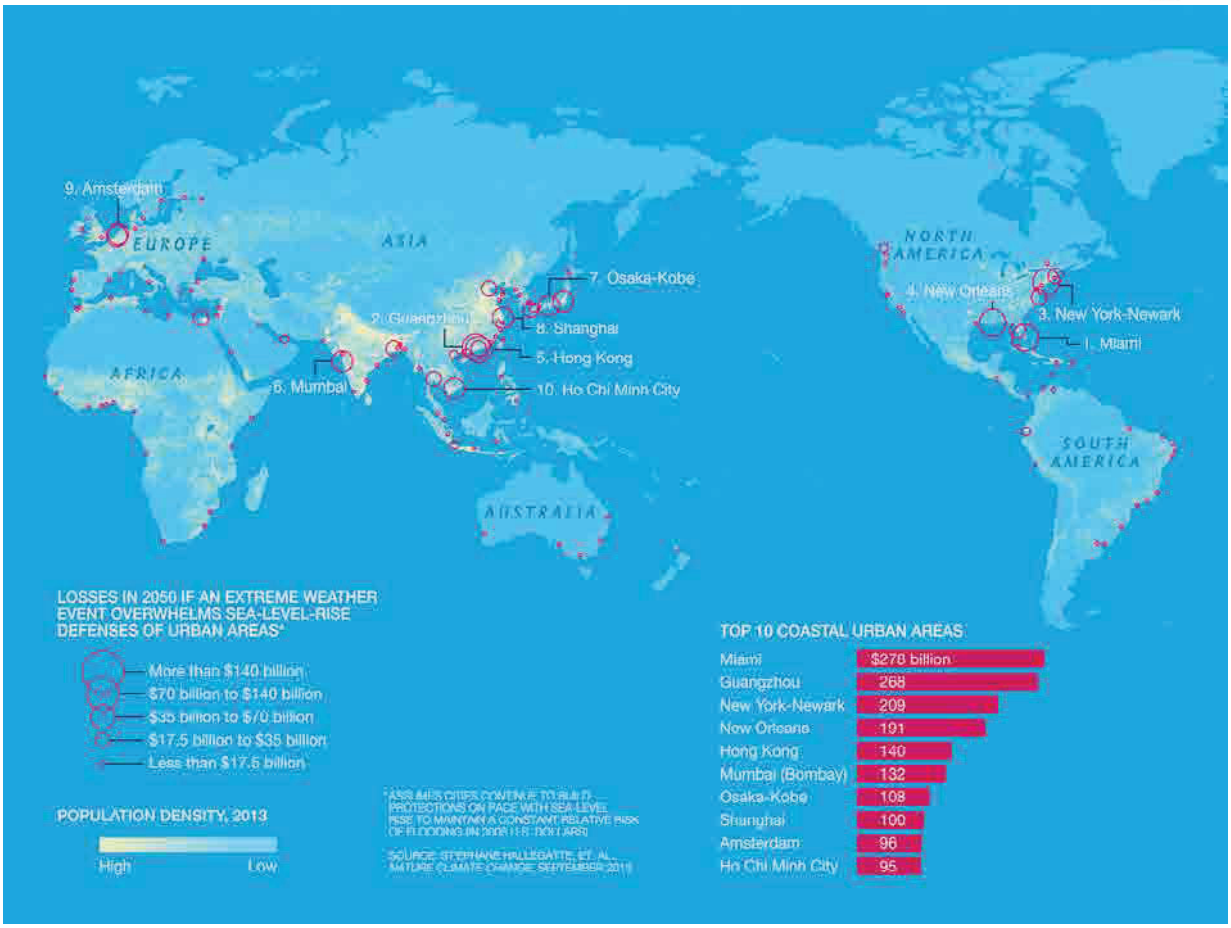
Source: Miami-Dade County Local Mitigation Strategy/Southeast Florida Regional Climate Change Compact

Extent

According to the IPCC, the sea level rise gradually rose in the 20th century and has been rising at an increased rate in the 21st century. According to the World Resources Institute, the sea level in South Florida has increased by 12 inches since 1870. By 2100, greenhouse gas concentrations are predicted to reach levels greater than or equal to those observed during the last interglacial period when sea levels were between 13.1' and 19.7' higher than present levels (Rhode Island, 2014 Hazard Mitigation Plan).

Rising sea levels, coupled with potentially higher hurricane wind speeds, rainfall intensity, and storm surges are expected to have a significant impact on coastal communities. More intense heat waves may mean more heat-related illnesses, droughts, and wildfires. As climate science has evolved and improved, compared to past updates this plan considers climate change as a parameter in the ranking or scoring of natural hazards and respective mitigation actions rankings.

If sea levels rise by just 16 inches, flood damages in port cities around the world could cost one trillion dollars per year. In a recent National Geographic publication (see Map below), the cost to Miami in 2050 if an extreme weather event overwhelmed the city's sea level rise defenses would be the most expensive of all coastal urban areas in the world at $278 billion. The Miami metropolitan region has the greatest amount of exposed financial assets and 4th-largest population vulnerable to sea level rise in the world. The only other cities with a higher combined (financial assets and population) risk are Hong Kong and Calcutta. The county alone has more people living less than 4 feet above sea level than any state in the nation except Florida itself and Louisiana (Broward County's population is comparable as well).



Impact

Impact to Miami-Dade County Residents
Sea level rise can affect an entire population in the county. Because sea level rise is so encompassing and long-term, this hazard has the potential to affect major changes in the county, and not only the few populations identified here. Certain population groups may be impacted and/or more vulnerable based on location/proximity to the incident or other social vulnerability conditions.

Homeowners would be at greater risk if they own a home in a low elevation area. Home-owners would lose their home or have trouble selling their home knowing it lies in a low elevation area and will most likely experience the direct impacts of sea level rise. Because of sea level rise, county residents would have to move to a location above sea level, those who are part of the low-income/poor community may be unable to afford housing.

Consequences related to the public following severe sea level rise impact over time may include:

- Temporary/permanent loss of residence, causing an increased need for shelter, short-term or long-term housing.

Impact to Essential Facilities and Other Property
All essential facilities are vulnerable to a one-foot sea level depth scenario. As mentioned above, a portion of the properties at Homestead Air Reserve Base, the Turkey Point Nuclear Power Plant, and the Cutler Power Plant are at elevations below sea level. Most of these potentially inundated areas on these properties are existing storm water management ponds and ditches and the cooling canals at Turkey Point. The cooling canal system at Turkey Point is extremely critical to the function and safety of the plant and additional analysis is necessary in order to fully understand potential impacts to all components of the facility.

Building Inventory: Impacts to buildings within the county can be expected due to saltwater corrosion over time which could lead to possible loss of the entire building.

Consequences related to essential facilities and property following sea level rise may include:

- Loss of building function (e.g., damaged homes will no longer be habitable, causing residents to seek shelter).
- Business/service interruption, causing an impact to the local economy as well as individual households.

Impact to Critical Infrastructure
Due to sea level rise, the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges, dependent on the sea level rise depth. Because the county's entire infrastructure is equally vulnerable, it is important to emphasize that any number of these structures could become damaged by sea level rise over time.

Consequences related to critical infrastructure sea level rise impact may include:

- Disruption in the transportation of goods
- Disruption in the public transportation
- Shortage of fuel or other essential materials

Impact to Environment
Sea level rise can impact the environment dependent on the sea level rise depth. As stated earlier, under a one-foot sea level rise scenario, 12% of the county is impacted with conservation lands being the major land use type inundated. At the two-foot scenario, 16% of the land is impacted with agricultural lands added to the conservation lands. At the three-foot scenario, 18% of the total land mass of the county is impacted including inland areas around the Northwest Municipal Drinking Water Well field. Low lying inland areas like the well field are more likely subject to future drainage issue associated with rain events rather than saltwater impacts. In terms of acres inundated, wetland hardwood forest (mangrove) and vegetated non-forested wetlands are among the major habitats impacted.

Consequences related to the environmental impacts of sea level rise may include:

- Trees and plants can be uprooted and diseases in the soil are spread, impacting wildlife and their habitat.
- Marine plant and animal habitats may be impacted.
- Wetland hardwood forest (mangrove) and vegetated non-forested wetlands are among the major habitats impacted.

Previous Occurrences

Since sea level rise happens gradually over long periods of time, there are not specific incidents to highlight in this section.

Vulnerability

Based on scores from the Hazard Impact Analysis found in the THIRA and summarized on the table below, Miami-Dade County has a high overall vulnerability to sea level rise.

Sea Level Rise			
Category		Vulnerability*	Risk*
Social (People, etc.)	Special Populations	Vulnerable	High
	Cultural Conditions	Somewhat Vulnerable	High
	Socioeconomic Conditions	Vulnerable	High
Physical (Property, etc.)	Critical Infrastructure	Vulnerable	High
	Key Resources	Vulnerable	High
	Building Stock	Vulnerable	High
Community Conditions (Environment, Operations, etc.)	Economic Conditions	Vulnerable	High
	Social Conditions	Somewhat Vulnerable	High
	Environmental Conditions	Very Vulnerable	Extreme
	Governmental Conditions (inc. Operations)	Somewhat Vulnerable	High
	Insurance Conditions	Vulnerable	High
	Community Organizations	Minimally Vulnerable	Medium

**Vulnerability ratings take in consideration baseline vulnerabilities described in THIRA Volume 2 with adjustment based on this specific hazard. Risk ratings consider probability & frequency, potential magnitude & scale, vulnerabilities, potential impacts, capabilities, and mitigation efforts related to this specific hazard.*

Physical Vulnerabilities

The built environment (Critical Infrastructure, Key Resources, and Building Stock) and natural environment are vulnerable to sea level rise and though some preliminary mapping shows southern portions of the county at highest risk there is risk to other portions as well. Coastal communities, such as Miami Beach, have already begun to experience sunny day flooding in relation to high and king tides that limit the gravitational drainage that drains to the bay. Additional mapping is being done to determine all areas that may be at risk.

Social Vulnerabilities

Homeowners would be at greater risk if they own a home in a low elevation area. Homeowners would lose their home, or have trouble selling their home knowing it lies in a low elevation area and will most likely experience the direct impacts of sea level rise. Due to the effects of sea level rise, county residents would have to move to a location above sea level, and those who are part of the low-income/poor community may be unable to afford housing.

Although not exhaustive, the following is a list of potential social populations that may be more heavily affected by this hazard than other groups. For more information on the different categories indicated here, please refer to their respective sections in the Vulnerability Index & Assessment:

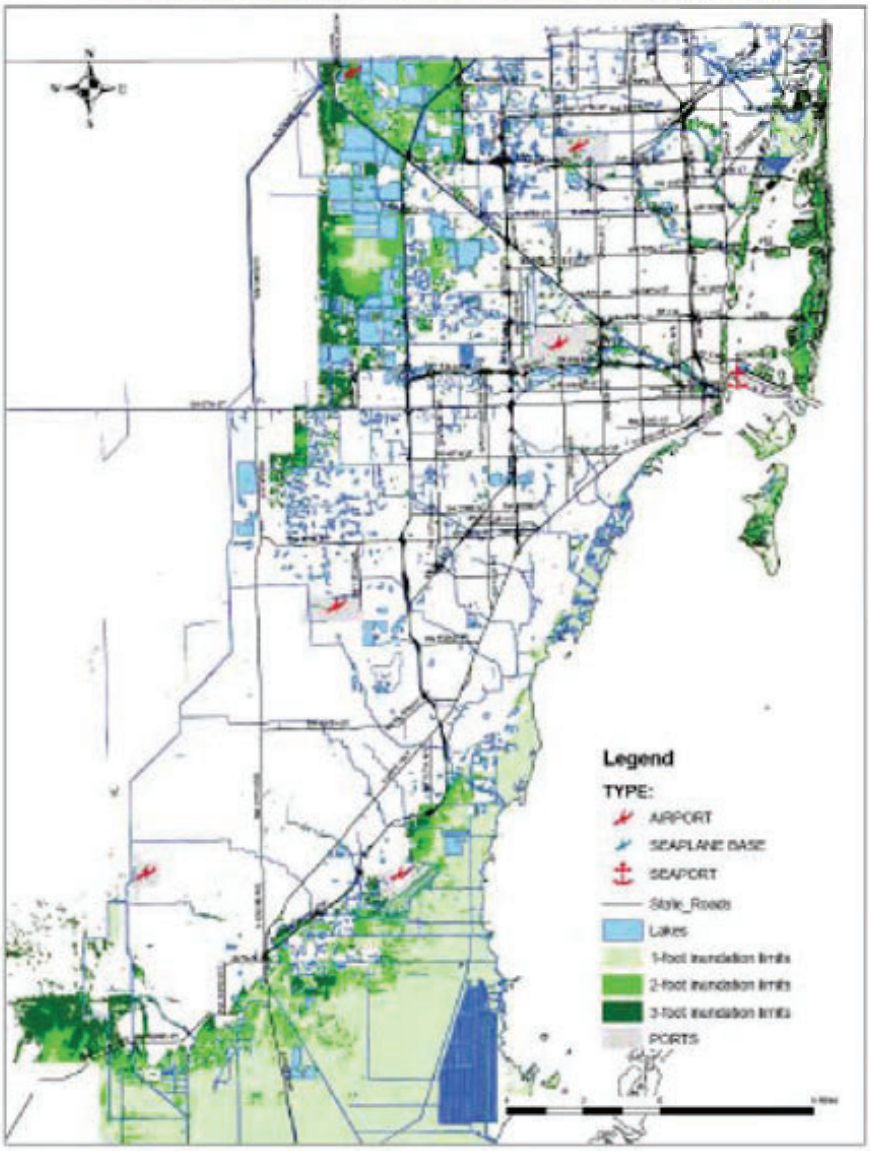
- Low-Income/Poor
- Homeownership

Analysis of Physical Features

Ports and Airports

One area determined by the group to be critical is Homestead Air Reserve Base. The County has already met with planners developing the long-term use of the base and provided input on sea level rise. Opa-Locka West is vulnerable, but this airport is only a landing strip used for training and so is not considered critical. Below are tables that represent the area that may be below mean high-high water sea level with a 1-, 2-, or 3-feet sea level rise.

MAP 6A-46 SEAPORTS AND AIRPORTS VULNERABILITY TO SEA LEVEL RISE



Source: Miami-Dade County Local Mitigation Strategy/Southeast Florida Regional Climate Change Compact

1-Foot Sea Level Rise

Facility Name	More Likely	Possible	Total Inundation	Total Area of Facility (Acres)	Percent Inundation
Homestead General Aviation	0	4.92	4.92	770.71	0.6%
Kendall-Tamiami	22.86	2.37	25.23	1,428.48	1.8%
Miami International	36.01	2.38	38.39	2,731.06	1.4%
Opa Locka Executive	16.87	4.71	21.58	1,640.89	1.3%
Opa Locka West	12.08	1.46	13.54	412.03	3.3%
Port of Miami (Seaport)	0.61	0.16	0.77	534.5	0.1%
Port of Miami (River Port)	2.32	1.26	3.58	136.23	2.6%
USA Homestead Air Base	195.43	80.4	275.83	1,970.96	14.0%

2-Feet Sea Level Rise

Facility Name	More Likely	Possible	Total Inundation	Total Area of Facility (Acres)	Percent Inundation
Homestead General Aviation	5.6	0.66	6.25	770.71	0.8%
Kendall-Tamiami	26.87	1.6	28.47	1,428.48	2.0%
Miami International	42.34	5.63	47.97	2,731.06	1.8%
Opa Locka Executive	30.58	15.93	46.51	1,640.89	2.8%
Opa Locka West	24.2	68.55	92.75	412.03	22.5%
Port of Miami (Seaport)	0.89	0.22	1.11	534.5	0.2%
Port of Miami (River Port)	4.63	3.61	8.24	136.23	6.0%
USA Homestead Air Base	327.73	119.27	447	1,970.96	22.7%

3-Feet Sea Level Rise

Facility Name	More Likely	Possible	Total Inundation	Total Area of Facility (Acres)	Percent Inundation
Homestead General Aviation	6.58	0.83	7.41	770.71	1.0%
Kendall-Tamiami	31.01	2.82	33.83	1,428.48	2.4%
Miami International	57.47	24.24	81.71	2,731.06	3.0%
Opa Locka Executive	65.51	76.22	141.73	1,640.89	8.6%
Opa Locka West	212.09	96.59	308.68	412.03	74.9%
Port of Miami (Seaport)	1.63	0.5	2.13	534.5	0.4%
Port of Miami (River Port)	14.73	11.47	26.2	136.23	19.2%
USA Homestead Air Base	573.64	202.52	776.16	1,970.96	39.4%

Power Plants

Miami-Dade County has one nuclear power and one coal generation power plant. The generation facilities are not directly impacted. This data below includes impact to the Turkey Point Nuclear Power Plant cooling canals, the coastal wetlands at the Cutler Plant, and some scattered power transfer stations throughout western Miami-Dade County.

Power Plant	More Likely (acres)	Possible (acres)	Total Inundation (acres)	Total Area of Facility (Acres)	Percent Inundation
1-foot Sea Level Rise	4,812	247	5,059	7,228.77	70%
2-foot Sea Level Rise	5,259	233	5,492	7,228.77	76%
3-foot Sea Level Rise	5,707	233	5,940	7,228.77	82%

Railroads

Railroads did not seem to be particularly affected, perhaps because most of the rail beds in Miami-Dade County are elevated above the road and surrounding surfaces. The impact reported is limited to FEC Railroad in the northeast coast of Miami-Dade County and to the portion of the CSX railroad serving the rock mine lakes along NW 12 ST in the western portion of the County. This data is reported in miles.

FEC and CSX Railroads	More Likely (miles)	Possible (miles)	Total Inundation (miles)	Total Length of Rail (miles)	Percent Inundation
1-foot Sea Level Rise	0.71	0.09	0.8	320.9	0.1%
2-foot Sea Level Rise	0.91	0.23	1	320.9	0.4%
3-foot Sea Level Rise	1.65	0.79	2	320.9	0.7%

Water and Wastewater Treatment Plants

Miami-Dade has three major water and three major wastewater treatment plants within the County boundary. The analysis was performed by land use category as provided by the Department of Planning and Zoning. The results, therefore, do not include the names of the facilities, only the area possibly or more likely affected by the inundation scenario. Since this original analysis was completed Miami-Dade County Water and Sewer Department has invested significantly in understanding the vulnerability of their assets and investing in protecting them from future flooding.

Water Treatment Plants	More Likely (acres)	Possible (acres)	Total Inundation (acres)	Total Area within Land Use Category (acres)	Percent Inundation
1-foot Sea Level Rise	0.38	0.16	0.54	210.37	0.26%
2-foot Sea Level Rise	0.85	0.64	1.49	210.37	0.71%
3-foot Sea Level Rise	2.58	1.6	4.18	210.37	1.99%

Wastewater Treatment Plants	More Likely (acres)	Possible (acres)	Total Inundation (acres)	Total Area within Land Use Category (acres)	Percent Inundation
1-foot Sea Level Rise	11.1	5.32	16.42	460.14	3.57%
2-foot Sea Level Rise	19.91	6.15	26.06	460.14	5.66%
3-foot Sea Level Rise	36.47	8.33	44.8	460.14	9.58%

Landfills

Inundation for all levels of sea level rise were primarily in areas surrounding landfills. The South Dade Landfill, Munisport, and Dade Recycling are surrounded by low-lying areas. Below ground components such as leachate collection systems will also be impacted by sea level rise.

South Dade Landfill, Munisport, & Dade Recycling	More Likely (acres)	Possible (acres)	Total Inundation (acres)
1-foot Sea Level Rise	154	80	234
2-foot Sea Level Rise	266	33	299
3-foot Sea Level Rise	333	30	363

Hospitals

No hospitals in Unincorporated Miami-Dade County were projected to be permanently inundated by 3 feet of sea level rise. Of the 34 total hospitals within the county boundaries, only three hospitals were affected in municipalities in the 3-foot sea level rise scenario.

- Selected Specialty Hospital, 955 NW 3rd ST, City of Miami, 33128
- Mount Sinai Medical Center, 4300 Alton Road, City of Miami Beach, 33140
- South Beach Community Hospital, 630 Alton Road, City of Miami Beach, 33139

Schools

No schools in Unincorporated Miami-Dade County were projected to be permanently inundated by sea level rise of 3 feet. Only three of the 867 schools were affected in municipalities in the 3-foot sea level rise scenario. However, more specific survey information on all affected schools, such as elevation certificates and topographic survey is needed to determine if those would be impacted.

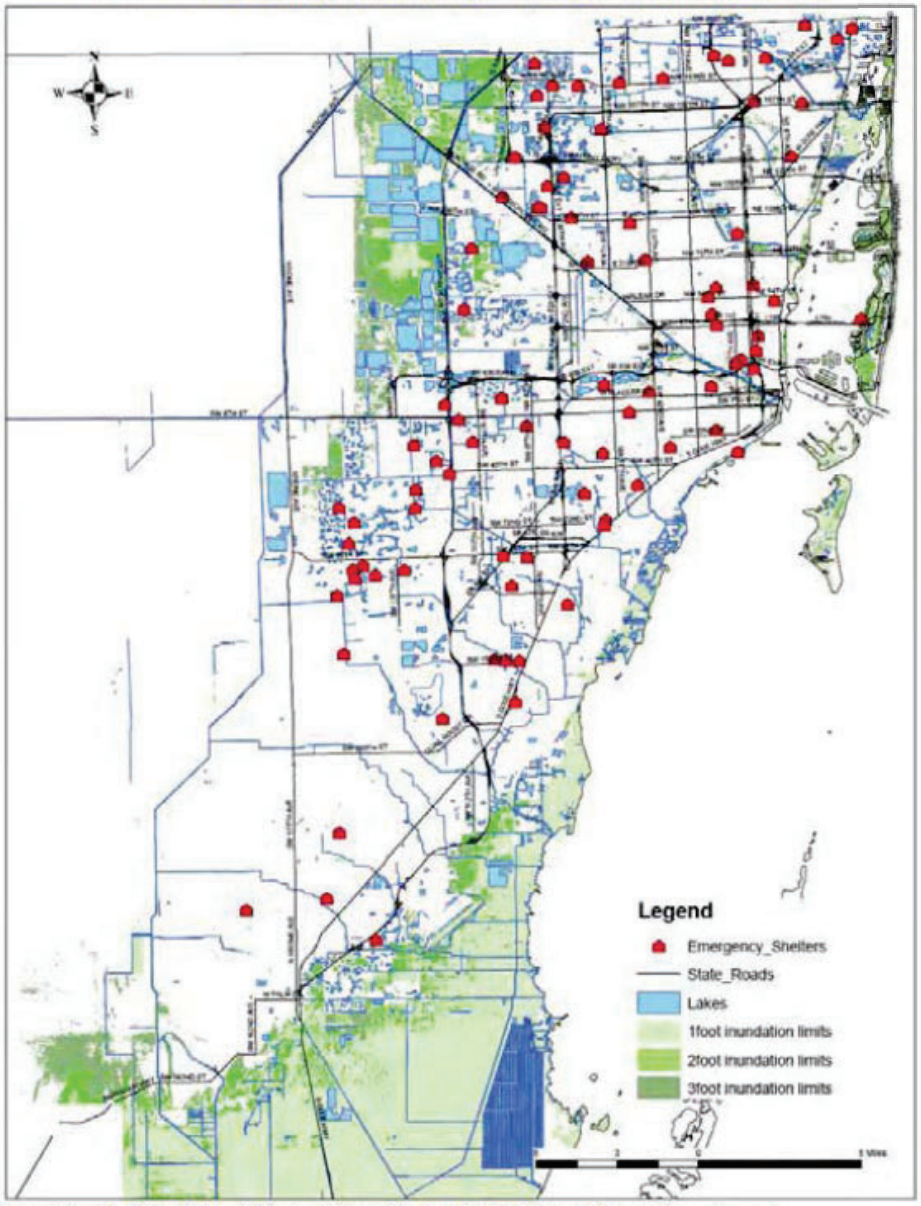
- Student Services & Attendance, 489 East Drive, Miami Springs 33166
- School Board Administrative – Annex, 1500 Biscayne Boulevard, Miami 33132
- Biscayne Elementary, 800 77th Street, Miami Beach 33141

Emergency Evacuation Centers

None of the 69 emergency evacuation centers in Miami-Dade County were impacted.[43] However, more specific survey information and finished floor elevation certificates on all shelters are needed to determine actual impacts.

[43] 2020 Florida Emergency Shelter Plan

MAP 6A-47 VULNERABILITY OF EMERGENCY SHELTERS TO SEA LEVEL RISE

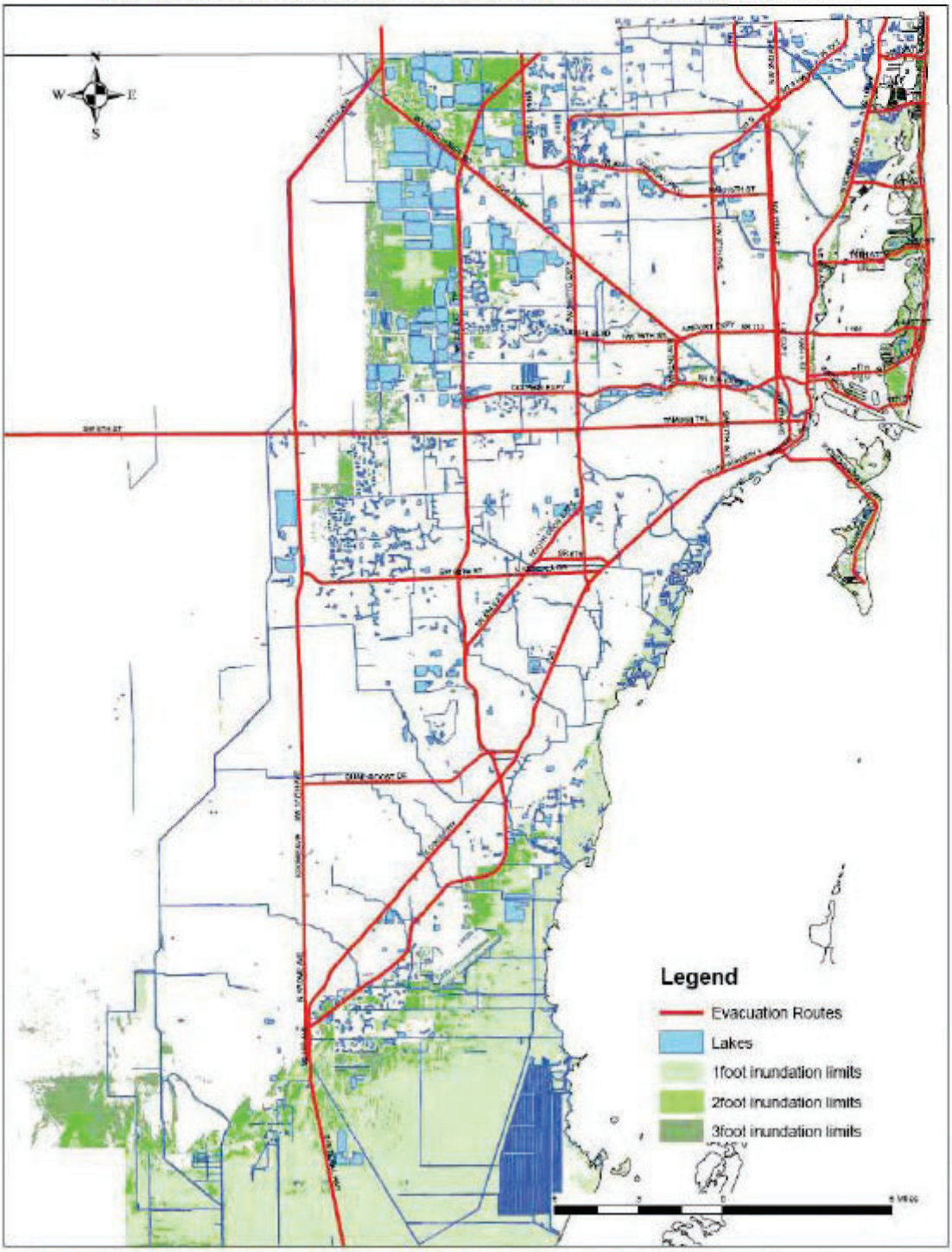


Source: Miami-*Dade County Local* Mitigation Strategy/*Southeast Florida Regional Climate Change Compact*

Evacuation Routes

Miami-Dade County determined there are at most four miles of evacuation routes that would be permanently inundated by a three-foot rise in sea levels. These routes are designed to provide service in a 100-year storm. US1 Overseas Highway to the Florida Keys and the Rickenbacker Causeway to Key Biscayne have been improved. The concern for the evacuation routes is flooding of the local access roads leading to them.

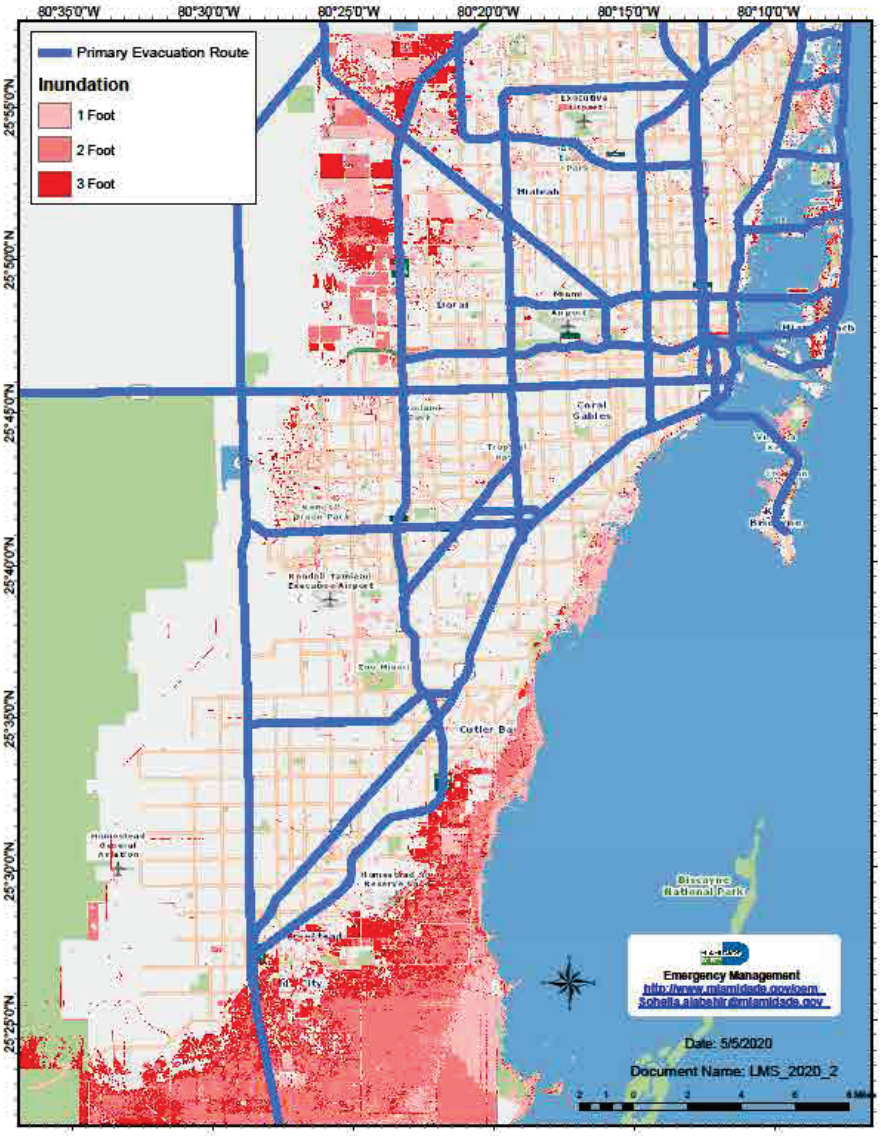
MAP 6A-48 VULNERABILITY OF EVACUATION ROUTES TO SEA LEVEL RISE



Source: Miami-Dade County Local Mitigation Strategy/Southeast Florida Regional Climate Change Compact

Marinas

Marine facilities were analyzed using land use category maps provided by the Department of Planning and Zoning. Marine complexes and marine commercial land uses were combined. All marina facilities are located on or next to water features, east of all salinity control structures to give easy access to the ocean. The assumption is that all will be affected in some way, although the extent is only estimated by this current analysis. It is assumed that those docks with fixed infrastructure will be inundated while floating docks will rise with sea levels.



Marine Facilities	Total Inundation (acres)
1-foot Sea Level Rise	31
2-foot Sea Level Rise	75
3-foot Sea Level Rise	150

Results of Analysis
Geographic analysis was done based on the following criteria:

- Miles of road by Florida Department of Transportation category
- Future Land Use
- Habitat/Land Use Land Cover

Taxable Value of Property
Miami-Dade County has chosen not to estimate the taxable value of potentially impacted property until such time as the mapping and analytical methods are more robust. Miami-Dade, through the Stormwater Master Planning Process, has determined that the current assessment tools probably underestimate potential impacts.

Roads by FDOT Category
Roadways are summarized by Functional Class in miles. High volume categories include sections of roadway where bridges were removed from the LiDAR data and represented bare earth rather than the actual roadways.

1-Foot Sea Level Rise – Assumption: 50% Percent Inundation = Whole Segment Affected

Functional Class	Total Inundation (Miles)	Total Coverage (% impacted)
1 – high volume, maximum speed	3	0.08%
2 – high speed, channels traffic to FC1	4	
3 – high speed, lower mobility, connects to FC2	3	
4 – moderate speed, through neighborhoods	62	
5 – low volume, i.e. access roads, parking lanes	Not assessed	
Total	72	

2-Foot Sea Level Rise – Assumption: 50% Percent Inundation = Whole Segment Affected

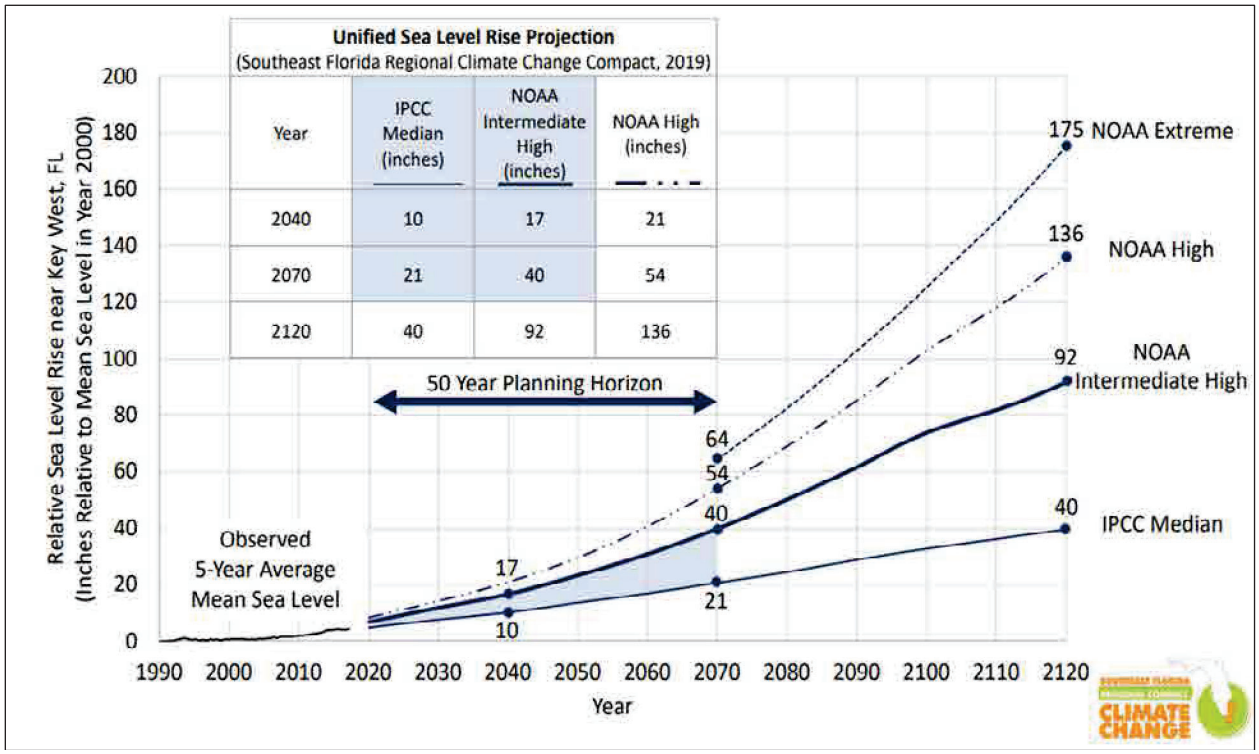
Functional Class	Total Inundation (Miles)	Total Coverage (% impacted)
1 – high volume, maximum speed	6	3%
2 – high speed, channels traffic to FC1	11	
3 – high speed, lower mobility, connects to FC2	8	
4 – moderate speed, through neighborhoods	232	
5 – low volume, i.e. access roads, parking lanes	Not assessed	
Total	257	

3- Foot Sea Level Rise – Assumption: 50% Percent Inundation = Whole Segment Affected

Functional Class	Total Inundation (Miles)	Total Coverage (% segments impacted)
1 – high volume, maximum speed	12.18	6%
2 – high speed, channels traffic to FC1	26.33	
3 – high speed, lower mobility, connects to FC2	21.22	
4 – moderate speed, through neighborhoods	496.21	
5 – low volume, i.e. access roads, parking lanes	Not assessed	
Total	555.94	

Frequency/Probability

According to the World Resources Institute, the sea level in South Florida has increased by 12 inches since 1870. Miami-Dade County continues to experience sea level rise, see projection below from the Southeast Florida Regional Climate Change Compact 2019.



Severe Storm

Description

Severe storms often combine several meteorological events, including lightning, hail, tornadoes, and flooding. Each of these are covered in their own hazard profile. This profile will focus on what qualifies as a thunderstorm and heavy rain.

A thunderstorm is a meteorological event generated by atmospheric imbalance and turbulence caused by unstable warm air that rises rapidly, heavy moisture, and upward lift of air currents that can bring a combination of heavy rains, strong winds, hail, thunder, lightning, and tornadoes.

The National Weather Service classifies a severe storm as a thunderstorm that can produce 1 inch or larger hail, wind gusts greater than 58 mph and/or a tornado. Although lightning and/or excessive rainfall may occur during a severe thunderstorm and have severe consequences, these are not considered primary elements of a severe thunderstorm. Severe thunderstorms, flood threats and lightning are handled through difference sets of warnings and watches by the National Weather Service.

Types of thunderstorms:

- Single-cell storm: Grow and die within an hour; brief heavy rain and lightning
- Multi-cell storm: Individual cells last 30-60 minutes, but the entire storm may last for hours; may produce hail, strong winds, brief tornadoes, and flooding
- Squall Line: Group of storms in a line that passes quickly, with high winds and heavy rain
- Supercell: Highly organized storm that lasts for more than an hour; produces the most violent tornadoes
- Bow Echo: Squall line that bows outward
- Mesoscale Convective System (MCS): Collection of thunderstorms that act as a system, can last more than 12 hours
- Mesoscale Convective Complex: Long lived cluster of showers and thunderstorms
- Mesoscale Convective Vortex: MCS with low pressure center that pulls winds into vortex pattern
- Derecho: Long lived windstorm with rapidly moving band of showers or thunderstorms; can produce as much damage as a tornado, but the damage is all in one direction (straight line wind damage)

There are an average of 72 thunderstorm days in the Miami-Dade County area, according to the monitor at the Miami International Airport. Thunderstorms are most frequent

during July and August when afternoon storms are a near daily experience. Severe thunderstorms and lightning strikes are traditionally responsible for the most frequent damage in Miami-Dade County. Windstorm damage resulting from downbursts and squall lines frequently knock down trees and power lines.

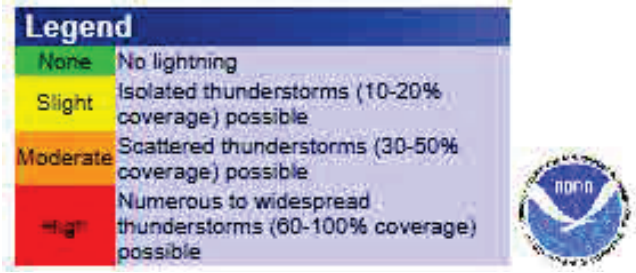
Location

While the entire county and all of its participating jurisdictions are vulnerable to severe storms, the effects of flooding would be felt more along our coastal areas, low-lying areas, Biscayne Bay and Miami River areas, as well as any inland areas with poor drainage. Refer to the flooding hazard section for maps that show specific areas prone to flooding, buildings per jurisdiction in FEMA flood zones. Refer to the hurricanes hazard section for a list of mobile park homes that would also be locations of severe impact due to winds associated with severe storms.

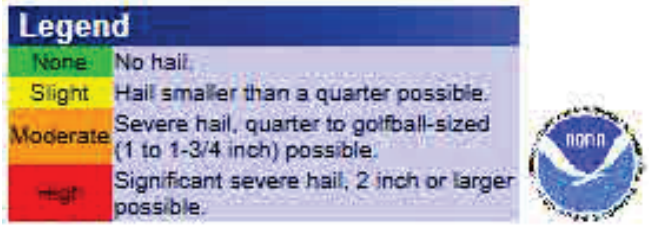
Extent

The intensity of a severe storm can range from moderate to high levels depending on amount of rainfall, wind speed, and occurrence of hail or lightning. Severe storms, as reported by the local NWS office, may have lightning and/or hail ranging from none to high. These scales are depicted below. Severe storms become more dangerous when any of these factors are high, and especially when multiple factors combine due to potential damages.

Lightning



Hail



For rainfall scale of severity, refer to the chart titled Miami Dade County Action Levels on pg. 66. As a general wind speed scale, the county and local NWS office uses the Beaufort Wind Scale provided below.

Beaufort Wind Scale

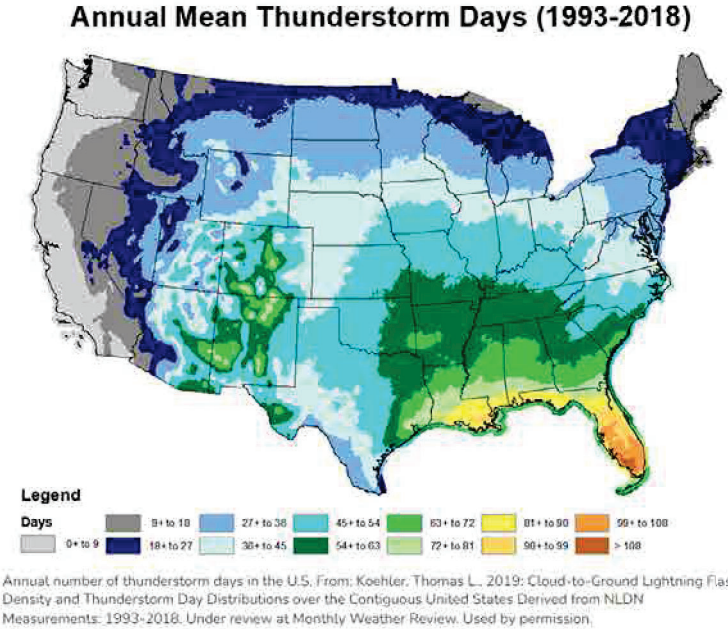
Legend	
None	Wind 0-24 mph sustained and/or gusts to 39 mph
Slight	Wind sustained 25-39 mph and/or gusts 40-57 mph possible.
Moderate	Damaging wind sustained 40-73 mph and/or gusts 58 mph or greater possible.
High	Hurricane force (74+ mph) winds possible.

The most expensive severe storm to take place in Miami-Dade County occurred in 1995 and left $5 million in damages. Only 1 person has been killed and 4 injured in heavy rain and thunderstorm wind events, according to the National Climatic Data Center (NCDC).

Thunderstorms are most likely during the spring and summer months, in the afternoon and evening, however they can occur year-round and at all hours. Winter thunderstorms are rare, but they do occur when conditions are right.

Most thunderstorms last around an hour, but some can last for several hours. The duration depends on the type of storm, as described above.

There are over 16 million thunderstorms worldwide each year. At any given time, there are about 2,000 thunderstorms happening around the world. There are about 10,000 severe thunderstorms each year in the U.S. Many thunderstorm aspects, including flooding, lightning and hail, are very dangerous, and are described further in their respective hazard profiles.



Annual number of thunderstorm days in the U.S. From: Koehler, Thomas L., 2019: Cloud-to-Ground Lightning Flash Density and Thunderstorm Day Distributions over the Contiguous United States Derived from NLDN Measurements: 1993-2018. Under review at Monthly Weather Review. Used by permission.

Impact

Impact to Miami-Dade County Residents

A severe storm would affect an entire population within the area most severely, but power outages and street closures have the potential to impact many more. Because severe storms are categorized as having winds more than 58 mph, those most at risk from severe storms include people living in mobile homes, campgrounds, and other dwellings without secure foundations or basements. The disabled population are also considered to be most vulnerable because of the lack of mobility to escape the impacted area. Additionally, those residents who are electric dependent are vulnerable as severe storms tend to cause power outages.

Consequences related to the public following a severe storm may include:

- Increased need for medical care, causing a potential surge at local hospitals.
- Temporary/permanent loss of residence, causing an increased need for shelter, short-term or long-term housing.
- Temporary/permanent loss of transportation, causing a need for replacement or alternative forms of transportation.
- Temporary/permanent loss of employment/business income, causing an increased need for loans.
- Temporary loss of services/utilities, requiring alternate means to address immediate needs.

Impact to Essential Facilities and Other Property

All essential facilities and buildings are vulnerable to severe storms. An essential facility will encounter many of the same impacts as any other building within the jurisdiction. These impacts will vary based on the magnitude of the severe storm, but can include

structural failure, damaging debris (trees or limbs), roofs blown off, windows broken by debris, hail, high winds, and loss of facility functionality (e.g., a damaged police station will no longer be able to serve the community).

Consequences related to essential facilities and property following a severe storm may include:

- Loss of building function (e.g., damaged homes will no longer be habitable, causing residents to seek shelter).
- Business/service interruption, causing an impact to the local economy as well as individual households.

Impact to Critical Infrastructure

During a severe storm, the entire built environment is vulnerable due to wind or rain damage. As mentioned earlier, structures that were built prior to any 1957, before any building codes related to flooding were implemented in Miami-Dade may be at higher risk and buildings built from 1958 to1972 that are considered pre-FIRM may also be at higher risk.

Consequences related to critical infrastructure following a severe storm may include:

- Disruption in the transportation of goods
- Disruption in the public transportation

Impact to Environment

Agricultural areas are vulnerable to heavy rains which may flood the farmlands. Flooding of farmlands may lead to a decrease in crop yielding. Severe storms can also cause water contamination, impacting local flora and fauna. If a high wind hits power lines or causes gas leaks, fires or contamination can also result.

Consequences related to the environment following a severe storm may include:

- Trees and plants can be uprooted and diseases in the soil can spread, impacting wildlife and their habitat.
- Crop yielding may substantially decrease dependent on the severity of flooding.

Previous Occurrences

June 11-13, 2024 – A plume of deep tropical moisture streamed into South Florida during the week of June 10 through 15th as the region remained south of a stationary boundary and near a weak tropical disturbance. Multiple mesoscale convective systems developed to the south of this boundary over Central Florida and gradually pivoted southward into South Florida during the morning and afternoon hours of June 11th, 12th, and 13th, 2024. With a very moist and warm atmospheric composition, rainfall rates were efficient and tropical in nature. Storm total rainfall of up to 20 inches occurred across NE Miami-Dade and SE Broward counties. Flooding from the June 11-13 heavy rainfall and flash flooding event lingered for several days across portions of NE Miami-Dade County. This included

neighborhoods across Miami Beach, Miami Shores, North Miami, North Miami Beach, and Aventura. Total damages were estimated at 3.8 million.

February 4, 2024 – Due to the combination of a surface low and mid-level impulses, there was development of widespread showers and thunderstorms across South Florida. The first wave of activity moved from southwest Florida into southeast Florida by the late morning hours. With impressive wind shear and sufficient instability, there was a supportive atmosphere for strong to severe thunderstorms. This led to line activity, which produced damaging straight-line winds and heavy rainfall. Wind damage that began with an overturned semi-tractor trailer near Krome Avenue and SW 104th Street and cut through several areas of The Hammocks, Kendall Lakes, Westchester, and West Miami. There was vegetation damage, which included medium to large downed branches and snapped trees. Wind damage indicated gusts reached an estimated 60 to 70 mph. Property damages amounted to $20,000.

April 17, 2023 – A shortwave trough and frontal boundary migrated across south Florida, which including daytime heating, brought multiple strong to severe thunderstorms. Reports of large trees down from wind gusts around SE 27th Drive in Homestead. Damages amounted to $10,000.

September 1, 2021 – A combination of high pressure sinking southward and Tropical Depression Ida over the Northeast U.S. led the Gulf Sea Breeze inland. The Atlantic Sea Breeze caused strong thunderstorms to develop over parts of South Florida. Reports of fencing blown over and large hardwood tree branches down due to a thunderstorm wind gust. Radar estimated winds were 45 to 50 mph in the area. Property damage amounted to 1.5 million.

April 11, 2021 – Strong severe storms produced hail and damaging winds across the east coast metro areas of South Florida. There were reports of downed power lines near SW 187th ST and SW 82nd Ave in Cutler Bay. A total of 63,147 customers lost power during this event. Damages amounted to $2,000.

August 24, 2020 – A low pressure system moving across the tropical Atlantic into the Bahamas formed into Tropical Storm Laura near Puerto Rico and Hispaniola. As Laura continued across the northern Caribbean Sea, making landfall along southern Cuba, the outer rain bands extended across the South Florida bringing minor impacts. Tropical Storm force wind gusts reached across Miami-Dade, a few strong enough to become severe gusts.

April 30, 2020 – A line of thunderstorms developed over loop current in the Gulf of Mexico ahead of an approaching cold front. As the line progressed eastward, strong daytime heating allowed for an Atlantic Sea breeze to develop across, which resulted in several

rounds of thunderstorms that produced damaging wind gusts and hail across South Florida.

May 6, 2019 – Thunderstorms caused damage across Miami-Dade County that resulted in downed trees, power poles, fences and street signs. A tractor trailer was also overturned on the Florida Turnpike.

January 23, 2017 – A strong squall line ahead of a cold front produced a tornado near the Palmetto Expressway and NW 48th Street at 3:45am. The tornado continued a northeast track and moved over Miami Springs and the City of Hialeah producing between EF-0 and EF-1 damage. Damage consisted of an overturned tractor trailer, about 24 empty cargo containers were moved, downed trees and power lines, and damage on roofs. No injuries or fatalities were reported, but 13 families were displaced in Hialeah and required assistance by the American Red Cross.

July 18, 2016 – This thunderstorm produced gusty winds which resulted in property damage in Cutler Bay. This damage, estimated at $5,000 occurred in the vicinity of SW 200th Street between Old Cutler Road and Cutler Ridge Park.

June 18, 2016 – A severe thunderstorm over Miami-Dade County led to wind damage. Power lines, trees, fences, and store signs were knocked down in Westchester. There was also damage in Downtown Miami to furniture being blown off high rise balconies into the streets due to the high winds.

February 16, 2016 – On February 15th, a strong squall line developed ahead of a cold front over the Gulf of Mexico and as it moved over the warm waters, it intensified. An unstable environment and strong low level rotation was in place over South Florida ahead of the line. In the overnight hours of February 16th, another squall line developed ahead of the first line. Both of these lines merged over southeast Florida before daybreak. As the squall line moved across Florida, it produced a number of severe thunderstorms throughout. A total of 6 tornadoes were confirmed across southern Florida, including an EF-0 in Northeast Miami-Dade. No injuries or fatalities were reported.

June 29, 2015 – Afternoon showers and thunderstorms caused sporadic tree damage in an area from Doral to Florida International University campus, then east to Fontainebleau. A total of 12,940 customers reported power outages in Miami-Dade County.

Vulnerability

Based on scores from the Hazard Impact Analysis found in the THIRA and summarized on the table below, Miami-Dade County has a medium overall vulnerability to severe storms.

Severe Storms			
Category		**Vulnerability***	**Risk***
Social (People, etc.)	Special Populations	Somewhat Vulnerable	Medium
	Cultural Conditions	Minimally Vulnerable	Low
	Socioeconomic Conditions	Minimally Vulnerable	Low
Physical (Property, etc.)	Critical Infrastructure	Somewhat Vulnerable	Medium
	Key Resources	Somewhat Vulnerable	Medium
	Building Stock	Somewhat Vulnerable	Medium
Community Conditions (Environment, Operations, etc.)	Economic Conditions	Minimally Vulnerable	Low
	Social Conditions	Minimally Vulnerable	Low
	Environmental Conditions	Minimally Vulnerable	Low
	Governmental Conditions (inc. Operations)	Minimally Vulnerable	Low
	Insurance Conditions	Minimally Vulnerable	Low
	Community Organizations	Minimally Vulnerable	Low

**Vulnerability ratings take in consideration baseline vulnerabilities described in THIRA Volume 2 with adjustment based on this specific hazard. Risk ratings consider probability & frequency, potential magnitude & scale, vulnerabilities, potential impacts, capabilities, and mitigation efforts related to this specific hazard.*

Physical Vulnerabilities

The entire built environment (Critical Infrastructure, Key Resources, and Building Stock) may be vulnerable to severe storms due to wind or hail damages. These types of events could cause power outages or some structural damages to mobile/manufactured homes (see Hurricanes/Tropical Storms for a listing), communications towers, or damage trees and overhead utilities. Underground utilities could be impacted if trees topple and uproot these systems. Severe weather may also cause flying debris to cause additional damage. Structures in areas where there have been repetitive losses and no mitigation may also be at higher risk but past flooding events do not necessarily indicate future flooding problems. Areas with ongoing construction or drainage problems may also be at greater risk. Parks and open spaces where people congregate outside are vulnerable to severe weather that may roll in with little notice, this includes coastal beaches, Crandon Park, all County and State parks, large venues such as the Homestead-Miami Speedway, Hard Rock Stadium, and Marlins Park.

Social Vulnerabilities

People who live in areas prone to flooding and may be uninsured or underinsured are at greatest risk. The cost of insurance may be prohibitive and people who live outside of a flood zone may believe they are not at risk. People who rent properties may not be aware of their flood risk as they may not be disclosed by the owner or they may not know the

history of the area. Electric dependent and people living in mobile/manufactured homes may be at greater risk when it occurs in their areas.

Frequency/Probability

There have been 50 recorded severe storm (heavy rain and thunderstorm wind) events in Miami-Dade County from January 2015 to December 2020, averaging out to approximately ten per year. 41 thunderstorm wind events, and 9 heavy rain events in the past five years. According to the monitor at the Miami International Airport, there is an average of 72 thunderstorm days in the Miami-Dade County area.

Tornado

Description

Tornadoes are one of nature's most violent storms. A tornado is a violently rotating column of air extending from a thunderstorm to the ground. The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. Damage paths can be more than one mile wide and 50 miles long. Most tornadoes, however, have wind speeds of 112 mph or less.

Tornadoes occur as part of strong thunderstorms that develop in unstable atmospheric conditions. The strongest tornadoes form with supercells, rotating thunderstorms with a well-defined radar circulation called a mesocyclone. One in three supercells experience a decent of clouds or funnel cloud. These thunderstorms can also produce damaging hail and severe straight-line winds even without a tornado occurrence.

Tornadoes develop under three scenarios: (1) along a squall line ahead of an advancing cold front moving from the north; (2) in connection with thunderstorm squall lines during hot, humid weather; and (3) in the outer portion of a tropical cyclone. Because the temperature contrast between air masses is generally less pronounced in the state, tornadoes are typically less severe in Florida than in other parts of the country.

Florida tornadoes occur in the greatest number during June, July and August. These are typically small, short-lived events that can produce minor damage and seldom take lives. Florida's most deadly tornado outbreaks occur in the spring. Most of the nation's large killer tornadoes tend to occur in the late afternoon and early evening hours, due to the afternoon buildup of heat in the lower atmosphere that lingers into the early nighttime hours. However, Florida is different. Tornado climatology shows that strong to violent tornadoes are just as likely to occur after midnight as they are in the afternoon. This unique feature makes these tornadoes more dangerous, because most people are asleep after midnight and do not receive warnings relayed by commercial radio or television.

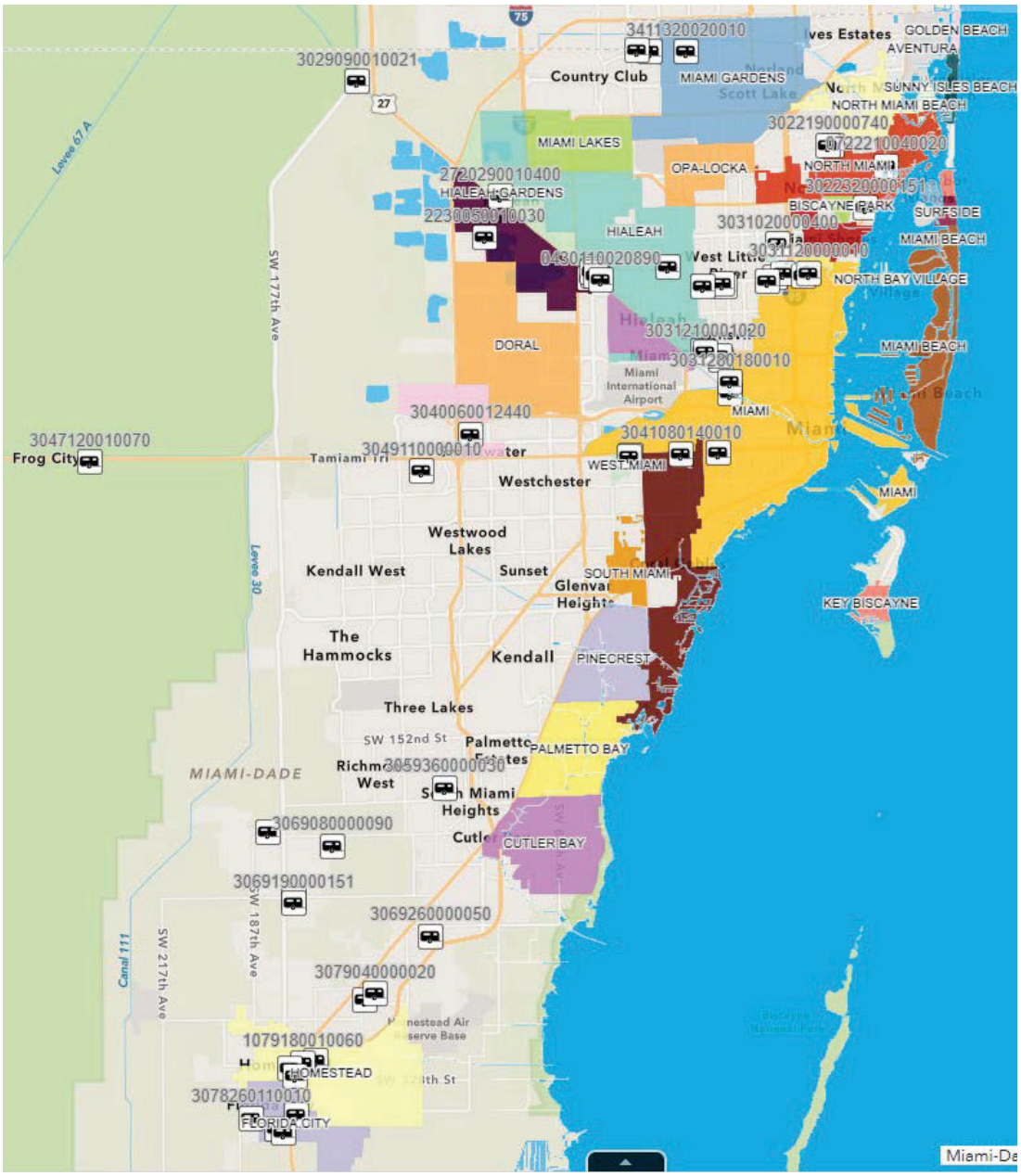
Waterspouts, tornadoes that occur over bodies of water, are common along the southeast U.S. coast, especially off Southern Florida and the Keys. They are smaller and weaker than the most intense tornadoes, but still can be quite dangerous. Waterspouts can overturn small boats, damage ships, create significant damage when hitting land, and kill people.

The impact of a tornado is relative to its intensity and location. Even a weak tornado can cause significant damage if it strikes a densely developed area. Comparing Florida to other states that are affected by tornadoes is only a point of reference as it only takes one large tornado or a series of smaller tornadoes to truly devastate a community. The East Central Florida Tornado Outbreak of 22-23 February 1998 clearly demonstrates this fact. In under four hours it caused: almost half the fatalities, 42; close to one-tenth the injuries,

260; and almost one-fifth the cost (approximately $100 million) as the preceding statewide totals for tornado damage over a thirty-five-year period.

Location

The entire county and all of its participating jurisdictions are equally vulnerable to tornadoes as they could occur anywhere without regard for jurisdictional boundaries. However, areas with more mobile park homes and more structures built prior to 1957 when Miami-Dade County adopted the South Florida Building Code would have a greater risk to damages from tornadoes. The map below shows mobile home parks in the county. For a list



of these locations refer to pg.85-88. For the number of buildings per jurisdiction that were built pre-1957, refer to Part 5 pg.24-25.

Extent

The strongest tornado to affect Miami-Dade County was an EF3 in 1959. Florida has two tornado seasons: summer and spring. The summer tornado season runs from June until September and has the highest frequencies of storm generation, with usual intensities of EF0 or EF1 on the Enhanced Fujita Scale. This includes those tornadoes associated with land-falling tropical cyclones. These tend to be more common and usually the least destructive.

The spring season, from February through April, is characterized by more powerful tornadoes because of the presence of the jet stream. When the jet stream digs south into Florida and is accompanied by a strong cold front and a strong squall line of thunderstorms, the jet stream's high-level winds of 100 to 200 mph often strengthen a thunderstorm into what meteorologists call a “supercell” or “mesocyclone.” These powerful storms can move at speeds of 30 to 50 mph, sometimes occur in groups of six or more, and produce dangerous downburst winds, large hail, and usually the deadliest tornadoes. They generally move in an easterly direction.

Strong to violent tornadoes in Florida are just as likely to occur after midnight as they are during the afternoon. This unique feature makes Florida tornadoes very dangerous because most people are asleep and do not receive adequate weather warnings.

Most tornadoes last less than 10 minutes, however on rare occasions, they can last long enough to affect areas in multiple states (the longest tornado in history was likely an EF5 in 1925, which lasted for 3.5 hours and traveled 219 miles). They often form with little warning; recent reports show there is an average warning time of 13 minutes before tornadoes hit.

Most tornadoes are below the EF-3 scale.

TABLE 6A-73 TORNADO STRENGTH

Tornado Strength	% of Tornadoes	% of Deaths	Lifetime	Winds
Weak (EF-0 or EF-1)	69%	3%	5-10 minutes	< 110 mph
Strong (EF-2 or EF-3)	29%	27%	20 minutes +	110-205 mph
Violent (EF-4 or EF-5)	2%	70%	can exceed 1 hour	> 205 mph

Source: National Oceanic and Atmospheric Administration, Tornado Classifications, Louisville, KY Forecast Office

Enhanced Fujita (EF) Scale

On February 1, 2007, the National Weather Service adopted the “Enhanced Fujita (EF) Scale”. The EF Scale evaluates and categorizes tornado events by intensity. Both the original Fujita Scale and the EF Scale estimate the intensity of a tornado (3-second gust

speed) based on the magnitude of damage. The original scale had a lack of damage indicators and with the increasing standards for buildings, rating of tornadoes was becoming inconsistent. The EF Scale evaluates tornado damage with a set of 28 indicators (see NOAA website). Each indicator is a structure with a typical damage description for each magnitude of a tornado.

TABLE 6A-74 FUJITA VS. ENHANCED FUJITA SCALE

Fujita Scale			Derived EF Scale		Operational EF Scale	
F Number	Fastest 1/4-mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)	EF Number	3 Second Gust (mph)
0	40-72	45-78	0	65-85	0	65-85
1	73-112	79-117	1	86-109	1	86-110
2	113-157	118-161	2	110-137	2	111-135
3	158-206	162-209	3	138-167	3	136-165
4	207-260	210-261	4	168-199	4	166-200
5	261-318	262-317	5	200-234	5	Over 200

Source: National Oceanic and Atmospheric Administration

Impact

Impact to Miami-Dade County Residents

A tornado would affect the entire population in the tornado's path most severely, but power outages and street closures have the potential to impact many more. Those most at risk from tornadoes include people living in mobile homes, campgrounds, and other dwellings without secure foundations or basements. People in automobiles are also very vulnerable to tornadoes. The elderly, very young, and the physically and mentally handicapped are most vulnerable because of the lack of mobility to escape the path of destruction. Currently, approximately 5.8% and 2.4% of Miami-Dade County residents are under 5 or over 85 years of age, respectively . People who may not understand watches and warnings due to language barriers are also at risk. Approximately 76% of Miami-Dade County residents 5 and over speak a language at home other than English, although basic familiarity with English is likely. Additionally, emergency notifications are translated into Spanish and Haitian Creole. As of 2020, approximately 3,472 people resided in an emergency shelter or were found to be sleeping in places not meant for human habitation, such as on the streets, under a bridge or in a car.

Consequences related to the public following a tornado may include:

- Increased need for medical care, causing a potential surge at local hospitals.
- Temporary/permanent loss of residence, causing an increased need for shelter, short-term or long-term housing.
- Temporary/permanent loss of transportation, causing a need for replacement or alternative forms of transportation.
- Temporary/permanent loss of employment/business income, causing an increased need for loans.

- Temporary loss of services/utilities, requiring alternate means to address immediate needs.

Impact to Essential Facilities and Other Property
All essential facilities and buildings are vulnerable to tornadoes. An essential facility will encounter many of the same impacts as any other building within the jurisdiction. These impacts will vary based on the magnitude of the tornado, but can include structural failure, damaging debris (trees or limbs), roofs blown off, windows broken by debris, hail, high winds, and loss of facility functionality (e.g., a damaged police station will no longer be able to serve the community).

Consequences related to essential facilities and property following a tornado may include:

- Loss of building function (e.g., damaged homes will no longer be habitable, causing residents to seek shelter).
- Business/service interruption, causing an impact to the local economy as well as individual households.

Impact to Critical Infrastructure
During a tornado, the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Because the county's entire infrastructure is equally vulnerable, it is important to emphasize that any number of these structures could become damaged during a tornado. The impacts to these structures include broken, failed, or impassable roadways, broken or failed utility lines (e.g., loss of power or gas to community), and railway failure from broken or impassable railways. Bridges could fail or become impassable, causing risk to traffic.

Consequences related to critical infrastructure following a tornado may include:

- Disruption in the transportation of goods
- Disruption in the public transportation
- Shortage of fuel or other essential materials

Impact to Environment
Tornado and high wind events can destroy trees, building, and other important infrastructure. Tornados have been known to kill animals, damage farmland, and disrupt the food chain. Tornados can also cause water contamination, impacting local flora and fauna, not to mention humans. If a high wind or tornado hits power lines or causes gas leaks, fires or contamination can also result.

Consequences related to the environment following a tornado may include:

- Trees and plants can be uprooted and diseases in the soil are spread, impacting wildlife and their habitat.

Previous Occurrences

October 9, 2024 – The outer circulation of hurricane Milton began affecting South Florida late on October 8th, with sustained tropical storm force winds spreading across much of the region through the early morning hours of Thursday, October 10th. As a result, a total of 15 tornadoes were recorded across South Florida on Wednesday, October 9th, two of these reaching EF-3 on the Enhanced Fujita Scale. A cluster of small supercells in Florida City and Homestead produced a brief tornado that was able to attain EF-1 intensity with estimated maximum winds of 87 mph. While the tornado never produced a tornadic debris signature, it did have a couple instances of gate to gate rotation. The tornado had a non-continuous damage path length of 2.93 miles with a maximum width of 75 yards. Most of the damage was characterized by light fence, tree, or yard damage. The worst damage was in Florida City, where several trees were reported down.

May 25, 2023 – A thunderstorm produced a short-lived EF-0 tornado in Redland, starting around SW 192nd St before traveling south along SW 147th Ave until almost SW 200th St. Several trees were snapped and/or uprooted. A semi tractor trailer was knocked on its side by the tornado near SW 196th St and the driver was injured. Most of the winds along the brief damage path were estimated in the 55-65 mph range, with a peak estimate of 80 mph. Damage amounts were estimated at $50,000.

September 27, 2022 – A total of 13 reported tornadoes were spawned by Ian on Tuesday, September 27th and early on Wednesday, September 28th as it was approaching the SW Florida coast. The strongest were outside the boundaries of Miami-Dade County but there was a brief reporting of one in the city of Doral. Several trees were significantly damaged by a brief tornado next to the city of Doral Police Training complex. Damage to the SE in the Fountainbleau area a few minutes earlier likely came from the same parent storm.

August 19, 2020 – A robust, stationary trough over the Gulf of Mexico kept deep south/southwest flow and rich tropical moisture over South Florida. Several short waves rotating around the base of the trough enhanced the showers and thunderstorms that produced a tornado over the Golden Beach area in Miami-Dade from a waterspout and flooding from heavy rainfall. Damage consisted primarily of numerous broken/snapped tree branches, including to a large Sea Grape tree, a couple of newly planted trees toppled, several damaged/twisted metal gates, and tossed lawn/patio furniture. Some of the debris ended up in the adjacent Atlantic Ocean. Most of the damage was confined to ocean-facing homes and properties. One home had water blown in through a set of sliding glass doors due to the force of the wind. This damage is mainly consistent with EF-0 intensity, although one or two spots could have experienced winds close to the EF-1 threshold.

January 27, 2019 – Tornado likely began on W 20th Avenue and W 76th Street just east of the Palmetto Expressway, tracking ENE over the Palm Lakes neighborhood of

Hialeah. Heaviest damage began a block to the east at the intersection of W 18th Lane and W 76th Street, where two vehicles were overturned. The heavy damage continued at homes in the 1800 block of W 76th Street, where minor roof damage was noted, along with many broken large tree branches, a couple of uprooted trees, awning, and patio damage. The tornado then tracked over a small lake, then over a home at W 16th Court and W 77th Street where a small patio roof was blown across the street. The damage pattern became quite discontinuous and spread-out to the east of W 16th Court, suggesting that the tornadic circulation had lifted. Estimated wind speeds with the section of the tornado from W 18th Lane to W 16th Court is 75-85 mph, in the upper end of the EF-0 range.

January 23, 2017 – During the overnight and pre-dawn hours of January 23rd, a powerful squall line well ahead of a cold front over the Gulf of Mexico moved over South Florida. The line of storms resulted in a tornado touching down several times. The tornado first touchdown was near the Palmetto Expressway and NW 48th Street at 3:45 am. It then touched back down on the east side of the Palmetto Expressway, from NW 50th Street to NW 52nd Street between NW 74th and 69th Avenue. The damage in this area included an overturn tractor trailer, about 24 empty cargo containers were moved and an office building sustained minor roof damage. These were EF-0 borderline EF-1 damages (75-85 mph winds). The tornado continued a northeast track and moved into the Miami Springs area with winds most likely in the EF-1 range (90-95 mph). Loss of roof covering material and downed trees was reported in the "Bird District" between Shadow and Ludlum Avenue and Falcon and Dove Avenue. As it continued its track through Miami Springs, more damage was recorded east of Hammond Drive to Okeechobee Road where downed power lines and trees were reported. Once it crossed Okeechobee Road and entered into the City of Hialeah it caused EF-1 damage from Red Road to W 2nd Avenue between West 10th and 13th Streets. In this area, four apartment buildings sustained roof damage and although the tornado passed very close to a water plant, it did not sustain any damage. The tornado lifted near W 2nd Avenue and W 13th street. 13 families were displaced in Hialeah and required assistance by the American Red Cross.

February 16, 2016 – A squall line moving through Florida produced an EF-0 tornado in NE Miami-Dade. The tornado had an intermittent path of about 3.4 miles and affected the areas between NE 191st Street and Ives Dairy Road, from NW 8th Avenue to NE 23rd Avenue. Damage consisted of uprooted trees, several leaning poles and minimal structural damage, including several structures with roof damage. No injuries or fatalities were reported.

June 24, 2012 – Golden Beach Police reported a waterspout moving onshore moving north. The path was approximately 0.5 miles, and it was estimated as an EF-0. Beach chairs were tossed about 30 feet in the air and there was damage to trees and a hut. One residence also had damage to a metal gate and trees. The estimated amount of property damage was $10,000.

August 14, 2008 – A thunderstorm in Hialeah produced an EF1 tornado with the highest estimated wind speeds near 90 mph. The tornado damaged eight structures. The estimated property damage was $150,000.

March 27, 2003 – An F1 to F2 tornado touched down in East Hialeah, reached maximum intensity in the Brownsville area, and then lifted just before entering Biscayne Bay. The F1 to F2 damage began in an industrial area where several warehouse roofs were damaged and several empty semi-tractor trailers were overturned. The tornado then heavily damaged 60 houses in Brownsville. A total of 343 other structures sustained damage, mostly to roofs and windows. Also, several cars were overturned. Total damage estimates were around $8 million. Numerous trees, utility poles, and signs were uprooted or knocked down.

Vulnerability

Based on scores from the Hazard Impact Analysis found in the THIRA and summarized on the table below, Miami-Dade County has a medium overall vulnerability to tornadoes.

Tornado			
Category		Vulnerability*	Risk*
Social (People, etc.)	Special Populations	Vulnerable	Medium
	Cultural Conditions	Somewhat Vulnerable	Medium
	Socioeconomic Conditions	Somewhat Vulnerable	Medium
Physical (Property, etc.)	Critical Infrastructure	Somewhat Vulnerable	Medium
	Key Resources	Somewhat Vulnerable	Medium
	Building Stock	Somewhat Vulnerable	Medium
Community Conditions (Environment, Operations, etc.)	Economic Conditions	Vulnerable	Medium
	Social Conditions	Somewhat Vulnerable	Medium
	Environmental Conditions	Somewhat Vulnerable	Medium
	Governmental Conditions (inc. Operations)	Somewhat Vulnerable	Medium
	Insurance Conditions	Somewhat Vulnerable	Medium
	Community Organizations	Somewhat Vulnerable	Medium

**Vulnerability ratings take in consideration baseline vulnerabilities described in THIRA Volume 2 with adjustment based on this specific hazard. Risk ratings consider probability & frequency, potential magnitude & scale, vulnerabilities, potential impacts, capabilities, and mitigation efforts related to this specific hazard.*

Physical Vulnerabilities

The entire built environment is vulnerable to tornadoes depending on where it hits (may be directly or indirectly impacted). Mobile and manufactured homes tend to sustain the most damage from a tornado due to their lighter weight building materials. A list of mobile home parks in Miami-Dade is provided in the Hurricane/Tropical Storm section. Unreinforced concrete buildings and wood structures may be more vulnerable to tornado damage. Power lines and trees may be downed or underground utilities may be uprooted when trees topple.

Social Vulnerabilities

People with disabilities such as decreased vision or hearing may not be aware of the tornado warnings. Electrically dependent individuals may rely on life-sustaining medical equipment and may be at greater risk due to power outages.

Frequency/Probability

There have been 129 recorded tornadoes in Miami-Dade County since 1950, averaging out to approximately two per year (though the frequency has been less than that over the past five-year period). In addition to tornado events, 67 funnel clouds and approximately the same number of waterspouts are noted for the same period.

Wildfire

Description

Wildfire is defined by the Florida Forest Service (FFS) as any fire that does not meet management objectives or is out of control. Wildfires occur in Florida every year and are part of the natural cycle of Florida's fire-adapted ecosystems. Many of these fires are quickly suppressed before they can damage or destroy property, homes and lives.

A wildfire is a naturally occurring event, often ignited by lightning and fueled by grasses, brush, and trees. Wildfires help to control the buildup of woody debris, improve soil conditions, reduce weedy and invasive plants, reduce plant disease, and maintain the habitat conditions thus providing a healthy ecosystem. However, as Florida communities grow and expand, they push into wildfire-prone areas, aggravating the delicate ecosystem and increasing the risk of fires. The wildland-urban interface describes the area of transition between non-human inhabited areas and the built environment. According to FEMA, a wildland-urban interface fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels. An urban-wildland interface fire is typically ignited by human activities including campfires, uncontrolled burns, smoking, vehicles, trains, equipment use, and arsonists. People start more than four out of every five wildfires, usually through debris burns, arson, or carelessness.

Wildfire behavior is based on three primary factors: fuel, topography, and weather. The type and amount of fuel, as well as its burning qualities and level of moisture affect wildfire potential and behavior. Fuel is the most important factor in determining fire behavior in Florida, due to the large amounts of vegetative growth from the long growing season, ample sunshine, and significant annual rainfall. The amount dry woody debris fuel dramatically increases following a hurricane. Topography affects the movement of air and fire over the ground surface. Slope and terrain can change the rate of speed at which fire travels. Topography is the least important factor in Florida, because of the generally flat layout of the land. Weather affects the probability of wildfire and has a significant effect on its behavior. Temperature, humidity, and wind (both short and long term) affect the severity and duration of wildfires. Weather phenomena such as El Niño and La Niña events further complicate the delicate balance of these three essential components to

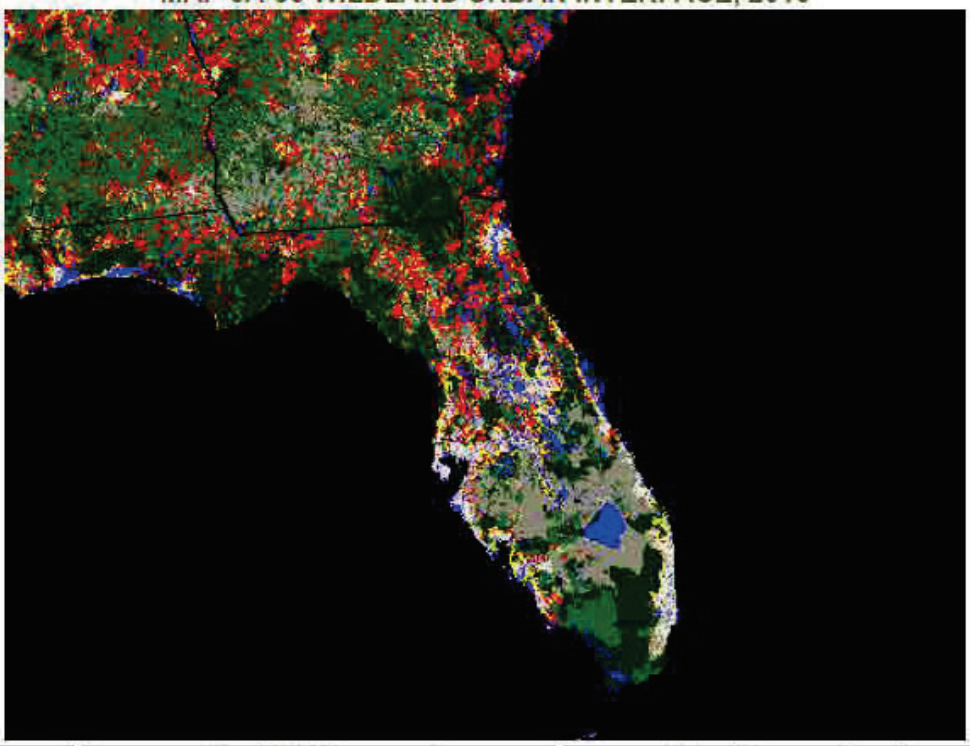
wildfire. The deluge of rainfall that occurs during El Niño events creates excessive vegetative growth. El Niño is followed by La Niña, which creates drought conditions and excessive heat. As a result, the abundant vegetative growth dies off and provides ample fuel for wildfires.

According to the State of Florida Enhanced Hazard Mitigation Plan, Miami-Dade County is at a medium risk for wildfires and has an estimated annualized loss of $428,000 (residential buildings, commercial buildings, medical buildings, educational buildings, and governmental buildings).

Location

Wildfires are most likely to occur in the western portions of Miami-Dade County. This area includes the Everglades and the Urban Wildland Interface.

MAP 6A-55 WILDLAND URBAN INTERFACE, 2010



WUI		Non-WUI Vegetated		Non-Vegetated or Agriculture	
	Interface		No Housing		Medium and High Density Housing
	Intermix		Very Low Density Housing		Low and Very Low Housing Density
					Water

Source: SILVIS Lab

Extent

The most damaging wildfire in Miami-Dade County according to the National Climatic Data Center caused $100,000 in damages (April, 2000).

Miami-Dade County is most vulnerable to wildfires during the dry season. Wildfires typically occur during periods of high temperature and drought and are often exacerbated by wind. The Fire Weather Outlook issued by NOAA's National Weather Service is a good source to monitor fire forecasts.

Wildfires can last for as long as conditions permit (fuel, heat & oxygen). Wildfires can spread rapidly, traveling up to 14 mph. Factors determining a wildfire's speed of onset include fuel, topography, and weather.

Over 100,000 wildfires burn 4-5 million acres in the United States yearly. Wildfires have become increasingly common in recent years and have burned up to 9 million acres in the most destructive years.

Florida accounts for 5% of the nation's wildfires each year. Since 1998, more than 15,000 Florida wildfires have burned over one million acres destroying over 750 structures. Florida wildfires are an example of the increasing threat of fires from the urban-wildland interface.

Forests that rely on wildfires (including the Everglades) have extremely varied ideal time intervals between fire events. Some low-elevation forests ("dry" forests), thrive on fire intervals of 5-20 years. Surface fires can be low to high intensity. Ground and crown fires are often extremely intense.

Fires in the Everglades tend to happen annually, with rapid wet-season fires, often started by lightning. Dry-season fires are less common but can be more damaging. Additionally, there seems to be a longer 10–14-year cycle that coincides with global climate condition changes.

Impact

Impact to Miami-Dade County Residents

A wildfire would affect an entire population group and/or more vulnerable population based on location/proximity to the incident or other social vulnerability condition(s). Those most at risk from wildfires include people living in mobile homes, campgrounds, and other dwellings without secure foundations or basements. Low-income families could be living in homes or apartments that are vulnerable to wildfires leading to lose of property or death. Children are more vulnerable to smoke inhalation due to their small body size. The disabled and elderly also have more frail bodies than adults. Currently, approximately 5.8% and 2.4% of Miami-Dade County residents are under 5 or over 85 years of age, respectively. People who may not understand watches and warnings due to

language barriers are also at risk. Approximately 76% of Miami-Dade County residents 5 and over speak a language at home other than English, although basic familiarity with English is likely. Additionally, emergency notifications are translated into Spanish and Haitian Creole. The actual consequence of such an incident will be dependent upon the location, duration, scale, magnitude and extent of the incident in addition to the vulnerabilities and conditions described above.

Consequences related to the public following a wildfire may include:

- Increased need for medical care, causing a potential surge at local hospitals.
- Temporary/permanent loss of residence, causing an increased need for shelter, short-term or long-term housing.
- Temporary/permanent loss of employment/business income, causing an increased need for loans.
- Temporary/permanent loss of transportation, causing a need for replacement or alternative forms of transportation.
- Temporary loss of services/utilities, requiring alternate means to address immediate needs.

Impact to Essential Facilities and Other Property

All essential facilities and buildings are vulnerable to wildfire. An essential facility will encounter many of the same impacts as any other building within the jurisdiction. These impacts will vary based on location and duration of the wildfire, but can include structural failure, disrupted communications systems, power outage, and loss of facility functionality (e.g., a damaged police station will no longer be able to serve the community).

Consequences related to critical infrastructure following a wildfire may include:

- Loss of building function (e.g., damaged homes will no longer be habitable, causing residents to seek shelter).
- Business/service interruption, causing an impact to the local economy as well as individual households.

Impact to Critical Infrastructure

All aspects of the built environment are vulnerable to wildfires, especially those within the wildland-urban interface (WUI), or up to 1 mile outside the WUI; approximately 80% of all wildfires in Florida happen within one mile of the WUI.

Consequences related to critical infrastructure following a wildfire may include:

- Loss of building function (e.g., damaged homes will no longer be habitable, causing residents to seek shelter).
- Business/service interruption, causing an impact to the local economy as well as individual households.

Impact to Environment

There can be long-term impacts to the environment because of a wildfire on weather and the climate. The scale of wildfire can release large quantities of carbon dioxide and carbon monoxide into the atmosphere. This chain reaction would then cause increased air pollution. For more information on vulnerabilities to environmental conditions, please refer to the respective section in the Vulnerability Index & Assessment (THIRA Volume II, pages 284 - 292).

Consequences related to the environment following a wildfire may include:

• Increase of air pollution that could cause various types of health issues (e.g. respiratory or cardiovascular problems).

TABLE 11. FIRE DANGER LEVELS

Level	Criteria
Low	**Ignition**: Fuels do not ignite readily from small firebrands although a more intense heat source, such as lightning, may start fires. **Spread**: Fires in open cured grasslands may burn freely a few hours after rain, but woods fires spread slowly by creeping or smoldering, and burn in irregular fingers. **Spotting**: There is little danger of spotting. Control: Easy
Moderate	**Ignition**: Fires can start from most accidental causes, but with the exception of lightning fires in some areas, the number of starts is generally low. **Spread**: Fires in open cured grasslands will burn briskly and spread rapidly on windy days. Timber fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel, especially draped fuel, may burn hot. **Spotting**: Short-distance spotting may occur, but is not persistent. **Control**: Fires are not likely to become serious and control is relatively easy.
High	**Ignition**: All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. **Spread**: Fires spread rapidly. High-intensity burning may develop on slopes or in concentrations of fine fuels. **Spotting**: Short-distance spotting is common. **Control**: Fires may become serious and their control difficult unless they are attacked successfully while small.
Very High	**Ignition**: Fires start easily from all causes. **Spread**: Immediately after ignition, spread rapidly and increase quickly in intensity. Fires burning in light fuels may quickly develop high intensity characteristics such as long-distance spotting and fire whirlwinds when they burn into heavier fuels. **Spotting**: Spot fires are a constant danger; long distance spotting likely. **Control**: Direct attack at the head of such fires is rarely possible after they have been burning more than a few minutes.

Level	Criteria
Extreme	**Ignition**: Fires start quickly and burn intensely. All fires are potentially serious. **Spread**: Furious spread likely, along with intense burning. Development into high intensity burning will usually be faster and occur from smaller fires than in the very high fire danger class. **Spotting**: Spot fires are a constant danger; long distance spotting occurs easily. **Control**: Direct attack is rarely possible and may be dangerous except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions the only effective and safe control action is on the flanks until the weather changes or the fuel supply lessens.

Source: National Fire Danger Rating System

Previous Occurrences

March 12-26, 2025 – On March 12, Miami-Dade County Fire Department (MDFR) reported a wildfire of approximately 220 acres at 60% containment near the intersection of East Palm Drive and SW 117th Avenue near Homestead. Although the cause of origin was unknown, the fire was fueled by high winds, low humidity, and drought conditions. Over the following days the fire spread substantially, eventually covering more than 25,000 acres, and having containment levels as low as 20%. Unified Command was established by DEM, MDFR, Miami Dade Sheriff's Office, and the Florida Forestry Service. The effects of the fire were mostly interruptions to traffic on Card Sound Road and US-1, downed power lines, and economic effects resulting from business closures. By March 26, the containment levels increased to 85% and the Florida Forestry Service continued routine operations without heightened emergency response.

June 1-5, 2021 – Dry conditions across South Florida allowed a wildfire to burn in Miami-Dade County for several days (fire ignited in May). The fire ignited near a densely populated area, but no injuries or damage was reported. However, proximity of the fire and smoke resulted in the closure of Krome Ave for a period of time between Kendall Drive and SW 8 Street. The size of the wildfire was approximately 600 acres.

June 28, 2019 – A small wildfire developed in the Tamiami Pinelands Park area. The fire quickly spread causing damage to two vehicles. The estimated damage was $75,000.

May 2008 – The Mustang Corner Fire was a large wildfire that burned over the Everglades of western Miami-Dade County. The fire burned 39,465 acres in the Everglades National Park. The fire also prompted the evacuation of some 1,753 prisoners and 250 employees from the Everglades Correctional facility and 535 detainees from the Krome Detention Center as the fire closed within ten miles. The fire prompted dense smoke advisories for the Miami Metropolitan area from May 17th to May 21st as dense smoke moved into the area during the night and early morning hours.

May 7, 2008 – A wildfire broke out near Southwest 227th Avenue and Southwest 232nd Street in the Redland area of western Miami-Dade County, covering about 20 acres and threatening a home before being extinguished. The fire consumed 20 acres of a 30 acre farm, two vehicles, and some farm equipment. The estimated damage caused by this fire was $30,000.

August 7, 2004 – A lightning-initiated wildfire burned 10,000 acres mostly in an area between the Homestead Extension of the Florida Turnpike and Krome Avenue. Smoke from the fire closed down portions of both roads for hours at a time and one person was killed in a vehicle crash likely caused by the restricted visibility. A local health alert was issued for persons mainly in the Doral area.

April 5, 2000 – A 50-acre wildfire occurred in Homestead and destroyed two mobile homes and two boats. The total estimated damage was $100,000.

March 30-31, 1999 – Redland area about a dozen wildfires burned as winds gusting near 30 mph quickly spread the flames. None of the fires exceeded 100 acres but a plant nursery was destroyed, and several homes were threatened. Smoke closed the Florida Turnpike Extension and the Don Shula Expressway for several hours.

TABLE 6A-86 PRESIDENTIALLY DECLARED WILDFIRE EVENTS IN MIAMI-DADE COUNTY

Disaster Type	Disaster Number	Title	Incident Begin Date	Declaration Date	Incident End Date	Disaster Close Out Date
DR	1223	EXTREME FIRE HAZARD	5/25/1998	6/18/1998	7/22/1998	6/21/2011
FS	2256	FL-FIRES 04/13/99	4/13/1999	4/18/1999		7/26/2002
EM	3139	FL-FIRES 04/15/99	4/15/1999	4/27/1999	5/25/1999	4/14/2004
FS	2359	FL - EVERGLADES FIRE COMPLEX - 04/25/01	4/17/2001	4/25/2001		9/16/2003

Source: data.gov, FEMA Disaster Declarations Summary

Vulnerability

Based on scores from the Hazard Impact Analysis found in the THIRA and summarized on the table below, Miami-Dade County has a medium overall vulnerability to wildfires.

Wildfire			
Category		Vulnerability*	Risk*
Social (People, etc.)	Special Populations	Vulnerable	Medium
	Cultural Conditions	Somewhat Vulnerable	Medium
	Socioeconomic Conditions	Somewhat Vulnerable	Medium
Physical (Property, etc.)	Critical Infrastructure	Somewhat Vulnerable	Medium
	Key Resources	Somewhat Vulnerable	Medium
	Building Stock	Vulnerable	Medium
Community Conditions (Environment, Operations, etc.)	Economic Conditions	Somewhat Vulnerable	Medium
	Social Conditions	Somewhat Vulnerable	Medium
	Environmental Conditions	Vulnerable	Medium
	Governmental Conditions (inc. Operations)	Somewhat Vulnerable	Medium
	Insurance Conditions	Vulnerable	Medium
	Community Organizations	Somewhat Vulnerable	Medium

**Vulnerability ratings take in consideration baseline vulnerabilities described in THIRA Volume 2 with adjustment based on this specific hazard. Risk ratings consider probability & frequency, potential magnitude & scale, vulnerabilities, potential impacts, capabilities, and mitigation efforts related to this specific hazard.*

Physical Vulnerabilities

The built environment (Critical Infrastructure, Key Resources and Building Stock) and natural environment that are closest to the Everglades, agricultural areas or large open spaces are at a higher risk for exposure from wildfires. Critical facilities would include the Homestead Correction Institute, Dade Correctional Institution, Dade Juvenile Residential Facility, Everglades Correctional Institution, Krome North Service Processing Center, South Florida Reception Center, and Metro-West Detention Center. Residential areas of concern would include the Everglades Labor Camp, Gator Park Mobile Home Park, and Jones Fishing Camp Trailer Park. Visibility on roads may be compromised due to smoke, and this may lead to the need for road closures or increased traffic accidents.

Social Vulnerabilities

Populations with respiratory complications may be at greater risk due to air quality issues in relation to wildfires. The social vulnerability section should be reviewed for more information on how these types of circumstances may affect populations differently.

Frequency/Probability

There have been 13 recorded wildfires in Miami-Dade County since 1998, averaging approximately one and a half per year. Miami-Dade County is most vulnerable to wildfires during the dry season. Wildfires typically occur during periods of high temperatures and drought and are often exacerbated by wind.

Cold Wave

Description

A cold wave is a natural hazard defined by FEMA as a rapid fall in temperature within 24 hours and extreme low temperatures for an extended period. These low temperatures sometimes accompany a winter storm or cold front that affects an area. Since a cold wave is relative to temperatures in the area, a universal temperature threshold for this hazard is not available. However, DEM policy and procedures establish the cold weather threshold for notification at or below 50 degrees Fahrenheit. The classification of an incident as cold wave or extreme cold can also be determined by the potential threat to life safety or by the local National Weather Service (NWS) weather forecast office which informs DEM.

A cold wave is often correlated with the arrival of a cold front. A cold front is a weather system that moves into a region and replaces existing warmer air with cold air. Since cold air is denser than warm air, a cold front will push cold air under warm air causing warm air to rise higher in the atmosphere and subsequently cool. This often produces cloud cover or precipitation. This weather pattern can remain in a region for a few hours or sometimes as long as a couple of weeks. Cold air will eventually be pushed out by another weather front. Extreme cold temperatures are seasonal in nature and can occur any time from early fall to mid spring. The frequency of extreme cold is dependent on weather patterns within a particular region. The magnitude of the cold weather is also affected by many variables including where the cold air weather system originates and whether another system forms that will push the existing system out. Temperature changes and extreme cold can be somewhat mitigated by large bodies of water, as water takes longer to cool and warm than land. However, even though water will stabilize temperatures, changes in air pressure associated with water contribute to winds in the area.

Winter storms are a rare occurrence in Florida but not entirely improbable of affecting the state. The latest occurrence of snow was in Florida's panhandle in January 2025 when 10 inches of snow was recorded near Pensacola due to a winter storm that brought record-breaking low temperatures for the state.

In Miami-Dade County, most cold weather concerns revolve around protecting crops and providing shelter for vulnerable populations such as the homeless. This hazard is responsible for dozens of deaths a year across the Country due to exposure to the elements. It can lead to complications such as hypothermia and frostbite after prolonged exposure. Hazards such as carbon monoxide poisoning, and household fires are increased in improperly ventilated homes during cold weather events. The loss of utilities during these incidents also stress resources and puts vulnerable populations at risk.

Location

The entire county is vulnerable to cold waves or cold weather events, and inland portions tend to see colder temperatures by a just few degrees. These areas tend to be south of

Kendall Drive and west of the Florida Turnpike, primarily the Redland area and areas west of Homestead and Florida City.

Extent

Temperatures have dropped as low as the 20s in Miami-Dade County. In January 2010, cold temperatures killed an elderly man and caused $286 million in crop damages.

Extreme cold weather is seasonal in nature and can occur any time temperature and atmospheric conditions are right. Depending on the geographic latitude of the jurisdiction in question, cold weather events can occur anywhere from late September to early May, but it is not necessarily limited to those months.

Although weather patterns are impossible to predict exactly, the National Weather Service tracks weather and provides warnings up to 3 to 7 days in advance. The duration of a cold weather event is also highly variable and can last as long as 3-4 days while others have been over within a period of hours.

Weather is influenced by many factors including man's footprint on the environment, natural climatic cycles, volcanic activity, jet stream and ocean current patterns such as El Niño and La Niña. These factors will vary the atmospheric conditions conducive to cold weather events resulting in some winters with multiple storms and others with few or no storms. The exact impact of these factors has yet to be determined.

TABLE 6A-93 NATIONAL WEATHER SERVICE ALERTS FOR WINTER WEATHER

Alert	Criteria
Winter Weather Advisories	Are issued for accumulations of snow, freezing rain, freezing drizzle, and sleet which will cause significant inconveniences and, if caution is not exercised, could lead to life-threatening situations.
Winter Strom Watch	Alerts the public to the possibility of a blizzard, heavy snow, heavy freezing rain, or heavy sleet. Winter Storm Watches are usually issued 12 to 48 hours before the beginning of a Winter Storm.
Winter Storm Warning	Issued when hazardous winter weather in the form of heavy snow, heavy freezing rain, or heavy sleet is imminent or occurring. Winter Storm Warnings are usually issued 12 to 24 hours before the event is expected to begin.

Source: National Weather Service

The National Weather Service posts wind-chill advisories and warnings for communities based on the winter temperatures. Wind chill advisories and warnings are set locally and based on typical and expected temperatures for the region. Periods of extreme cold or high winds may necessitate the declaration of wind chill advisories and warnings. A wind chill warning is the more serious of the two declarations. The NWS maintains a wind chill index to illustrate the effects of different speeds of wind.

TABLE 6A-94 WIND CHILL INDEX

Wind	Temperature																	
	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
	5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
	10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
	15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
	20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
	25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
	30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
	35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
	40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
	45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
	50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
	55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
	60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98
	Frostbite Times	30 Minutes						10 Minutes						5 Minutes					
	Wind chill is calculated by: Wind chill (°F) = 35.74 0.6215T - 35.75(V^0.16) 0.4275T(V^0.16) Where: T = Air Temperature (F), V = Wind Speed (mph), ^ = raised to a power (exponential)																	

Source: National Oceanic and Atmospheric Administration

TABLE 13. AVERAGE FREEZE DATES FOR SOUTH FLORIDA[44]

LOCATION	EARLIEST FREEZE	AVERAGE FIRST FREEZE	AVERAGE LAST FREEZE	LATEST FREEZE
HIALEAH	DECEMBER 15	DECEMBER 21-31	JANUARY 21-31	MARCH 3
HOMESTEAD	DECEMBER 28	DECEMBER 21-31	JANUARY 21-31	JANUARY 31
MIAMI BEACH	DECEMBER 24	DECEMBER 21-31	JANUARY 21-31	MARCH 3
MIAMI	DECEMBER 11	DECEMBER 21-31	JANUARY 21-31	MARCH 3

Impact

Impact to Miami-Dade County Residents

Cold waves or extreme cold weather is a particularly dangerous hazard for at-risk populations. These populations include those who have a difficult time keeping warm or finding a heat source during an extreme cold event. The homeless are particularly at risk. Age groups such as the elderly and infants have limited physiological capability to keep warm. Outdoor animals and pets are also at risk of extreme cold temperatures. Consequences related to the public following a cold wave or cold weather event may include:

[44] National Weather Service Miami Office

- Increased need for medical care, causing a potential surge at local hospitals
- Temporary loss of water services/utilities, requiring alternate means to address immediate needs
- Temporary/permanent loss of transportation, causing a need for replacement or alternative forms of transportation.

Impact to Essential Facilities and Other Property
Little of the built environment (Critical Infrastructure, Key Resources, and Building Stock) is vulnerable to winter storms. Pipes carrying water to households could freeze and expand causing pipes to burst. Often water will be contaminated during this process. Inadequately heated or insulated homes may resort to heating by kerosene heaters or stoves. These methods of heating are dangerous and contribute to carbon monoxide poisoning and household fires. Agricultural interests are more vulnerable to winter storms and frost can destroy crops.

Consequences related to essential facilities and property following a flooding may include:
- Business/service interruption, causing an impact to the local economy as well as individual households
- Loss of building function (e.g., damaged homes will no longer be habitable, causing residents to seek shelter).

Impact to Critical Infrastructure
Critical infrastructure can be impacted by winter storms and freezes. Transportation vehicles could lose functionality or unable to traverse through roads from winter storms or freezes that could cause sleet to appear on roads. The impacts to these structures include failed or impassable roadways, broken or failed utility lines (e.g., loss of power or gas to a community), and railway failure from broken or impassable railways. Bridges could fail or become impassable, causing risk to traffic.

Consequences related to critical infrastructure following a winter storm and freeze may include:
- Disruption in the transportation of goods
- Disruption in the public transportation
- Shortage of fuel or other essential materials
- Loss of power due to power outage.

Impact to Environment
Winter storms and freezes play a significant role in the impact of the environment. This natural hazard can create blizzards that can result in trees falling and plants dying. Because of that forests will be damaged producing excess carbon dioxide that causes an imbalance in the local ecosystem.

Consequences related to the environment following a cold wave or extreme freeze may include:

- Reduced crop, rangeland, and forest productivity
- Alter landscapes leading to uninhabitable locations
- Increased livestock and wildlife mortality rates
- Damage to wildlife and fish habitat

Previous Occurrences

There are no Cold Wave occurrences from the previous 5 years that have significantly affected Miami-Dade County or its participating jurisdictions.

January 2012 – Temperatures dropped to the freezing mark over parts of inland Miami-Dade County on the night of January 3rd and early morning of January 4th, with temperatures at these values for 2-4 hours. Areas most affected were the Redland and Homestead areas. Damage to most sensitive crops (beans, herbs, squash, and Asian vegetables) was about 15-20%. A few wind-protected fields suffered near-total losses.

January 2010 – A strong artic cold front moved through South Florida in the early part of January. This cold front produced freezing temperatures and very low wind chills . Freezing temperatures were noted over almost all of South Florida on the mornings of January 10th and 11th. This front resulted in the coldest 12-day period of temperatures throughout South Florida. Crop damage was extensive with total damage estimates in excess of $500 million. Thousands of customers experienced intermittent power outages during this period due to record-setting usage demands. There was one death as a result of the freezing temperatures.

January 5, 2001 –
A freeze occurred throughout the interior sections of south Florida, causing damage to certain crops. Hardest hit were certain vegetable crops with 75% losses in Hendry and east Collier counties and 30% losses in the farming areas of south Miami-Dade County. Other crops that were damaged included newly planted sugar cane, ornamentals, and tropical fruits. A heavy frost occurred in the western suburbs of Miami-Dade, Broward and Palm Beach metropolitan areas. Several daily minimum temperature records were broken. Selected minimum temperatures included 29 degrees in the Homestead agricultural area, 39 degrees at Miami International Airport and 43 degrees in Miami Beach.

February 5, 1996 – The coldest temperatures since the "Christmas freeze" of 1989 caused damage to fruit and vegetable crops in South Florida. Strong winds caused wind chill values in the teens and disrupted electrical service to over 20,000 customers throughout the region.

TABLE 14. PRESIDENTIALLY DECLARED FREEZE EVENTS IN MIAMI-DADE

Disaster Type	Disaster Number	Title	Incident Begin Date	Declaration Date	Incident End Date	Disaster Close Out Date
DR	1359	SEVERE FREEZE	12/1/2000	2/5/2001	1/25/2001	5/14/2010
DR	851	SEVERE FREEZE	12/23/1989	1/15/1990	12/25/1989	4/23/1996
DR	732	SEVERE FREEZE	3/18/1985	3/18/1985	3/18/1985	10/27/1988
DR	526	SEVERE WINTER WEATHER	1/31/1977	1/31/1977	1/31/1977	12/18/1978
DR	304	FREEZE	3/15/1971	3/15/1971	3/15/1971	6/18/1973

Source: data.gov, FEMA Disaster Declarations Summary

Vulnerability

Based on scores from the Hazard Impact Analysis found in the THIRA and summarized on the table below, Miami-Dade County has a medium overall vulnerability to cold waves/freezes.

Winter Storms and Freezes			
Category		Vulnerability	Risk
Social (People, etc.)	Special Populations	Vulnerable	Medium
	Cultural Conditions	Minimally Vulnerable	Low
	Socioeconomic Conditions	Somewhat Vulnerable	Medium
Physical (Property, etc.)	Critical Infrastructure	Minimally Vulnerable	Low
	Key Resources	Somewhat Vulnerable	Medium
	Building Stock	Minimally Vulnerable	Low
Community Conditions (Environment, Operations, etc.)	Economic Conditions	Somewhat Vulnerable	Medium
	Social Conditions	Minimally Vulnerable	Low
	Environmental Conditions	Somewhat Vulnerable	Medium
	Governmental Conditions (inc. Operations)	Minimally Vulnerable	Low
	Insurance Conditions	Minimally Vulnerable	Low
	Community Organizations	Somewhat Vulnerable	Medium

**Vulnerability ratings take in consideration baseline vulnerabilities described in THIRA Volume 2 with adjustment based on this specific hazard. Risk ratings consider probability & frequency, potential magnitude & scale, vulnerabilities, potential impacts, capabilities, and mitigation efforts related to this specific hazard.*

Physical Vulnerabilities

Little of the built environment (Critical Infrastructure, Key Resources and Building Stock) is vulnerable to winter storms. Pipes carrying water to households could freeze and expand causing pipes to burst. Inadequately heated or insulated homes may resort to heating by kerosene heaters or stoves. These methods of heating are dangerous and contribute to carbon monoxide poisoning and household fires. Agricultural interests are more vulnerable to winter storms and frost can destroy crops. Crops most vulnerable to winter storms and freezes are the ones that are grown during the winter months and harvested

in the spring months including cantaloupe, carambola, celery, cucumbers, dragon fruit, eggplant, fennel, guava, green beans, herbs, jackfruit, longyan, lychee, mushrooms, onions, papaya, passion fruit, plantains, radishes, sapodilla, spinach, squash, strawberries, sweetcorn, thyme, tomatoes and zucchini.

Social Vulnerabilities

Extreme cold weather is a particularly dangerous hazard for at risk populations such as the homeless, elderly, low income or people living in homes without heating or means to keep warm. These populations include those who have a difficult time keeping warm or finding a heat source during an extreme cold event. The homeless are particularly at risk. Age groups such as the elderly and infants have limited physiological capability to keep warm. It is estimated that there are 3,472 homeless individuals reside in Miami-Dade County as of April 2019. Larger concentrations of homeless tend to be near the downtown Miami and Miami Beach areas. Body warming mechanisms such as "goose bumps" and shivering are restricted in these groups. Outdoor animals and pets are also at risk of extreme cold temperatures. In the event that ambient temperatures in the county are forecasted to be at or below 50 degrees Fahrenheit for any period of time the Miami-Dade Homeless Trust will open and operate cold weather shelters.

Frequency/Probability

According to the annual frequency data of 2005-2021 from the local NWS office, Miami-Dade County experiences 0.3 Cold Wave events per year. This frequency was determined based on the issuance of wind child warnings or current extreme cold warning products by NWS Miami.

Extreme Heat

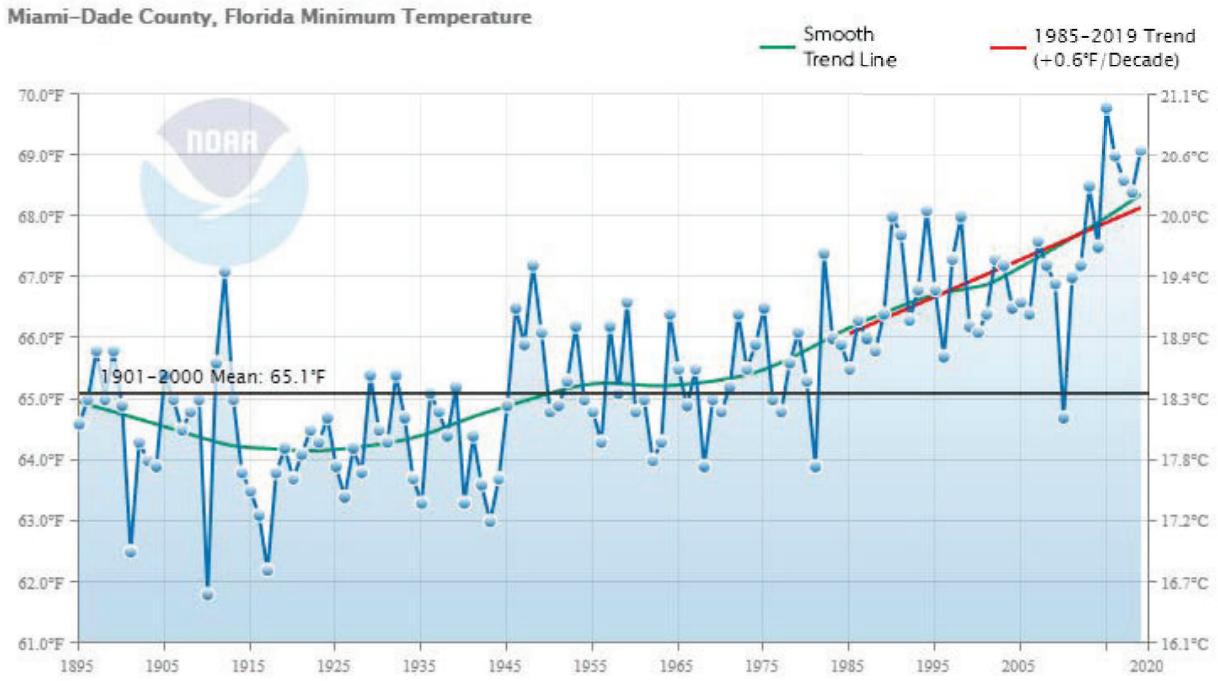
Description

Extreme heat is defined as temperatures that are approximately 10 degrees or more above the average high temperature for a given region lasting a prolonged period of time, usually several days or weeks. In Miami-Dade County, extreme heat advisories are issued when the heat index is projected to reach 105 degrees Fahrenheit for two or more hours. Extreme heat occurs when a layer of high atmospheric pressure descends over a geographical area. High pressure causes the air normally located high in our atmosphere to descend, compress, and increase in temperature. This leads to hazy, humid, and muggy air. High pressure systems can reside in an area for weeks as they are resistant to being moved by other weather systems. In addition, high pressure inhibits wind and clouds which normally mitigates the effects of the sun.

Every year, many municipalities experience periods in which the air temperature and humidity creates conditions that could potentially harm human health. Urban areas in particular experience a “heat island” effect. Urban heat island is when an urban area experiences warmer temperatures than its surrounding rural areas. This is caused by large amounts of concrete absorbing heat from the sun during the day. The heat releases at night keeping temperatures high and allowing little time for cooling. This can lead to increased energy demands and stress at-risk populations, especially those without access to air conditioning.

Studies indicate that climate change is expected to make extreme heat worse. According to the National Weather Service, in the summer of 2021, Miami observed 60 days of temperatures at or above 90°F.[45] In 2023, 42 days at or above 105°F and in 2024, 60 days at or above 105°F. By comparison, the 14 years before 2023 had an average of 6 days per year that reached the same temperature for more than two hours. As shown in the graph below, Miami-Dade County's minimum temperature has been warming at a rate of +0.6°F per decade since 1985. Depending on how greenhouse gas emissions are managed, there are different future warming scenarios predicted for South Florida. Days with a high heat index in South Florida are also projected to increase with climate change. Additionally, if greenhouse gas emissions continue without mitigation, Miami-Dade is projected to have 14 "off the chart" heat index days by late century (2070-2099), "off the chart" being a value of over 135°F.

[45] Understanding Heat Exposure in Miami-Dade County: https://storymaps.arcgis.com/stories/6f1e91cf8a8e4d5d9bd67525575c042e



This graph shows the minimum temperature in Miami-Dade county from 1895 - 2020.

MIAMI-DADE COUNTY				
Heat Index above	Historical (1971-2000)	By midcentury (2036-2065)	By late century (2070-2099)	By late century, if we limit warming to 2°C (2070-2099)
90℉ ------	154 days	187 days	200 days	183 days
100℉ ------	41 days	134 days	166 days	115 days
105℉ ------	7 days	88 days	138 days	60 days
Off the Charts	0 days	1 days	14 days	0 days

This image shows the Southeast Florida Regional Climate Change Compact heat index projection for Miami-Dade.

Heat Index

Heat index is a measurement created by the National Weather Service to illustrate the apparent temperature (i.e. the temperature the human body generally feels) when the air temperature is combined with the relative humidity. The heat index is generally used to determine the effects the temperature and humidity can have on the population. Heat index values are reduced by shady, light wind conditions. Full sunshine conditions can increase heat index values by up to 15 degrees.

TABLE 6A-15 HEAT INDEX

Relative Humidity	Temperature															
	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	109	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	114	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	118	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	124	137			
60	82	84	88	91	95	100	105	110	116	123	129	129				
65	82	85	89	93	98	103	108	114	121	126	130					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution	Extreme Caution	Danger	Extreme Danger

Source: National Oceanic and Atmospheric Administration

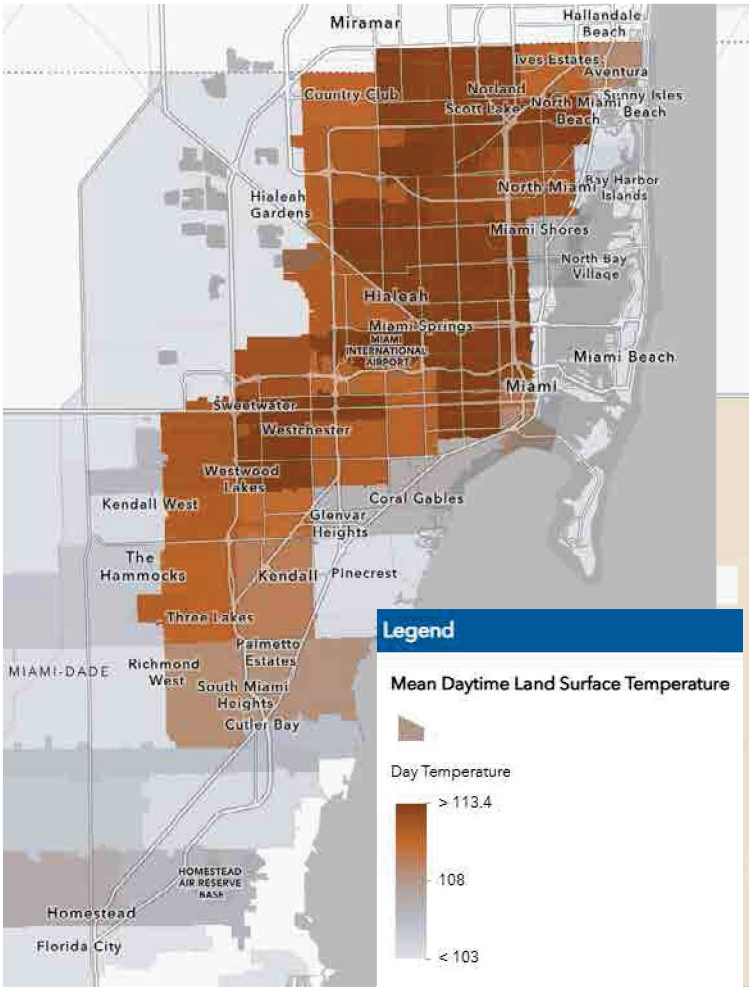
Location

The entire county and all its participating jurisdictions are at risk for extreme heat, but several factors could make an area more, or less, vulnerable to the effects of heat. In a study by the Miami-Dade County Office of Resilience, these factors included average daytime land surface temperature, percentage of impervious surface, percentage of urban tree canopy, and percent of outdoor workers. The study also measured vulnerability of certain areas by the number of heat related hospitalizations. For detailed information and all the GIS maps from this study please reference the Miami-Dade County Heat Vulnerability Assessment.[46] The selected maps below, drawn from this assessment, tell a story about the different levels of vulnerability for each jurisdiction based on specific factors. Additional information about these factors could also be found below.

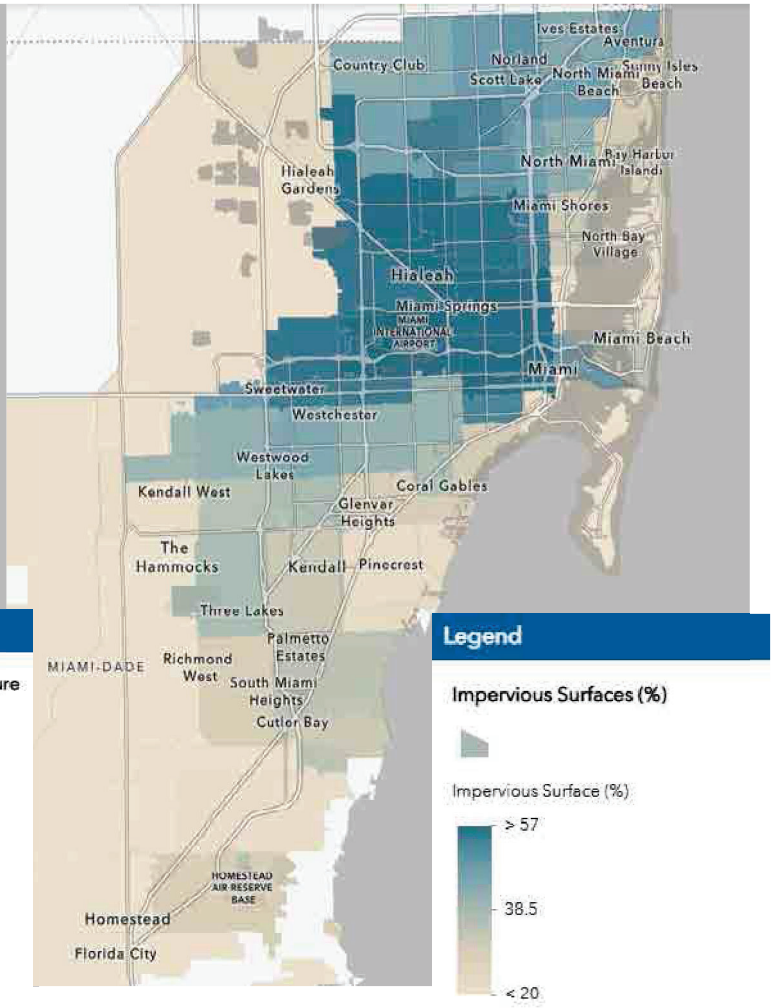
- Daytime Land Surface Temperature - 1 km MODIS satellite data averaged from 2003-2021 at 1:30 p.m.
- Impervious Surfaces - Surfaces that allow little or no storm water infiltration into the ground such as concrete or pavement. High amounts of these materials warm the surface.

[46] Understanding Heat Exposure in Miami-Dade County: https://storymaps.arcgis.com/stories/6f1e91cf8a8e4d5d9bd67525575c042e

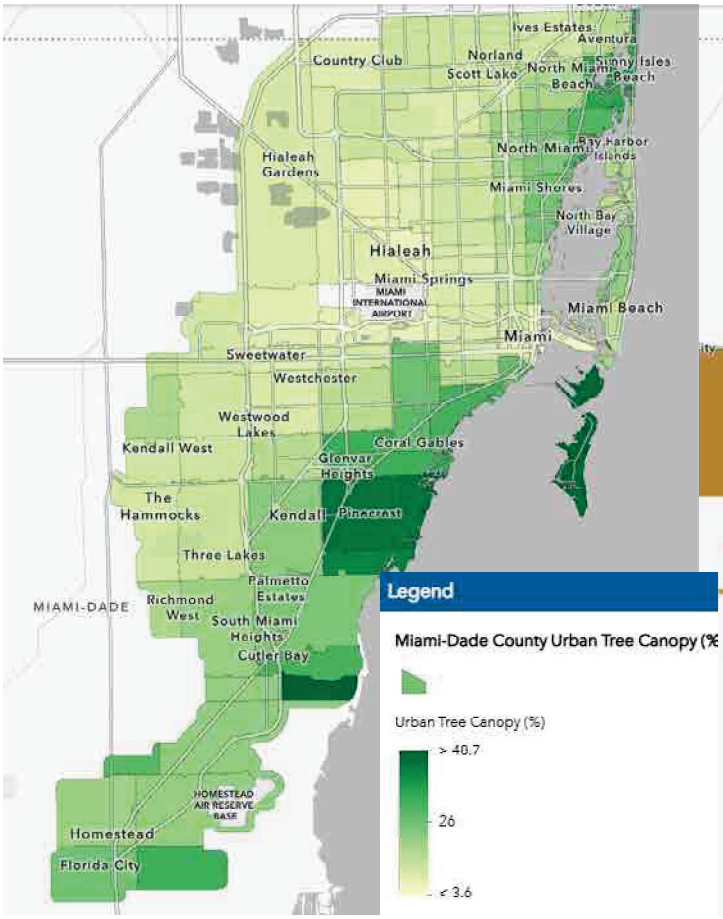
- Urban Tree Canopy - The percent of each zip code covered in shrubs or trees. Trees help cool surface temperatures through evapotranspiration.
- Outdoor Workers - Those who work in hot and humid conditions experience elevated health risks to heat related illnesses and death.



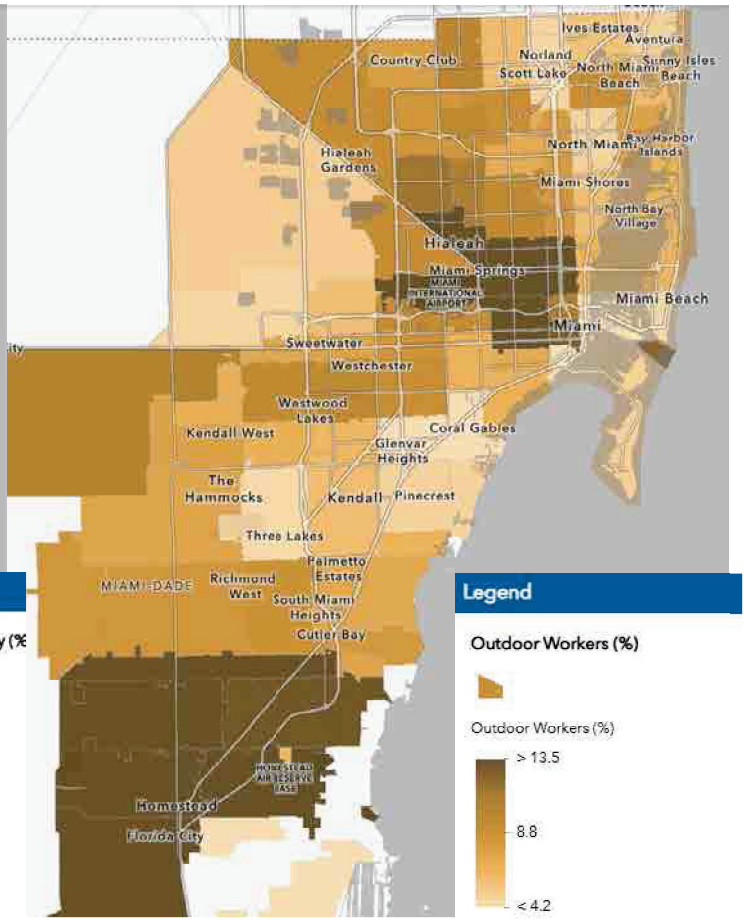
Mean Daytime Land Surface Temperature



Impervious Surface (%)



Urban Tree Canopy (%)



Outdoor Workers (%)

Extent

The average annual high temperature in Miami-Dade County is 84.2ºF, and the average annual relative humidity is 83% in the morning and 61% in the afternoon. The heat index has reached up to at least 110ºF.

Extreme heat is typically seasonal in nature with heat waves occurring in the summer months. However, heat waves are associated with high pressure systems and can occur in late spring and early fall as well. For regions in southern latitudes, extreme heat events can occur any time of the year. High pressure systems associated with heat waves can move into an area within a matter of days. These systems are resistant to being moved by other systems and can affect a region for days, weeks, or months. The frequency of extreme heat is dependent on weather patterns within a particular region. Weather patterns are affected by many variables including ocean currents, jet streams, and man's footprint on the environment.

In the event of extreme heat, the National Weather Service will issue heat advisories based on heat indices through media messages. The National Weather Service provides assistance to state and local health officials in preparing emergency messages in severe heat waves in addition to issuing special weather statements such as who are at most risk, safety rules, and the severity of the hazard. The National Weather Service will also aid state and local authorities on issuing warnings and survival tips. State and local health officials will be responsible to check on vulnerable populations such as the disabled and the elderly. Residents will be notified to remain indoors and refrain from strenuous activities. They will also be reminded to consume fluids often throughout the day and to stay near air conditioning, fans, and so forth. Exposure to extreme heat can result in various health issues such as sunburn, dehydration, heat cramps, heat exhaustion, and heat stroke. The following table lists some common health hazards that correspond to a certain range of heat index and how dangerous the conditions may be:

TABLE 6A-17HEAT HEALTH HAZARDS

Category	Heat Index	Health Hazards
Extreme Danger	130° F- Higher	Heat stroke/ Sunstroke is likely with continued exposure
Danger	105° F- 129° F	Sunstroke, muscle cramps, and/or heat exhaustion with prolonged exposure and/or physical activity.
Extreme Caution	90° F- 105° F	Sunstroke, muscle cramps, and/or heat exhaustion with prolonged exposure and/or physical activity.
Caution	80° F- 90° F	Fatigue possible with prolonged exposure and/or physical activity.

Source: National Weather Service

Impact

Impact to Miami-Dade County Residents

Population groups that may be more vulnerable to the impacts of extreme heat include children, the elderly, pregnant women, individuals with respiratory illnesses, outdoor workers, and transients. Children tend to be especially vulnerable to extreme heat. Their small bodies can overheat more quickly than adult bodies because they do not have fully developed temperature regulation mechanisms, they are not always able to recognize the physical symptoms associated with heat illness, and they tend to spend more time outdoors than adults. Elderly adults and the disabled may be vulnerable because they are frailer and the possible interaction of high temperatures with certain medications and side effects (including dehydration). This population may also be socially alienated, reducing their social support system. Low-income households may not be able to afford air conditioning. Individuals with respiratory illnesses are also vulnerable because extreme heat increases the production of ground-level ozone, a known respiratory irritant. Finally, transients may be vulnerable for a few reasons; tourists may not follow heat warnings and continue to pursue outdoor activities, and the homeless may not have a place to find respite from the heat or enough clean water to stay

hydrated. The consequence of such an incident will be dependent upon the location, scale, magnitude and extent of the incident in addition to the aforementioned vulnerabilities and community conditions described above.

Consequences related to the public following an extreme heat event may include:

- Increased need for medical care, causing a potential surge at local hospitals

Impact to Essential Facilities and Other Property
All essential facilities and buildings could be vulnerable to extreme heat. An essential facility could encounter many of the same impacts as any other building within the jurisdiction. These impacts will vary based on the temperature caused by extreme heat, but can include temporary loss of facility functionality (e.g., a police station with a power outage causing no air conditioning may be temporarily unable to serve the community).

Consequences related to essential facilities and property following an extreme heat event may include:

- Loss of building function (e.g., power outage at a residence may temporarily be uninhabitable, causing residents to seek shelter).
- Business/service interruption, causing an impact to the local economy as well as individual households

Impact to Critical Infrastructure
Spikes in usages of electricity to meet air conditioning demands could cause a strain on the electric infrastructure and possibly cause rolling blackouts or outages. Extreme heat could impact agricultural and aquaculture interests and exacerbate animal or plant diseases. In 2014, South Florida Water District had to provide additional water for the Turkey Point Nuclear Power Plant cooling canals in order to maintain the desired operational temperature range.

Consequences related to critical infrastructure following an extreme heat may include:
- Disruption in the transportation of goods
- Shortage of production of agriculture and livestock
- Disruption to the power grid

Impact to Environment
Extreme heat events can exacerbate drought, and hot, dry conditions can cause wildfire events. Infrastructure such as buildings and roads absorb heat and can increase temperatures. Extreme heat may kill animals and damage farmland.

Consequences related to the environment following an extreme heat event may include:

- Trees and plants could be ignited by extreme heat causing wildfires
- Disruption of the ecosystem causing various species to be extinct

- Increase in temperatures contribute to global warming, increasing the possibility of other hazards.

Previous Occurrences

July 6, 2023 — Hot and very moist southerly winds across South Florida led to heat index values in the 105 to 109 range across the area. A Heat Advisory was in effect for all of South Florida. Broadcast media reported the death of a 30-year-old agricultural worker found under a tree at his worksite in Homestead. Information from the county medical examiner's office indicates that heat exposure was a likely contributing factor, along with other complicating factors.

July 11, 2022 — Temperatures across South Florida were in the lower 90s with relative humidity values over 50%. This led to high heat index values and contributed to the death of a child who was left in a car during the afternoon.

July 25, 2017— High pressure in place with abundant moisture led to high temperatures and dewpoints. This led to the heat index reaching 108-110 degrees. With these high heat indices many people were treated for heat related illness at Miami Beach.

September 8, 2011— Very warm and humid weather conditions led to heat indexes near 110 degrees across northeast Miami-Dade County. Eight students were treated for heat-related illnesses at Ruth Broad Bay Harbor K-8 Center in Bay Harbor Islands after physical education class. One student was transported to a hospital and the other seven students were treated at the scene. Temperatures were around 90 degrees with relative humidity values around 70 percent near the time of the event, yielding heat index values in the 106 to 111 degree range.

November 15, 2011— Unseasonably warm and humid weather occurred across south Florida through the middle of November in association with southeast wind flow around a high-pressure area over the Atlantic.

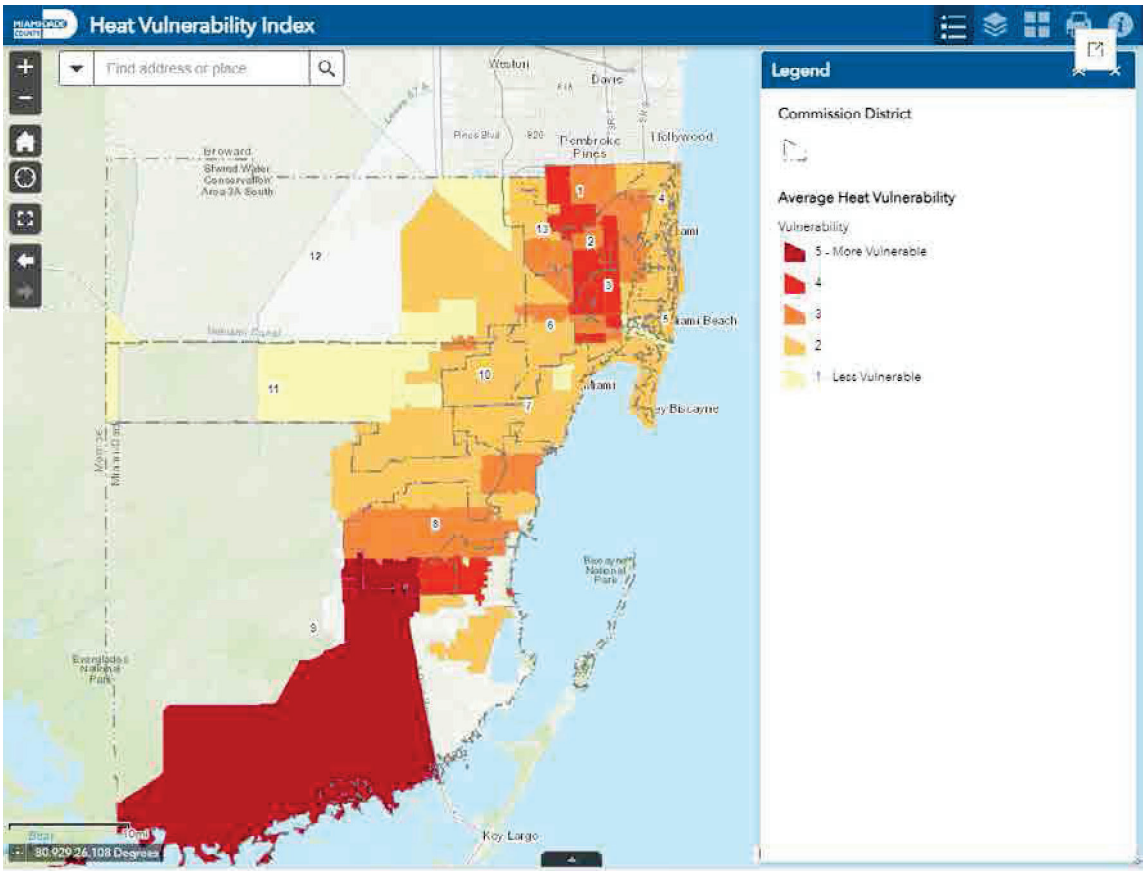
June 2009 – Strong surface west winds ahead of a rare late June cold front over north Florida along with strong high pressure aloft led to record heat over southeast Florida. Many locations over the southeast Florida metro area reached the upper 90s, falling just short of the 100 degree mark. Miami International Airport tied an all-time record for June with a reading of 98 degrees, and West Palm Beach broke a daily record with a high of 96. Moore Haven in Glades County reached 100 degrees.

Vulnerability

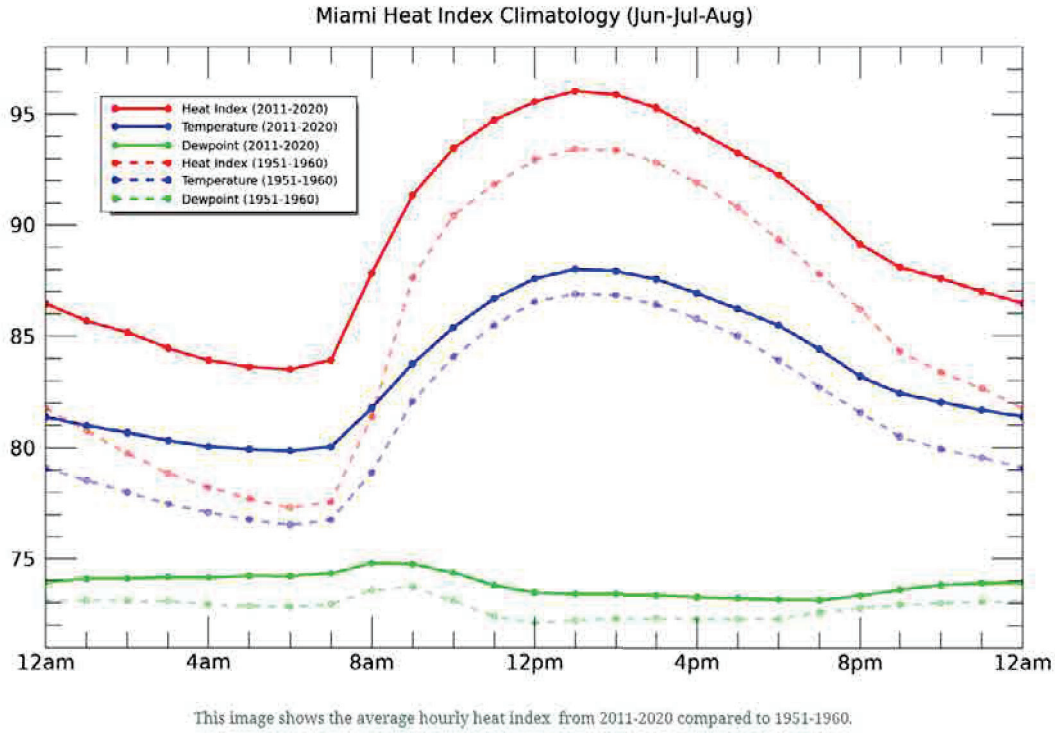
Based on scores from the Hazard Impact Analysis found in the THIRA and summarized on the table below, Miami-Dade County has a high overall vulnerability to extreme heat.

Extreme Heat			
Category		Vulnerability*	Risk*
Social (People, etc.)	Special Populations	Vulnerable	High
	Cultural Conditions	Somewhat Vulnerable	Medium
	Socioeconomic Conditions	Vulnerable	High
Physical (Property, etc.)	Critical Infrastructure	Somewhat Vulnerable	Medium
	Key Resources	Somewhat Vulnerable	Medium
	Building Stock	Somewhat Vulnerable	Medium
Community Conditions (Environment, Operations, etc.)	Economic Conditions	Somewhat Vulnerable	Medium
	Social Conditions	Somewhat Vulnerable	Medium
	Environmental Conditions	Vulnerable	High
	Governmental Conditions (inc. Operations)	Somewhat Vulnerable	Medium
	Insurance Conditions	Somewhat Vulnerable	Medium
	Community Organizations	Somewhat Vulnerable	Medium

**Vulnerability ratings take in consideration baseline vulnerabilities described in THIRA Volume 2 with adjustment based on this specific hazard. Risk ratings consider probability & frequency, potential magnitude & scale, vulnerabilities, potential impacts, capabilities, and mitigation efforts related to this specific hazard.*



Source: Miami-Dade Extreme Heat Vulnerability Mapping Report (Uejio and Ahn, 2022).



Source: Miami Heat Index and Dewpoint Climatology for Miami, FL (McNoldy, B. D., 2022)

Physical Vulnerabilities

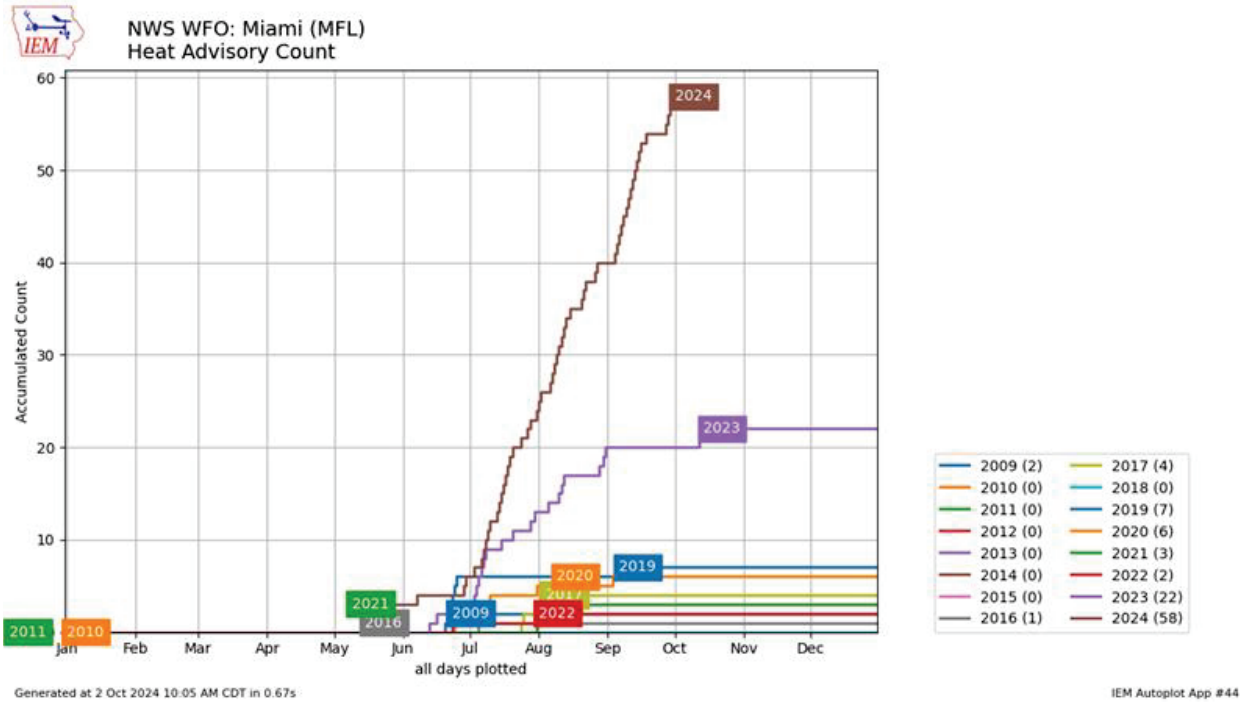
Due to various exposure and sensitivity factors some neighborhoods experience increased risk to extreme heat effects. Neighborhoods with less trees and green space as well as densely populated urban areas are more vulnerable to the effects of extreme heat due to the Urban Heat Island Effect. Trees help cool surface temperatures through evapotranspiration. High amounts of impervious surfaces allow little or no storm water infiltration into the concrete ground which would help cool the area. All essential facilities and buildings could be vulnerable to extreme heat. An essential facility could encounter many of the same impacts as any other building within the jurisdiction. These impacts will vary based on the temperature caused by extreme heat, but can include temporary loss of facility functionality.

Social Vulnerabilities

All people in Miami-Dade are at risk, but some groups are more sensitive than others. High-risk groups for heat related illnesses include adults over 65 years, young children, homeless population, pregnant women, lower-income populations, outdoor workers, people recreating outside, athletes, and people with pre-existing (heart, lung, kidney) conditions who take certain medications that reduce their body's ability to keep cool.

Frequency/Probability

Since 2019, Miami-Dade has experienced a significant increase in the number of days of documented extreme heat based on heat advisories given by the National Weather Service Weather Forecast Office. A heat advisory is issued when the heat index value is expected to reach 105 to 110 degrees for at least 2 consecutive days, this being a lower threshold established by the NWS Office in Miami since 2023. The number of advisories has averaged nineteen annually in the past five years. With this pattern, it is likely that extreme heat events will continue to happen at a higher frequency than ever.



Epidemic/Pandemic

Description

An epidemic is a widespread occurrence of an infectious disease in a community at a particular time. According to the Dictionary of Epidemiology, a pandemic is an epidemic occurring worldwide, or over a very wide area, crossing international boundaries and usually affecting many people. For the World Health Organization (WHO) to label an ailment as a pandemic (recently, often influenza based), it must meet three requirements:

- Able to infect humans
- Able to cause disease in humans
- Able to spread from human to human easily

Pandemics can be spurred from a number of illnesses, including influenza, cholera, smallpox, typhus, measles, tuberculosis, leprosy, malaria and yellow fever. This hazard section will tend to focus on pandemic influenza, as it is the highest pandemic threat in the United States.

Influenza is a virus that occurs on seasonal basis and presents itself in one of many different genetic combinations. Influenza has been classified into three types of viruses: A, B and C. The A and B viruses are responsible for seasonal epidemic spikes and cause illness in 5% to 20% of the population. The C virus is less virulent and causes only mild respiratory illness. Once the influenza is introduced to a host, it has the ability to replicate itself billions of times resulting in illness. Due to its persistence in the population and its seasonal nature, humans have developed a natural resistance to many of the genetic variations of the influenza virus. However, when a novel genetic variation presents itself in a population, humans will be absent their natural resistance to the virus. This will allow the virus to spread rapidly from host to host causing larger than normal morbidity and mortality rates. This occurrence is classified as pandemic influenza.

Pandemics typically occur in waves lasting anywhere from six to eight weeks. As immunity is developed within a population, the virus will recede for a period of 8-12 weeks. The virus will then reemerge slightly mutated for another wave lasting six to eight weeks. This process repeats during a pandemic two to three times.

Symptoms of pandemic influenza vary depending on the virulence of the strain but mirror typical seasonal symptoms including, fever, coughing, sore throat, congestion headaches, soreness in the muscles and joints, chills and fatigue. During a pandemic, these symptoms can be severe resulting in hospitalizations and death.

The most effective strategy to combating pandemic influenza is vaccination. However, since a pandemic is caused by a novel strain, it is likely vaccine will not be available for the first wave and sometimes not until the middle of the second wave. Alternate

strategies for mitigation include the use of antiviral medication, antibiotics for bacterial pneumonia often associated with influenza, social distancing, and public health hygienic practices.

SARS-CoV-2

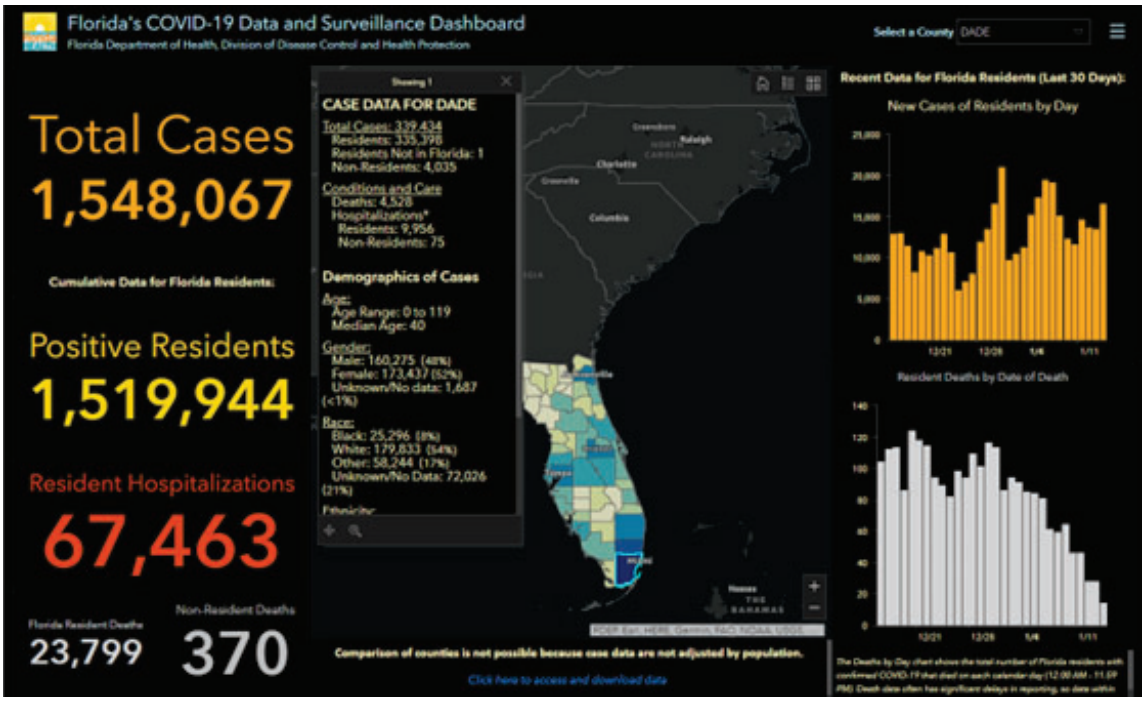
The World Health Organization (WHO) reports that the current COVID-19 pandemic is caused by a coronavirus named SARS-CoV-2. Coronaviruses (CoVs) are a large family of viruses, several of which cause respiratory diseases in humans, from the common cold to more rare and serious diseases such as the Severe Acute Respiratory Syndrome (SARS) and the Middle East respiratory syndrome (MERS), both of which have high mortality rates and were detected for the first time in 2003 and 2012, respectively.

The first cases of COVID-19 were reported in late December 2019 directly linked to the Huanan Wholesale Seafood Market in Wuhan, China where seafood, wild, and farmed animal species were sold. After investigation by the WHO, it was found that many of the initial patients were either stall owners, market employees, or regular visitors to this market. Environmental samples taken from this market in December 2019 tested positive for SARS-CoV-2, further suggesting that the market in Wuhan City was the source of this outbreak or played a role in the initial amplification of the outbreak.

On January 20, 2020, the U.S. Centers for Disease Control and Prevention (CDC) activated its EOC to support public health partners response to the outbreak identified in China. On January 30, 2020, the International Health Regulations Emergency Committee of the World Health Organization (WHO) declared the outbreak a public health emergency of international concern. The next day, U.S. Health and Human Services (HHS) Secretary, Alex M. Azar II, declared a public health emergency for the United States to aid the nation's health care community response to COVID-19.

On March 11, 2020, the Florida Department of Health (FDOH) confirmed the first COVID-19 case in Miami-Dade County. On the same day, the WHO declared COVID-19 a pandemic—as the virus began to rapidly spread to a growing number of countries. After Miami-Dade County Mayor, Carlos Gimenez, declared a Local State of Emergency in Miami-Dade County, the Miami-Dade EOC activated to a Level 2 (Partial) to support healthcare, public safety, and municipal partners in emergency preparedness efforts and response operations.

FIGURE 6A-7 – FLORIDA'S COVID-19 DATA AND SURVEILLANCE DASHBOARD JAN. 2021



Source: FDOH, Division of Disease Control and Health Protection

Location

The entire county is vulnerable to epidemics and pandemics. Locations of high density may be more at risk than others (schools, universities, large work buildings, etc.).

Extent

In contrast to seasonal influenza when it occurs during the late fall and early winter months, pandemic influenza can occur during any month or season. Pandemic Influenza generally occurs in multiple waves (2 to 3) that last a period of six to eight weeks each. Generally, each wave will occur approximately 12 weeks apart. Once a novel strain of influenza can achieve human to human transmission, the pandemic is expected to spread rapidly and across geographic barriers. Although the likelihood of pandemic is a certainty, their frequency is difficult to predict. In the 20th century, there were three influenza pandemics. In the 21st century, there has been one to date. There has been an average 3 pandemics per century, occurring at intervals of 10-50 years. Pandemic influenza is characterized based on its ability to spread, not its virulence. Pandemics in the past have ranged from severe to mild. The severity of

pandemic influenza has varied in the past, but estimates range from an infection rate of 30% to 40%. Mortality rates will depend on the virulence of the strain. The 1918 strain had an estimated mortality rate of 3% of infected persons.

The Pandemic Severity Index (PSI), released by the U.S. Department of Health and Human Services, categorizes flu pandemics on a scale of 1 to 5, with 5 being the deadliest, similar to the Saffir-Simpson Scale. The benefit of categorizing pandemic intensity is the correlated preventative recommendations.

TABLE 6A-13 PANDEMIC SEVERITY INDEX

Category	Case Fatality Ratio (CFR)	Projected Number of Deaths (US Population, 2006)*
1	<0.1%	<90,000
2	0.1% - <0.5%	90,000 - <450,000
3	0.5% - <1.0%	450,000 - <900,000
4	1.0% - <2.0%	900,000 - <1,800,000
5	≥=2.0%	≥=1,800,000

*Source: Centers for Disease Control and Prevention, *Assumes 30% illness rate*

TABLE 6A-14 COMMUNITY STRATEGIES BY PANDEMIC FLU SEVERITY

Interventions by Setting	Pandemic Severity Index		
	1	2 and 3	4 and 5
Home			
Voluntary isolation of ill at home (adults and children); combine with use of antiviral treatment as available and indicated	Recommended	Recommended	Recommended
Voluntary quarantine of household member in homes with ill persons (adults and children); consider combining with antiviral prophylaxis if effective, feasible, and quantities sufficient	Generally not Recommended	Consider	Recommended
School			
Dismissal of students from schools and school-based activities, and closure of child care programs	Generally not Recommended	Consider: ≤= 4 weeks	Recommended ≤= 12 weeks
Reduce out-of-school contacts and community mixing	Generally not Recommended	Consider: ≤= 4 weeks	Recommended ≤= 12 weeks
Workplace/Community			
Decrease number of social contacts (e.g. encourage teleconferences, alternative to face-to-face meetings)	Generally not Recommended	Consider	Recommended

Interventions by Setting	Pandemic Severity Index		
	1	2 and 3	4 and 5
Increase distance between persons (e.g. reduce density in public transit, workplace)	Generally not Recom-mended	Consider	Recom-mended
Modify, postpone, or cancel selected public gath-erings to promote social distance (e.g. stadium events, theater performances)	Generally not Recom-mended	Consider	Recom-mended
Modify workplace schedules and practices (e.g. telework, staggered shifts)	Generally not Recom-mended	Consider	Recom-mended

Source: Centers for Disease Control and Prevention

Impact

Impact to Miami-Dade County Residents

As mentioned above, due to Miami-Dade County's large population and high levels of international travel and trade, the county may experience greater incidence and prevalence of epidemics and pandemics, especially those coming from Central and South America. The specific populations who are most at-risk are children, the elderly, and those who are disabled. Young children have an immune system that is not fully developed and may be a detriment to fighting off an illness. The elderly and the disabled have weakened immune systems that may not be strong enough against an epidemic/pandemic. Schools and universities may need to adjust their schedule and/or services offered depending on the severity of the outbreak and choose to limit students per classroom. Additionally, the economy may be damaged if workers are unable to perform; they may be sick, caring for someone who is sick, or the office may be closed. Certain population groups may be impacted and/or more vulnerable based on location/proximity to the incident or other social vulnerability condition(s).

Although not exhaustive, the following is a list of potential social populations that may be more heavily affected by this hazard than other groups.

- Children
- Disabled
- Elderly

Consequences related to the public following an epidemic/pandemic may include:

- Increased need for medical care, causing a potential medical surge at local hospitals
- Temporary/permanent loss of employment/business income, causing an increased need for loans due to employees falling sick
- Temporary loss of services/utilities, medical personnel falling ill and staff shortages

Impact to Essential Facilities and Other Property
Epidemics and pandemics typically do not affect physical structures, essential services, or other key community assets, however emergency services and healthcare providers may be overwhelmed by the amount of people seeking treatment or a medical surge.
Building Inventory: Epidemics and pandemics typically do not affect building inventory.
For more information on vulnerabilities to key resources and building stock, please refer to the respective section in the Vulnerability Index & Assessment (THIRA Volume II, pages 79 - 168).

Consequences related to essential facilities and property following an epidemic/pandemic may include:

- Business/service interruption, causing an impact to the local economy as well as individual households due to employees falling sick (e.g. staff shortages)

Impact to Critical Infrastructure
Epidemics and pandemics typically do not affect physical structures, essential services, or other key community assets.

Consequences related to critical infrastructure following an epidemic/pandemic may include:

- Shortage of medical supplies dependent on the scale and magnitude of the epidemic/pandemic

Impact to Environment
Epidemics and pandemics typically do not affect the environment negatively, however, air quality may significantly improve, and ecological systems may be restored.

No consequences related to the environment following an epidemic/pandemic.

Impact to Operations
Vulnerabilities associated with an epidemic/pandemic are impacts to emergency services and possible medical surges at hospitals.

Consequences related to operations following an epidemic/pandemic may include:

- Continued delivery of services, life safety operations, etc. may require the use of mutual aid and emergency contracts
- Shortage of medical personnel and supply chain issues for medical supply
- Continuity of Operations Plans may need to be activated to address impacts to systems and essential functions

Consequences related to responders following an epidemic/pandemic may include:

- Increased potential for human to human transmission while performing response (e.g. EMS teams, medical personnel, fire rescue)
- Staff shortages requiring activation of mutual aid agreements

Slow recovery from an epidemic/pandemic could also impact the local economy. Businesses seriously impacted by an epidemic/pandemic may close permanently due to short staff or simply no business.

Previous Occurrences

Only notable occurrences, if applicable, have been included in this section; and this section does not represent an all-inclusive list of past hazard incidents/events.

Miami-Dade County

There have been no instances of an epidemic only affecting Miami-Dade County.

2009 (Swine Flu-H1N1): H1N1 was first detected in the United States in April 2009. The virus genes were a combination of genes most closely related to North American swine-lineage H1N1 and Eurasian lineage swine-origin H1N1 influenza viruses. Because of this, initial reports referred to the virus as a swine origin influenza virus. The CDC estimates about 55 million people were infected, 246,000 H1N1-related hospitalizations, and 11,160 H1N1-related deaths in 2009. There were 3,676 confirmed cases in Florida and 230 confirmed deaths, with the first cases appearing in Lee and Broward Counties. According to weekly Swine Flu Surveillance Reports published by the Florida Department of Health, at least 38 people came down with Swine Flu in Miami-Dade County.

1918 (Spanish Flu): The influenza pandemic of 1918-1919 was one of the deadliest epidemics in history, causing influenza-related symptoms in more than 20% of the world's population and claiming more than 21 million lives worldwide. It spread along trade routes and shipping lines. Outbreaks swept through North America, Europe, Asia, Africa, Brazil and the South Pacific. World War I probably aided in its rapid diffusion and attack through the mass movements of men in armies and aboard ships. A study attempted to reason why the disease had been so devastating in certain localized regions, looking at the climate, the weather and the racial composition of cities. They found humidity to be linked with more severe epidemics. Therefore, Miami-Dade County may be more susceptible to influenza pandemics than other, drier locations.

Florida

2014/2015 Flu Season (H3N2): Florida was among 22 states where the CDC claimed influenza reached epidemic levels. By the end of 2014, 15 children had died due to flu complications, one of which was in Tampa Bay. The epidemic comes during a season

where the flu vaccine was not well-matched to the predominant circulating flu strains. The Florida Health Department estimated that between 15% & 40% of the population is likely to develop the flu.

Vulnerability

Based on scores from the Hazard Impact Analysis found in the THIRA and summarized on the table below, Miami-Dade County has a high overall vulnerability to epidemics/pandemics.

Epidemic/Pandemic			
Category		Vulnerability*	Risk*
Social (People, etc.)	Special Populations	Very Vulnerable	High
	Cultural Conditions	Vulnerable	High
	Socioeconomic Conditions	Vulnerable	High
Physical (Property, etc.)	Critical Infrastructure	Minimally Vulnerable	Low
	Key Resources	Vulnerable	High
	Building Stock	Minimally Vulnerable	Low
Community Conditions (Environment, Operations, etc.)	Economic Conditions	Vulnerable	High
	Social Conditions	Vulnerable	High
	Environmental Conditions	Minimally Vulnerable	Low
	Governmental Conditions (inc. Operations)	Somewhat Vulnerable	Medium
	Insurance Conditions	Somewhat Vulnerable	Medium
	Community Organizations	Somewhat Vulnerable	Medium

**Vulnerability ratings take in consideration baseline vulnerabilities described in THIRA Volume 2 with adjustment based on this specific hazard. Risk ratings consider probability & frequency, potential magnitude & scale, vulnerabilities, potential impacts, capabilities, and mitigation efforts related to this specific hazard.*

Physical Vulnerabilities

Physical structures, essential services, and other key community assets are not typically vulnerable to epidemics or pandemics.

Social Vulnerabilities

The most vulnerable population would depend on the unique features of the illness causing the epidemic or pandemic. With COVID-19, those with previous health conditions and the elderly were most at-risk as well as those special populations within lower socio-economic communities or densely populated communities that could not establish many protective social distancing measures. However, the entire population in Miami-Dade County is vulnerable to epidemics and pandemics, especially when considering the high levels of international travel and trade that occur within the county.

Frequency/Probability

The frequency and probability of an epidemic/pandemic is difficult to predict. As mentioned previously, in contrast to seasonal influenza when it occurs during the late fall and early winter months, pandemic influenza can occur during any month or season. Pandemic Influenza generally occurs in multiple waves (2 to 3) that last a period of six to eight weeks each.

Data Sources

We have identified the following data sources as being important and comprehensive to the development of this plan and the accomplishment of our mitigation goals moving forward.

Federal Emergency Management Agency (FEMA)

- National Flood Insurance Program repetitive loss inventory.
- Flood Insurance Rate Maps, hurricane storm surge maps, and previous natural hazard computer modeling results.
- The FEMA website www.fema.gov has a wealth of accumulated data that can be extremely valuable in developing mitigation measures.

Other U. S. Government Databases and Information Sources

- National Hurricane Center and the National Oceanographic Atmospheric Administration (NOAA) historical storm related data (including, National Climatic Data Center).
- The National Weather Service Miami Forecast Office data files.
- National Hurricane Center “SLOSH” models.
- National Priorities List (NPL)
- Comprehensive Environmental Response, Compensation and Liability Information System List (CERCLIS – the “Superfund”)
- No Further Remedial Action Planned List (NFRAP)
- Emergency Response Notification System List (ERNS)
- RCRA Corrective Action Tracking System List (CORRACTS)
- Resource Conservation and Recovery Information System List (RCRIS)
- Hazardous Waste Data Management System List (HWDMS)
- Facility Index Data System List (FINDS)
- Toxic Release Inventory System List (TRIS)
- U. S. Immigration and Naturalization Service databases.

State of Florida

- Florida State University Department of Meteorology hurricane historical database.
- State-Funded Action Sites List (SFAS).
- State Sites List (SITES).
- Solid Waste Facilities List (SLDWST).
- Petroleum Contamination Tracking System Report (PCTS).
- Stationary Tank Inventory System List (TANKS).

- Hazardous Waste Compliance & Enforcement Tracking System List (COMHAZ).
- South Florida Water Management District (SFWMD).

Miami-Dade County

- Municipal and County Emergency Management Plans and Comprehensive Plans.
- Municipal and County Floodplain Management Plans.
- Miami-Dade Stormwater Management Master Plan and Capital Improvements Projects.
- Miami-Dade County, Division of Environmental Resources Management (DERM) GIS database.
- Miami-Dade County, Information Technology Department, Critical Facilities Inventory and other GIS databases.
- Enforcement Case Tracking System Report (ECTS).
- Fuel Spill Report (FSPILL).
- Hazardous Waste Report (HW).
- Industrial Waste Reports.
- Underground Storage Tanks Report (UST).
- Agriculture extension services and databases.

Municipal Agencies

- Staff resources, records and data files.

Additional Resources

- The American Red Cross will provide information regarding shelters, as well as staff resources and records
- Internet web sites provided by the Florida Division of Emergency Management as part of the Local Mitigation Strategy Guidebook

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2025

PART 2:

THE PROJECTS

MIAMI-DADE
DEPARTMENT OF
EMERGENCY
MANAGEMENT

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INTRODUCTION

This part details the methodology for mitigation project submission, tracking, and prioritization[1] in Miami-Dade County. This section also includes the list of projects identified by the LMS Working Group members and highlights case studies of projects completed within the last four years. Project submissions are evaluated to ensure they meet FEMA and LMS criteria and are prioritized to determine funding order when limited funding sources under the purview of the LMS are made available.[2]

METHODOLOGY

Project Submittal and Tracking

WebEOC is an online system that allows LMSWG members to input new projects and update existing projects at any time throughout the year. The LMS Chair is responsible for the review of the projects and for providing an update to the State of Florida every January 31st. The LMS Chair will post an update of the current list of projects every January on the LMS website: https://www.miamidade.gov/global/emergency/projects-that-protect.page

It is the responsibility of the LMSWG members that post projects to ensure the projects are listed with the information that local and Federal Emergency Management Agency (FEMA) requirements identified below. The LMS Chair may also require additional information that may be required to prioritize projects because of shifting priorities.

Project Requirements

Below is a list of the project fields in WebEOC for project submission:

Project List Field	Level of Requirement	Comments
Agency Type	Local Requirement	Must be utilized to tie project to agency
Agency	Local and FEMA Requirement	Must be utilized to tie project to agency
Project Title	FEMA Requirement	Satisfies Name and Description
Entry type	FEMA Requirement	Identifies new project and project to be removed from Active List
Original Date of Entry	Default	Identifies when the project was first put in the LMS Project list.
Last Updated	Default	Identifies last date of update. If an agency fails to review and update project on an annual basis, they can be made inactive.
Status	FEMA Requirement	Current status of project. Satisfies New, Deferred, Completed or Deleted.

[1] EMAP 2016 Standard 4.2.3
[2] EMAP 2016 Standard 4.2.3

Project List Field	Level of Requirement	Comments
Hazard	Local Requirement	Allows us to sort hazard type for potential funding and identify flood projects in support of Part 6.
Project Type	Local Requirement	Allows us to sort for funding options by type of project
Mapper Label	Not Required at this time	For future use for mapping
Address	Local Requirement	Will allow us to geo-code and map projects
Longitude and Latitude	Local Suggestions	Will aid in future mapping of projects
Flood Basin	Local Requirement for Flood projects, Local Suggestion for ALL projects	Allows us to identify where mitigation projects for flooding have been identified and facilitate additional coordination and mapping. May assist with showing effectiveness of mitigation projects after significant rain events.
Completion Time Frame	FEMA Requirement	If a project is unfunded provide your best estimation as to when this project could be completed.
Mitigation Goals	Local Requirement	Shows alignment with LMS
Funding Source	FEMA Requirement	FEMA lists this a potential funding source, we split this to also identify internal funding sources or potential grant sources
Grant Source (Potential or secured)		
Is a Match Required	Local Requirement	May assist us with identifying projects for global match opportunities
Match Identified	Local Requirement	
Estimated Costs	Local Requirement	We are required to include this in the County Annual report.
Global Match	Local Requirement	Identifies if the project may be able to be used as a global match for another project in need of a match
Project Description	FEMA Requirement	
Comments	Reserved for additional notations	LMS Chair notates and changes or requests for letters of support in this area.
Attachments	Local Suggestion	Allows the agency to place supporting documents in the database with the record.
Name, Email and Phone	Local Requirement	Allows LMS Chair to contact POC directly regarding projects
BCA Completed and BCA score	Required only when funding source requires this information.	Must be completed if a letter of support is requested and the funding source requires it.
Self-Prioritization	Local Requirement	Identifies agency priorities.
Benefit Cost Review	FEMA Requirement	Provides a score based on Suitability, Risk Reduction and Cost and Time.

The LMS Chair has the responsibility for requesting that the LMS working group members update their projects and determine if these projects are missing information. This LMS Chair will also utilize the information provided to develop documents and other supporting documents such as maps to track mitigation projects. The LMS Chair will also utilize the information provided to develop documents and other supporting documents such as maps to track mitigation projects.

The projects listed later in this document are in a table format, which is an abridged version of the full project descriptions maintained in the WebEOC LMS Board. Additional information on listed projects, is available to all stakeholders with project accounts. Anyone wishing to have an account to add or review projects should make a request to the Miami-Dade County Department of Emergency Management at eoc@miamidade.gov or call 305-468-5400.

Updates and Reports

As stated in *Part 1*, the LMS is updated on an annual basis and as part of a regular update and monitoring process. To keep the project list updated, agencies with listed projects are required to review and update them within WebEOC on an annual basis by October 31. Based on those updates, the Prioritized Project List will be updated on the website each January.

In December of every year the LMS Chair is required to provide a report to the Continuity of Operations Planner as part of the Department's Annual Preparedness Report that is submitted to the County Mayor. The LMS Chair compiles information on projects that have been completed, are under construction, or are funded but not yet started since the previous year's report. This information is derived from the LMS Project list and is another way to demonstrate on an annual basis the progressive mitigation work being accomplished.

Project Administration and Implementation

The agency that submits each project is responsible for implementation and administration. Due to the variable nature of procurement and contracting procedures, availability of resources, and weather conditions, accurate implementation timelines are difficult to predict. Therefore, implementation timelines may not be developed for some projects until a funding source is identified and the factors above can be determined relative to the prevailing operating environment. Grant requirements may also dictate project implementation timelines for the appropriate recipient. If the project is funded through a grant, the grantee is responsible for implementing these projects as outlined in the grant's regulations.

Letters of Support

The LMS Chair will write a letter of support for grant opportunities when a listed project has all the required information provided, and the minimum requirements met, the LMS Chair will notify the requestor, if additional information is needed to be added to the project for a letter of support to be provided. Requests for letters must, at a mini-

mum, be requested 10 working days in advance of the required deadline. Late requests may not be able to be facilitated. The LMS Chair will make notations in the comments section as to date and action taken.

The agency requesting a letter of support must be an active participant of the LMS, meaning they comply with the requirements set forth in *Part 1* of the LMS. Currently the requirements include their organization/agency must attend at least two (2) of the four (4) previous quarterly meetings held each year or an equivalent committee or sub-committee meeting as a substitution. The other requirements are that their project in the LMS WebEOC must be updated every calendar year.

Inactive Projects

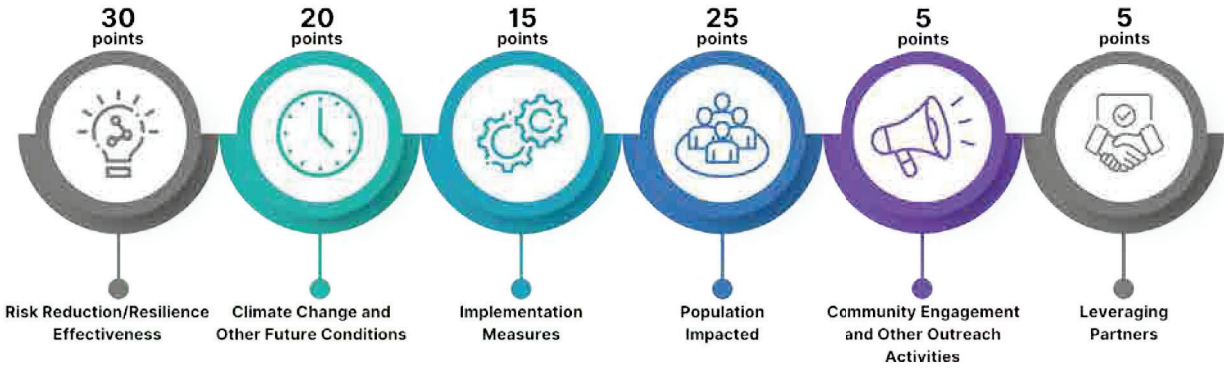
If a project has not been updated by October 31 of that same year, it will be marked *Inactive* by the LMS Chair. The agency will have until December 31 to update the project to restore the project back to active status. Projects that are not updated by that time will be deleted and archived on WebEOC.

PRIORITIZING MITIGATION PROJECTS[3]

The LMS Steering Committee is responsible for conducting the project prioritization process. The FEMA Building Resilient Infrastructure and Communities (BRIC) Qualitative Evaluation Criteria (QEC) has been adopted to prioritize mitigation projects in Miami-Dade County. The BRIC-QEC aligns with the mitigation goals and objectives of the Miami-Dade County LMS and has been developed through national stakeholder engagement. FEMA developed the qualitive evaluation criteria based on comments received during stakeholder engagement efforts in 2019. Comments indicated support for holistic project evaluation beyond economic metrics alone as well as for incentivizing partnerships and high-quality community engagement. Adopting the BRIC QEC will afford the advantage of normalizing FEMA's evaluation criteria and its implementation locally. It will also incentivize development of projects that align with FEMA's BRIC national competition. The LMS Steering Committee is responsible for reviewing project materials and scoring projects based on the QEC. The highest and lowest scores will be eliminated and the average of the remaining scores will be the final QEC project score. The BRIC QEC is divided into the following six parameters:

[3] EMAP 2016 Standard 4.2.2

BRIC Qualitative Evaluation Criteria



The LMS Steering Committee members will apply the scoring options listed in Table 1 to all six qualitative criteria for each mitigation initiative. Scores will be submitted using an online WebEOC form. Note that point values vary among each criterion. The graded scoring and point scales for each criterion are included later in this document.

Table 1: Qualitative Criteria Scoring Options

Scoring Option	Description
Not at all	The mitigation initiative does not address the criterion at all.
Minimally	The mitigation initiative addresses some of the criterion, but information in the mitigation initiative may be missing, confusing, unclear, and/or incorrect. The degree to which the mitigation initiative demonstrates the criterion is minimal, and references to the criterion do not include substantive information.
Partially	The mitigation initiative partially addresses the criterion, but the mitigation initiative may lack clarity and/or strong support, have some minor inconsistencies, or not address all components of the criterion. The degree to which the mitigation initiative demonstrates the criterion has been met is mediocre.
Mostly	Although the mitigation initiative may include a few minor inconsistencies or areas that need more clarity, there is strong support for most components of the criterion. The degree to which the mitigation initiative demonstrates the criterion has been met is acceptable.

Entirely	The mitigation initiative is clear, concise, and complete; provides examples; and is supported by data. It addresses all components of the criterion and may have a particularly compelling narrative. The degree to which the mitigation initiative demonstrates the criterion has been met is excellent.

Prompts are included for each qualitative evaluation criterion to serve as a helpful starting point for partners submitting mitigation initiatives. These prompts are designed to clarify terms and provide guiding questions for mitigation partners to consider as they develop mitigation initiatives. This information will be provided to the LMS Steering Committee members to foster a common frame of reference. Please note that answering every question, while informative, will not necessarily guarantee an "Entirely" score. Finally, prompts included here are by no means mutually exclusive or exhaustive; any additional information to support the merit of the mitigation initiative is welcome.

It is important to note that this will be one level of consideration when limited funding sources are available to fund projects in Miami-Dade County. Other considerations may include criteria of the available funding source.

There may be situations when the window for a funding opportunity is very limited and in situations like this, projects that are "shelf-ready" may be put ahead of projects that may have a higher priority. The LMS Steering Committee will work to maximize opportunities for funding and will be called upon by the LMS Chair when circumstances arise that require additional considerations to be made.

The LMS Chair or designated representative will act as the committee facilitator. The committee's primary function will be to review and act on recommendations with respect to its evaluation of mitigation initiatives and its ranking of the priorities for their implementation. Projects that may not have a QEC completed will not be considered for funding.

Qualitative Evaluation Criterion 1: Risk Reduction/Resilience Effectiveness (30 possible points)

FEMA defines resilience as the ability to prepare for anticipated hazards, adapt to changing conditions, and withstand and recover rapidly from disruption. The score received for Criterion 1 will depend upon how well the mitigation initiative details the following elements: (1) effective risk reduction, (2) effective increase in community resilience, (3) the provision of ancillary benefits, and (4) the leveraging of innovation.

Ancillary benefits could include among other options how the project will:

- Address inequities and provide the greatest support to those with greatest need.

- Contribute to the reduction of greenhouse gases by considering the use of low carbon materials or developing low carbon or net zero energy projects as described in the March 2023 Memorandum (IRA) Section 70006.

- Enable greater community resilience through cybersecurity in accordance with best practices and standards.

Criterion 1 Qualitative Criteria Scoring Points

Not at all	Minimally	Partially	Mostly	Entirely
0	7.5	15	22.5	30

Prompts for the Risk Reduction/Resilience Effectiveness Criterion
Below are additional considerations for developing mitigation initiatives towards this criterion.

Interpreting Responses to Effective Risk Reduction

The mitigation initiative should detail how the project will reduce risk. The details should identify the risk being reduced and state what action will reduce the identified risk. The details should be clear and reasonable. The mitigation initiative should identity how the project will mitigate the subject's most prevalent risk and also identify additional risks that may be mitigated as well. Priorities for BRIC include risk reduction of both acute events and chronic stressors, exacerbated by hazard risk and climate change, which are either observed or expected. However, FEMA does not limit evaluation of risk reduction to those that are quantifiable. FEMA encourages alternative explanations of risk reduction. How will the proposed project reduce risk(s) and to what level?

For example, a proposed project could be designed to provide 100-year-level flood protection to a neighborhood with 250 people, 135 homes, and 15 publicly owned structures that support several Community Lifelines, and a variety of cultural, historic, and environmental resources. Additionally, partners may have high Building Code Effectiveness Grading Schedule (BCEGS) scores that show a commitment to reducing risk through strong building code adoption and enforcement activities.

Interpreting Responses to Increases in Resilience

The mitigation initiative should indicate how the proposed project will improve resilience. Resilience refers to the ability to prepare for anticipated hazards, adapt to changing conditions, and withstand and recover rapidly from disruption. Detail how

the project will increase resilience. The details should identify the aspects of resilience being increased and state what action will increase the identified resilience. The details should be clear and reasonable. For example, a project designed to retrofit a library to serve as a tornado shelter could include tornado (and other hazards) preparedness, resilience, and hazard mitigation information. This could enhance the community's resilience by educating the public about the natural hazard risks they face, as well as build a culture of preparedness.

Interpreting Responses to Ancillary Benefits

Ancillary benefits refer to benefits other than the project's primary risk reduction objective, which should be identified in the Scope of Work section, if applicable. Ancillary benefits are benefits related to water/air quality, habitat creation, energy efficiency, economic opportunity, reduced social vulnerability, reduced carbon emissions, cybersecurity, cultural resources, public health, and mental health, as well as support mission areas of non- governmental organizations (NGOs), community-based groups, and other partners, etc.

Partners should consider the following: What ancillary benefits will the project provide and how? Does the project consider multiple hazards (e.g., wind/storm surge, wildfire/mudslides) to address risks beyond the proposal's primary risk reduction objective? Ancillary benefits should include how a project will lead to equitable outcomes and provide the greatest support to those with greatest need. Ancillary benefits could also address climate-related benefits. In this particular case, very significant ancillary benefits would be achieved by the project if it follows the Inflation Reduction Act Section 70006, FEMA building materials program and considers the use of low carbon materials or the project is developed as a low-carbon or net-zero energy project. The partner should include when possible or provide a reference to the Environmental Product Declarations (EPD) of the materials utilized in the project. A product-specific Type III (third-party verified) EPD must be shown and reported in a third-party dataset, such as the Embodied Carbon in Construction Calculator (EC3).

Interpreting Responses to Leveraging Innovation

Innovation in one community can look very different from innovation in another community. Partners should consider the following: How does the project leverage or demonstrate innovation for the community? What new ideas or approaches is the project incorporating? Does the project leverage collaborations and resources with NGOs, community-based groups, and other partners? The details should be clear and reasonable.

For example, a proposed project in a rural community that has seen an increase in development and impervious surface might include nature-based solutions that have

not previously been used. Details should include how the project will leverage innovation. The details should identify the aspects of innovation being leveraged and state what project aspects incorporate this element.

Qualitative Evaluation Criterion 2: Climate Change and Other Future Conditions (20 possible points)

Future conditions are inherently difficult to predict. However, it would be a mistake to not acknowledge potential climate change impacts when designing a project. Planning with climate change and future conditions in mind helps a community invest in choices that protect lives and property for a longer period of time. Hazard mitigation projects that account for changes in future conditions can minimize damage and losses as well as save or restore the benefits of natural systems. The score received for Criterion 2 will depend on how well the mitigation initiative details how the project will: (1) enhance climate adaptation, (2) respond to the effects of climate change, (3) respond to the effects of other future conditions (population/demographic/land use, etc.), and (4) cite data sources, assumptions, and models. Climate change is defined as "Changes in average weather conditions that persist over multiple decades or longer. Climate change encompasses both increases and decreases in temperature, as well as shifts in precipitation, changing risk of certain types of severe weather events, and changes to other features of the climate system" (Fourth National Climate Assessment).

The BRIC program may also accept the definitions of climate change of the National Aeronautics and Space Agency (NASA). Note, NASA defines climate change as "A change in the usual weather found in a place. This could be a change in how much rain a place usually gets in a year. Or it could be a change in a place's usual temperature for a month or season."

The U.S. Environmental Protection Agency's (EPA) definition of climate change is also accepted by the BRIC program. EPA defines climate change as "Any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among others, that occur over several decades or longer."

According to the EPA, climate change involves significant changes in average conditions—such as temperature, precipitation, wind patterns, and other aspects of climate—that occur over years, decades, centuries, or longer. Climate change involves longer-term trends, such as shifts toward warmer, wetter, or drier conditions. These trends can be caused by natural variability in climate over time, as well as human activities that add greenhouse gases to the atmosphere such as burning fossil fuels for energy.

The partner should indicate which definition of climate change is being used in its project narrative.

Criterion 2 Qualitative Criteria Scoring Points

Not at all	Minimally	Partially	Mostly	Entirely
0	5	10	15	20

FEMA works with state, local, Tribal, and territorial governments to build and deliver resources and capabilities that ensure the nation can withstand climate hazards of today and those we anticipate for tomorrow. Partners should use evidence-based, best-available climate data sets, information resources, and decision support tools, including Federal resources, to identify current and future climate risks over the project's expected service life. Climate projections, emission scenarios, or other suitable scenario conditions should be specified based on the project's service life and applicant's risk tolerance, as appropriate and available. Applicants should document how their planned project design and operations are resilient to any identified current and future climate risks.

Partners should describe how the project will enhance climate adaptation and resilience using the best available data, detail how the project is being responsive to the effects of climate change (such as sea level rise), increased rainfall, increased likelihood of flash flood due to wildfire, etc.) and/or other future conditions (population/demographic/land use, etc.), and cites data sources, assumptions, and models.

Be sure to include relevant information supporting this criterion, including data sources, studies, models, etc. Available data sources that partners may use as supporting data may include: Climate.gov, Drought.gov, Heat.gov, the Sea Leave Rise Viewer, the National Climate Assessment, the Wildfire Risk to Communities tool, Climate Mapping for Resilience and Adaptation (CMRA) portal, the National Risk Index and the U.S. Climate Resilience Toolkit. Cite the page number and location in the supporting data related to the qualitative criteria.

Prompts for the Climate Change and Other Future Conditions Criterion

Examples of future conditions include, but are not limited to, the following: expected population changes, land use and development shifts, aging population, shifts in income or employment, changes in housing needs, increasing temperatures, increased wildfire risk, sea level rise, more frequent high tide flooding, more intense rainfall events, increasing storm frequency, persistent and prolonged droughts, changing groundwater tables, etc. The following are additional considerations that may help complete the development of the mitigation initiative.

- What anticipated future conditions are relevant for the project?

- For climate adaptation, a proposed project in a coastal area that is at risk to coastal flooding due to sea level rise might include details as to how the proposed activities may combat climate change. Details might include anticipated

rate of sea level rise, construction techniques to elevate or mitigate future flooding, or other information that would allow a reviewer to determine how the proposed project takes into account future changes.

- How is the project responsive to any identified anticipated changes? Does the project integrate the consideration of future conditions into design, planning, and operations workflows?

- How was the project informed by, or connected to, plans and planning efforts and the assessment of future conditions? For example, a local hazard mitigation plan may identify climate change as a threat or risk and include the proposed project as a mitigation response. Relevant plans may include hazard mitigation plans, comprehensive plans, climate adaptation plans, long-range transportation plans, small area plans, coastal zone management plans, capital improvement plans, etc.

- What data sources and assumptions are used to guide the project? For example, when citing a sea level rise projection, what time period and what scenario of sea level rise are assumed?

Qualitative Evaluation Criterion 3: Implementation Measures (15 possible points)

To properly implement a project, partners need to understand what is expected of them, ensure the human capital and financial resources needed to complete the project are in place, and develop a realistic timetable. If implementation measures are thoroughly developed, the partner has a roadmap to successfully meet overall project objectives. The score received for Criterion 3 will depend on how well the partner describes: (1) how the costs will be managed; (2) how the schedule will be managed; (3) how the project will be successfully implemented, and how innovative techniques to facilitate implementation will be incorporated; and in its Scope of Work section, (4) the technical and managerial staff and resources available to successfully implement this project; and (5) whether and how strong labor standards are incorporated to ensure high-quality work, avert disruptive and costly delays and promote efficiency.

Criterion 3 Qualitative Criteria Scoring Points

Not at all	Minimally	Partially	Mostly	Entirely
0	3.75	7.5	11.25	15

Prompts for the Implementation Measures Criterion

Below are additional considerations for developing the mitigation initiative.

- Are strong labor standards incorporated? For example, the use of project labor agreements, requiring workers to be paid wages at or above the prevailing rate; use of local hire provisions; use of a directly employed workforce (as opposed to a subcontracted workforce); use of an appropriately skilled workforce (e.g., through registered apprenticeships or other joint labor-management training programs that serve all workers—particularly those underrepresented or historically excluded); and use of an appropriately credentialed workforce (i.e., satisfying requirements for appropriate and relevant pre-existing occupational training, certification, and licensure).

- Does the application inspire confidence that the project can be completed successfully as designed, given the stated implementation measures?

- What potential implementation challenges and obstacles are identified (e.g., technical, political, financial, public support, environmental/permitting, constructability), and what implementation solutions are proposed to address these challenges?

- How do project cost estimates and the schedule identify and address potential challenges and obstacles?

- What pre- and post-implementation monitoring strategies are proposed for the project? What specific evaluation elements are proposed to measure progress and ensure the project is executed as designed?

- What technical and managerial staff and resources are available to successfully implement the project? How will anticipated staff and resource gaps be filled?

- Are examples of successfully completed projects included to demonstrate effective implementation measures?

Qualitative Evaluation Criterion 4: Population Impacted (25 possible points)

While the intensity of a hazard is important, of equal or greater importance is the identification of the population impacted, many of whose demographic or socioeconomic characteristics may place its members at greater risk of harm before, during, and after a disaster.

The score received for Criterion 4 will depend on how well the sub application describes: (1) community-wide benefits, (2) the proportion of the population that will be impacted, including a description of the disadvantaged communities as referenced in Executive Order 14008, (3) how the project was selected and designed to maximize positive impacts and minimize negative impacts to any disadvantaged populations as referenced in Executive Order 14008, and (4) how the proposed project clearly benefits a disadvantaged community. As defined in Executive Order 14008:

- “A disadvantaged community may be characterized by variables including, but not limited to, low income, high and/or persistent poverty, high unemployment and underemployment, racial and ethnic segregation, linguistic isolation, high housing cost burden and substandard housing, distressed neighborhoods, high transportation cost burden and/or low transportation access, disproportionate environmental burden and high cumulative impacts, limited water and sanitation access and affordability, disproportionate climate impacts, high energy cost burden and low energy access, and all geographic areas within Tribal jurisdictions."

If a population impacted as demonstrated by the partner does not include a disadvantaged community, then the highest point allotment available is Partially. Mitigation initiatives that clearly state the proposed project is benefiting a disadvantaged community can score Mostly or Entirely.

Partners are encouraged to document their designation as an Economically Disadvantaged Rural Community (as referenced in Title 42 of United States Code (U.S.C.) Section 5133(a) as a small, impoverished community) or as a Community Disaster Resilience Zone (as defined in Title 42 United States Code Section 5136(a)) and if the project benefits or primarily benefits a census tract identified as disadvantaged by the Resilience Analysis and Planning Tool (RAPT) or Climate and Economic Justice Screening Tool (CEJST). Please note that the partner must explain in a narrative how the community is disadvantaged and impacted in addition to attaching all supporting documentation.

- Mitigation initiatives that demonstrate a direct positive impact to a disadvantaged community will receive a score of “Mostly.”

- Mitigation initiatives that thoroughly describe the population impacted and demonstrate a high positive impact— including a high positive impact on a disadvantaged community--will merit a score of “Entirely.”

Criterion 4 Qualitative Criteria Scoring Points

Not at all	Minimally	Partially	Mostly	Entirely
0	6.75	12.5	18.75	25

Prompts for the Population Impacted Criterion

Below are additional considerations for developing the mitigation initiative:

- Community size, scale, and definition can vary in different local contexts. Explain what "community-wide" means in the context of the proposed project.

- Describe what quantity (e.g., percent) of the population will directly benefit from the project (i.e., experience direct community-wide benefits) and how the estimate was calculated.

- The mitigation initiative should include percentages of the community's population that will directly and indirectly benefit from the project.

- Explain who are the most vulnerable members of the community where the project is proposed and describe how the project will minimize negative impacts to disadvantaged members of the community.

- Explain whether the project will maximize positive impacts to disadvantaged members of the community. Impacts can be directly related to the risk reduction activity or indirectly related, such as with ancillary impacts (i.e., social, environmental, and economic impacts).

Qualitative Evaluation Criterion 5: Community Engagement and Other Outreach Activities (5 possible points)

A key element in the hazard mitigation process is the discussion it promotes among community members about creating a safer, more disaster-resilient community. Community engagement and other outreach activities that capture a community's values and priorities are likely to result in a project having greater legitimacy and support, leading to greater success in implementation.

The score received for Criterion 5 will depend on how well the mitigation initiative describes: (1) the outreach strategy and supporting activities appropriate to the project and community that advance hazard mitigation, (2) the types of community planning processes leveraged, (3) how input from a diverse range of stakeholders, including people from disadvantaged communities, was gathered and incorporated into project

conception and design, and (4) how community planning and stakeholder input will continue to be used to help direct project execution.

Criterion 5 Qualitative Criteria Scoring Points

Not at all	Minimally	Partially	Mostly	Entirely
0	1.25	2.5	3.75	5

Prompts for the Community Engagement and Other Outreach Activities Criterion

Below are additional considerations for completing and/or developing a mitigation initiative.

- To what extent did stakeholders and/or stakeholder groups contribute to this project? What stakeholder collaboration activities occurred? What information regarding outreach has been provided? How was the community made aware of this potential project?

- What planning processes were leveraged during the development of the project proposal to advance mitigation? How did the project planning process ensure that the disadvantaged members of the community were involved in the planning and decision-making processes?

- For example: Were town hall meetings conducted with communities impacted by the project? How many stakeholder groups were represented? Suggestion: document attendance and outreach efforts.

- What information (e.g., resilience goals and outcomes, partnership opportunities, project implementation progress) will be shared with the public? What public outreach and engagement strategies will be used to disseminate project information to and gather feedback from stakeholders and members of the community? How will the information be shared?

- What support or conflicts emerged through the project planning process? How will conflicts be resolved as the project is implemented? How is support being used to implement the project?

- What are the connections between your hazard mitigation plan and local land use requirements, and how does the linkage make your community more resilient? For example, a local hazard mitigation plan may identify within the flood element that certain areas of the community are at a greater risk of future flooding. Do the associated land use plans have a floodplain classification, land use classification, or zoning ordinance that discourages development in that floodplain?

Qualitative Evaluation Criterion 6: Leveraging Partners (5 possible points)

Leveraging partners allows partners to access complementary strengths from neighboring communities, states, the federal government, and non-profit and private partners. This potentially helps the partners from a cost basis and serves the local community's greater good; leveraging may come from funds or provision of in-kind services by the partner.

The score received for Criterion 6 will depend on how well the mitigation initiative incorporates: (1) partnerships (e.g., state, territory, tribal, private, district, local community) that will ensure the project meets community needs, (2) an explanation of how these partnerships benefit disadvantaged communities, and (3) an explanation of the anticipated outcome of those partnerships (e.g., leveraging resources, such as financial, material, and educational resources; coordinating multi-jurisdictional projects; and a heightened focus on equity-related issues).

Criterion 6 Qualitative Criteria Scoring Points

Not at all	Minimally	Partially	Mostly	Entirely
0	1.25	2.5	3.75	5

Prompts for the Leveraging Partners Criterion

Below are additional considerations for developing mitigation initiatives.

- What partners were involved in the project design? How did partners contribute to the application? What partners will contribute to the implementation of the project? Partnerships can take many different forms. For example, partners may contribute financially, support and promote the proposed project, or help generate community-wide awareness of the risks the proposal is designed to address, etc.

- To what extent were NGOs—including those organizations that represent disadvantaged groups, universities, or other government entities—consulted for advice or assistance? How has collaboration with surrounding jurisdictions supported project development?

- To what extent have other federal programs or funding sources been leveraged for the project? To what extent have partners provided funding (or in-kind services, such as grant writing support, procurement support, expertise, supplies, etc.) that increases the non-federal cost share?

- How have partnerships been used to increase community resilience? What community groups will participate in this project? What potential exists for partnerships to continue beyond implementation of the project?

PRIORITIZED PROJECT LIST

Project information provided in this list is reported by the respective agency listed for each project. These projects are prioritized using the Benefit Cost Review (BCR) process described in the previous version of this plan. Projects will be prioritized using the process described in this version of the plan when the plan is approved and formally adopted. For more information on each project, please contact the responsible agency.

2020							
BCR	**Project Title**	**Agency**	**Hazards Mitigated**	**Funding Source**	**Estimated Costs**	**Completion Timeframe**	**Status**
0	NE 29PL & Aventura Boulevard	Aventura	Flood	City of Aventura	247,000.00	10/1/20 to 4/1/21	Project Complete
0	Yacht Club Drive Drainage Improvements	Aventura	Flood	Secured City of Aventura	750,000.00	8/1/20 to 2/1/21	Project Complete
0	Yacht Club Drive Seawall Repairs	Aventura	Flood, Flood/Storm Surge	City of Aventura	491,000.00	6/20 through 2/21	Project Complete
86	Replace Above Ground Fuel Tank	Mount Sinai	Flood, Power Failure, Wind, Health	Unknown	2,247,478.15	7/25/2022	Project Complete
87	Utility Bridge Hardening	Mount Sinai	Power Failure, Wind	Unknown	759,622.04	6/30/2022	Project Complete
43	Potable Water Lines	Pinecrest	Other	Unknown/None	17,674,687.50	1 year	Construction/ Project Begun
74	Palmetto Island Drainage (Phase 1)	Pinecrest	Flood, Flood/Storm Surge, Storm Surge	Unknown	750,000.00	1 year	Construction/ Project Begun
79	Police Station Headquarters Garage Drainage Improvements	Miami Beach	Flood, Flood/Storm Surge, Sea Level Rise	HMGP Funded Phase 1. Phase 2 TBD.	Unknown	2025	Funding Secured
80	Larchmont Drainage Retrofit Project	Public Works-Miami Dade County	Flood, Flood/Storm Surge	Stormwater Utility	1,000,000.00	1 year after funding is identified	Future Unfunded Project

83	CRS Activity 420 Open Space Preservation	Cutler Bay	Flood, Flood/Storm Surge, Sea Level Rise, Storm Surge, Wind	Building Resilient Infrastructure and Communities (BRIC)	8,000,000.00	1 year	Funding Applied for
85	West Lakes Drainage Improvements Project Phase IV	Miami Lakes	Flood, Flood/Storm Surge, Storm Surge, Health, Other	FEMA HMA Grants Programs Funds Secured	1,000,000.00	2023	Funding Secured
85	King's Bay Septic to Sewer Conversion	Coral Gables	Health, Sea Level Rise, Storm Surge	Grant source to be determined.	4,500,000.00	TBD	Future Unfunded Project
91	Miami-Dade County, FL: Countywide Continuity of Operations Energy Resilience Project	Fire Rescue	Power Failure, Technological Disruption	BRIC Program, Hazardous Mitigation Program	16,340,000.00	3 years	Funding Applied for
92	Seal and Paint Exterior DHM Patient Tower	Mount Sinai	Flood, Wind, Health	Hospital Funded	1,920,104.00	8/23/2023	Construction/ Project Begun
			2021				
BCR	**Project Title**	**Agency**	**Hazards Mitigated**	**Funding Source**	**Estimated Costs**	**Completion Timeframe**	**Status**
0	Beach Club Sewer Extension	Key Biscayne	Health	ARP	42,000.00	FY22	Project Complete
51	NW 187 Street Drainage and Sidewalk Curbing Improvement Project (from NW 33 - 34 Court)	Miami Gardens	Flood	Stormwater Funds	175,000.00	6 months to 1 year	Project Complete

57	NW 34 Ave and NW 151 Ter Area Road and Drainage Improvement Project	Miami Gardens	Flood	Stormwater and CITT Funds	800,000.00	1 Year	Project Complete
62	NW 213 Street Drainage Improvement Project (Flooding at 2931 NW 213 Street)	Miami Gardens	Flood	Stormwater Funds	100,000.00	1 Year	Funding Secured
62	Alleyways Drainage Project Improvements (off NW 2 Avenue between NW 189 to 191 Street)	Miami Gardens	Flood, Other	Stormwater Funds	30,000.00	6 months to 1 year	Funding Secured
62	Leslie Estates Road and Drainage Improvement Project-Phase #2 between NW 189 to 191 Street)	Miami Gardens	Flood	Stormwater and CITT Funds	1,700,000.00	1 Year	Funding Secured
63	NW 195 Terrace from NW 33-34 Court Drainage Project	Miami Gardens	Flood	Stormwater Funds	25,000.00	6 months to 1 year	Project Complete
65	NW 187-199 Street and NW Sunshine State Parkway to NW 12 Avenue	Miami Gardens	Flood	Stormwater and CITT Funds	1,200,000.00	1 Year	25% complete

66	Storm water & Roadway improvements	El Portal	Flood, Sea Level Rise	Miami-Dade County, FDEP, State of Florida Legislative Appropriations, federal government.	2,400,000.00	TBD	Funding Applied for
66	NW 165 Street Area Drainage/Swale Improvement Project	Miami Gardens	Flood	Stormwater Funding	25,000.00	1 Year	Project Complete
66	NW 202 Terrace Road, Drainage and Street Parking Improvement Project (west of NE 2 Avenue	Miami Gardens	Flood, Other	Stormwater Funding	750,000.00	1 Year	Project Complete
68	Miami Springs Wind Retrofit Project	Libraries-Miami Dade County	Wind	Submitting HMGP grant December 21, 2021	173,074.00	TBD	Funding Secured
69	NW 203 Street Area Drainage Improvement Project	Miami Gardens	Flood	Stormwater Funds	50,000.00	6 months to 1 year	Project Complete
71	Downtown Coral Gables Drainage and Water Quality Improvements	Coral Gables	Flood, Flood/Storm Surge, Health	Hazard Mitigation Grant Program	1,000,000.00	May 31, 2024	Funding Secured
74	Miami Beach Regional Hardening Project	Libraries-Miami Dade County	Flood/Storm Surge, Wind	HMGP, resilience and other Grant sources	1,415,285.00	TBD	Funding Secured

75	City of Miami Springs: Erosion Control and Stabilization of Drainage	Miami Springs	Flood, Flood/Storm Surge, Sea Level Rise, Storm Surge	State Legislation	$1,281,383.00	5 years	Project in Planning Stage
75	Allapattah Flood Improvements	Miami	Flood, Sea Level Rise, Other	Flooding & Sea Level Rise Resilience Plan, Miami Forever Bond	31,376,188.00	12/31/2024	Funding Secured
75	Melrose Flood Improvements Phase I	Miami	Flood, Sea Level Rise, Other	HMGP	11,029,883.00	12/31/2024	Funding Secured
75	Melrose Flood Improvements Phase II	Miami	Flood, Sea Level Rise, Other	HMGP	55,510,496.00	12/31/2024	Future Unfunded Project
75	Morningside Flood Improvements Phase I	Miami	Flood, Sea Level Rise, Other	HMGP	13,627,868.00	12/31/2024	Future Unfunded Project
75	Morningside Flood Improvements Phase II	Miami	Flood, Sea Level Rise, Other	HMGP	19,415,225.00	12/31/2024	Future Unfunded Project
75	North-West Wynwood Flood Improvements	Miami	Flood, Sea Level Rise, Other	HMGP	53,545,318.00	12/31/2024	Future Unfunded Project
75	South-West Wynwood Flood Improvements	Miami	Flood, Sea Level Rise, Other	CDBG MIT	31,523,773.00	12/31/2024	Funding Secured
75	Clemente Park Flood Improvements	Miami	Flood, Sea Level Rise, Other	Miami Forever Bond	14,734,729.00	12/31/2024	Funding Secured
75	Edgewater Flood Improvements Phase I	Miami	Flood, Sea Level Rise, Storm Surge, Other	Resilient Florida Grant Program	17,111,976.00	12/31/2024	Funding Secured

				(RFGP), Miami Forever Bond			
75	Edgewater Flood Improvements Phase II	Miami	Flood, Sea Level Rise, Storm Surge, Other	HMGP	18,650,223.00	12/31/2024	Future Unfunded Project
75	Brickell East Flood Improvements	Miami	Flood, Sea Level Rise, Other	HMGP	23,257,426.00	12/31/2024	Future Unfunded Project
75	South Shenandoah & Silver Bluff Flood Improvements Phase I	Miami	Flood, Sea Level Rise, Other	HMGP	10,100,000.00	12/31/2024	Funding Applied for
75	South Shenandoah & Silver Bluff Flood Improvements Phase II	Miami	Flood, Sea Level Rise, Other	HMGP	10,990,604.00	12/31/2024	Funding Applied for
75	East Little Havana Flood Improvements	Miami	Flood, Sea Level Rise, Other	CDBG-MIT, Miami Forever Bond	36,894,877.00	12/31/2024	Funding Secured
75	8 Street Flood Improvements	Miami	Flood, Sea Level Rise, Other	HUD - Community Project Funding (CPF) grant, Miami Forever Bond	9,781,446.00	12/31/2024	Funding Secured
75	Auburndale Flood Improvements	Miami	Flood, Sea Level Rise, Other	Resilient Florida Grant Program (RFGP), Miami Forever Bond	30,000,000.00	12/31/2024	Funding Secured
75	Shenandoah Flood Improvements Phase I	Miami	Flood, Sea Level Rise, Other	HMGP	49,433,816.00	12/31/2024	Future Unfunded Project

75	Shenandoah Flood Improvements Phase II	Miami	Flood, Sea Level Rise, Other	HMGP	44,510,554.00	12/31/2024	Future Unfunded Project
75	East Flagami Flood Improvements	Miami	Flood, Sea Level Rise, Other	Resilient Florida Grant Program (RFGP), Miami Forever Bond	30,000,000.00	12/31/2024	Funding Secured
75	NE 75 Street Flood Improvements	Miami	Flood, Sea Level Rise, Other	HMGP	24,337,933.00	12/31/2024	Funding Applied for
75	Shorecrest North Flood Improvements	Miami	Flood, Sea Level Rise, Storm Surge, Other	HMGP	11,440,377.00	12/31/2024	Future Unfunded Project
77	Design Stormwater Infrastructure Improvements K-8 Basin	Key Biscayne	Flood, Sea Level Rise	CIP, GF, Resilient Florida	2,419,130.00	5/9/2025	Funding Applied for
79	Dade Chase - C-4 Hardening	Banyan Community Health Centers	Wind	Either in-house or global match	430,225.57	3 years	Funding Secured
79	Sea wall improvements and shoreline enhancement	Key Biscayne	Flood, Flood/Storm Surge, Sea Level Rise, Storm Surge	N/A	47,361,600.00	2 years	Future Unfunded Project
80	Thalatta Estate Shoreline Stabilization	Palmetto Bay	Flood/Storm Surge, Sea Level Rise, Storm Surge	FIND grant and Village of Palmetto Bay	500,000.00	1 year or more	Project Complete
81	complete Streets/Roadway Improvements	Key Biscayne	Flood, Flood/Storm Surge, Health, Sea Level Rise, Storm Surge	general obligation bond	40,000,000.00	2021-2028	Funding Secured

81	Install Village Wide Security and Surveillance System	Key Biscayne	Health, Technological Disruption	ARPA, GF, CIP	470,000.00	FY23	Funding Secured
82	Brickell Bay Drive Seawall and Flood Improvements	Miami	Flood, Sea Level Rise, Storm Surge, Other	HMGP	20,000,000.00	03/31/2025	Funding Applied for
84	Replace Community Center RTU	Key Biscayne	Health, Power Failure, Flood/Storm Surge	N/A	27,888.00	3/25/2022	Project Complete
84	Colorama Estates/Avalon Estates Drainage Improvements Project	Miami Lakes	Flood, Flood/Storm Surge, Health, Storm Surge, Other	DEP, FEMA, Legislative	1,465,455.00	2024	Future Unfunded Project
85	Resilient Infrastructure Integration Strategy/Implementation Plan	Key Biscayne	Other, Sea Level Rise, Storm Surge, Wind, Technological Disruption, Health, Flood/Storm Surge, Flood, Power Failure, Security Breach	General Funds & Stormwater	1,000,000.00	FY23	Project in Planning Stage
85	Utility Undergrounding-Phase 1	Key Biscayne	Power Failure, Technological Disruption, Wind, Security Breach, Health, Other, Flood/Storm Surge, Flood	General Obligation Bond	8,500,000.00	TBD	Future Unfunded Project
86	Replace Community Center Roof	Key Biscayne	Health, Other, Technological Disruption	N/A	5,200,000.00	FY23	Project in Planning Stage

86	Hampton Park Improvements	Key Biscayne	Other	Grant	50,000.00	FY22	Project in Planning Stage
87	Replace Rescue Stretchers	Key Biscayne	Health, Other	General Fund	170,000.00	FY23	Future Unfunded Project
87	New Little Havana Health Center - Code Plus	Banyan Community Health Centers	Wind	Potential funding sources include FEMA, HMGP, HRSA, Florida House & Senate, private funders	5,000,000.00	3 years	Funding Secured
87	Miami-Dade County, FL: Structural and Roof Rehabilitation for Multiple Miami-Dade Fire Rescue Stations	Fire Rescue-Miami Dade County	Wind, Flood/Storm Surge	Potential HMGP	2,979,000.00	Unknown	Funding Secured
88	Miami-Dade Fire Rescue Headquarters Water Intrusion Retention Wall and French Drainage System	Fire Rescue-Miami Dade County	Flood/Storm Surge, Flood	Potential Resilient Florida Grant Program	1,150,000.00	TBD	Funding Applied for
88	MDFR Fire Station Hardening Project	Fire Rescue-Miami Dade County	Wind	Potential HMGP grant	2,000,000.00	TBD	Future Unfunded Project
89	Seal and Paint Exterior Blum Patient Tower	Mount Sinai	Flood/Storm Surge, Health, Wind	Hospital funding	500,000.00	08/23/2023	50% complete

89	Miami Fire Rescue - Fire Station 6 Hardening	Miami	Wind, Security Breach, Power Failure, Technological Disruption	Hazard Mitigation Grant Program (HMGP) - Potential	279,265.00	12/1/2025	Funding Secured
90	Blum Patient Tower Hardening	Mount Sinai	Flood/Storm Surge, Health, Wind, Storm Surge	Possible grant opportunity	16,000,000.00	18 months	Future Unfunded Project
90	Greene Patient and Medical Education Tower Hardening	Mount Sinai	Flood, Flood/Storm Surge, Health, Wind	Possible grant opportunity	7,000,000.00	18 months	Future Unfunded Project
90	Ascher Support Services Building Hardening	Mount Sinai	Flood, Flood/Storm Surge, Wind, Health	Possible grant opportunity	9,000,000.00	18 months	Future Unfunded Project
92	Solar Microgrid for Flood Risk Mitigation at Miami-Dade Fire Rescue Headquarters and Emergency Operations Center	Fire Rescue-Miami Dade County	Flood, Flood/Storm Surge	Potential Resilient Florida Grant Program Potential BRIC	28,625,019.00	TBD	Other
97	Improvements to access and parking to account for sea level rise	Solid Waste-Miami Dade County	Flood, Sea Level Rise, Flood/Storm Surge	Florida DEP Protecting Florida Together Funding	2,500,000.00	06/01/2023	Future Unfunded Project

97	Design plan to improve stormwater management for South Dade Landfill	Solid Waste-Miami Dade County	Flood, Flood/Storm Surge, Sea Level Rise	Florida DEP Resilience Project Grant	1,500,000.00	12/30/2023	Funding Secured
97	Feasibility study for a location of a new Waste to Energy (WTE) plant	Solid Waste-Miami Dade County	Flood, Flood/Storm Surge, Sea Level Rise	Florida DEP Resilience Projects Grant	500,000.00	12/31/2022	Future Unfunded Project
97	Storm Water Drainage Improvements for Snapper Creek Trash and Recycling Center	Solid Waste-Miami Dade County	Flood, Flood/Storm Surge, Sea Level Rise	Florida DEP Resilience Projects Grant	250,000.00	12/30/2023	Future Unfunded Project
			2022				
BCR	**Project Title**	**Agency**	**Hazards Mitigated**	**Funding Source**	**Estimated Costs**	**Completion Timeframe**	**Status**
68	Immediate Flood Control Solutions	Key Biscayne	Flood	CIP	1,000,000.00	TBD	Project in Planning Stage
69	Miami Beach Regional Library Resilience Grant	Libraries-Miami Dade County	Wind, Flood/Storm Surge, Sea Level Rise	Florida Department of Environmental Protection Agency	800,000.00	TBD	Funding Secured

70	Village-Wide Stormwater Master Plan Implementation	Pinecrest	Flood	Grants	12,750,000.00	1 year	Future Unfunded Project
73	Zone 7 Resilient Infrastructure Improvements	Key Biscayne	Flood/Storm Surge, Health, Power Failure, Sea Level Rise, Storm Surge, Flood, Wind, Other	CIP, GOB, CWSRF	40,000,000.00	TBD	Future Unfunded Project
73	Main Library Resilience Grant	Libraries-Miami Dade County	Flood, Flood/Storm Surge, Sea Level Rise	GOB and Library Taxing District Construction Fund	1,520,000.00	TBD	Other
78	Offshore Breakwater Submerged Structure Implementation	Key Biscayne	Flood/Storm Surge, Sea Level Rise, Storm Surge, Other	Potential grants like Resilient Florida, NFWF NCRF, or coral reef restoration grants.	15,340,000.00	2027	Future Unfunded Project
79	FS3/Fire Administration/ Logistics Hardening	Miami	Flood, Flood/Storm Surge, Wind, Technological Disruption, Power Failure, Security Breach	Hazard Mitigation Grant Program (HMPG)	650,000.00	45 months	Future Unfunded Project
80	Utility Undergrounding - Phase 2	Key Biscayne	Power Failure, Wind	CIP, GOB	30,000,000.00	TBD	Future Unfunded Project
83	Modify Rights of Way for Flood Reduction	Key Biscayne	Flood, Sea Level Rise, Flood/Storm Surge	General Obligation Bond	750,000.00	2027	Future Unfunded Project
83	City of Hialeah BRIC FY22 -	Hialeah	Flood, Flood/Storm Surge, Power	BRIC	543,049.29	TBD	Funding Applied for

	Critical Facility Backup Generator		Failure, Storm Surge, Wind				
83	Develop risk reduction ordinances	Key Biscayne	Flood, Flood/Storm Surge, Health, Power Failure, Sea Level Rise, Security Breach, Storm Surge, Technological Disruption, Wildfire, Wind, Other	General Fund or General Obligation Bond	350,000.00	2024	Future Unfunded Project
84	Montrose Road from Oak Lane to NW 154th Street Drainage Improvements Project	Miami Lakes	Flood, Flood/Storm Surge, Storm Surge, Other	Legislative	741,421.00	2024	Funding Secured
84	West Lakes Gardens Third Addition Drainage Project	Miami Lakes	Flood, Flood/Storm Surge, Other, Storm Surge	State Legislative Funding	490,447.00	2024	Funding Secured
86	Construct Pump Station in K-8 Stormwater Basin	Key Biscayne	Flood, Sea Level Rise, Storm Surge, Power Failure, Wind	Clean Water State Revolving Loan Fund, Resilient Florida (FDEP)	11,979,008.00	2026	Funding Applied for
86	Zone 2 Resilient Infrastructure Improvements	Key Biscayne	Flood, Flood/Storm Surge, Power Failure, Sea Level Rise, Storm Surge, Wind, Other, Health	CIP, CWSRF, General Obligation Bond	30,000,000.00	TBD	Future Unfunded Project
86	Zone 3 Resilient Infrastructure Improvements	Key Biscayne	Flood, Flood/Storm Surge, Health, Power Failure, Sea	CIP, CWSRF, General Obligation Bond	33,000,000.00	TBD	Future Unfunded Project

			Level Rise, Storm Surge, Wind, Other				
86	Zone 4 Resilient Infrastructure Improvements	Key Biscayne	Flood, Flood/Storm Surge, Health, Power Failure, Sea Level Rise, Storm Surge, Wind, Other	CIP, General Obligation Bond, CWSRF	36,000,000.00	TBD	Future Unfunded Project
86	Zone 5 Resilient Infrastructure Improvements	Key Biscayne	Flood, Flood/Storm Surge, Health, Power Failure, Sea Level Rise, Storm Surge, Wind, Other	CIP, General Obligation Bond, CWSRF	36,000,000.00	TBD	Future Unfunded Project
86	Zone 6 Resilient Infrastructure Improvements	Key Biscayne	Storm Surge, Flood, Flood/Storm Surge, Health, Power Failure, Sea Level Rise, Wind, Other	CIP, General Obligation Bond, CWSRF	43,000,000.00	TBD	Future Unfunded Project
86	Zone 7 Resilient Infrastructure Improvements	Key Biscayne	Flood, Flood/Storm Surge, Health, Power Failure, Sea Level Rise, Wind, Other, Storm Surge	CIP, GOB, CWSRF	43,000,000.00	TBD	Future Unfunded Project
86	Zone 8 Resilient Infrastructure Improvements	Key Biscayne	Flood, Flood/Storm Surge, Health, Power Failure, Sea Level Rise, Storm Surge, Wind, Other	CIP, GOB, CWSRF	43,000,000.00	TBD	Future Unfunded Project
87	Procure Mobile Generator for Pump Stations	Key Biscayne	Flood, Flood/Storm Surge, Power Failure, Sea Level Rise, Storm Surge, Technological Disruption, Health,	General Fund	150,000.00	2024	Future Unfunded Project

			Other, Wind, Security Breach				
87	Replace Two Fire Rescue Trucks	Key Biscayne	Flood/Storm Surge, Flood, Health, Security Breach, Storm Surge, Wildfire, Wind, Other	CIP	1,000,000.00	2026	Funding Secured
87	Loch Lomond Phase II Drainage Improvements Project	Miami Lakes	Flood/Storm Surge, Flood, Storm Surge, Other, Health	State Legislative Funding Secured	920,000.00	2024	Funding Secured
89	Renourish Beach and Restore Dunes	Key Biscayne	Flood/Storm Surge, Sea Level Rise, Storm Surge	CIP, Beach Management Assistance Funding, State Appropriations	2,800,000.00	2024	Funding Secured
89	Construct Northwest Boundary Berm	Key Biscayne	Flood, Flood/Storm Surge, Sea Level Rise, Storm Surge	Will require grant assistance, local contribution, and other funding sources to complete.	19,500,000.00	2028	Future Unfunded Project
89	Miami Fire Rescue - Fire Station 3 Hardening	Miami	Flood, Flood/Storm Surge, Wind, Security Breach, Technological Disruption, Storm Surge	HMGP	745,925.00	36 months	Future Unfunded Project
92	EOC Generator UPS replacement	Hialeah	Power Failure	BRIC Grant	236,928.80	30 days	Funding Secured
96	Stormwater Improvements –	Solid Waste-Miami	Flood	Statewide Flooding and Sea Level Rise	500,000.00	12/31/2025	Funding Secured

	Northeast Transfer Station	Dade County		Resilience Plan Grant			
96	Stormwater Improvements – West Transfer Station	Solid Waste-Miami Dade County	Flood/Storm Surge	Statewide Flooding and Sea Level Rise Resilience Plan Grant	500,000.00	12/31/2025	Funding Secured
56	Hardening of Miami City Ballet Building	Miami Beach	Flood, Flood/Storm Surge, Sea Level Rise, Storm Surge, Wind	Potential grant funding	Unknown	2019	Project Complete
61	Village Seawall and Dock Renovation	Bal Harbor	Flood, Flood/Storm Surge, Storm Surge, Other, Sea Level Rise	Capital Projects Reserved Funding. A FIND construction grant was recently secured to support with construction.	1,500,000.00	1 year	Project Complete
74	EC2 Expansion-Phase III	Mount Sinai	Flood, Flood/Storm Surge, Health, Power Failure, Sea Level Rise, Storm Surge, Wind	FDOH Grant	4,200,000.00	2021	Project Complete
80	PG5- Market Station First Floor Shutter Installation	Florida Inter-national University	Wind	HMGP	Unknown	More than 1 year	Project Complete
82	PG5 Market Station Generator Installation	Florida Inter-national University	Flood, Flood/Storm Surge, Power Failure, Technological Disruption, Wind	HMGP	Unknown	More than 1 year	Project Complete

88	Seawalls: Convention Center Dr to Washington	Miami Beach	Flood, Flood/Storm Surge, Sea Level Rise, Storm Surge	Unknown	Unknown	2022	Project Complete
2023							
BCR	**Project Title**	**Agency**	**Hazards Mitigated**	**Funding Source**	**Estimated Costs**	**Completion Timeframe**	**Status**
85	Franjo Park Restoration and Upgrades	Cutler Bay	Flood, Flood/Storm Surge, Health, Sea Level Rise, Storm Surge, Wind	Budgeted for in fiscal year(s) 2017-18 & 2019-20	1,800,000.00	2 years	Project Complete
84	Saga Bay 1.5 Drainage Improvement	Cutler Bay	Flood, Health	Stormwater Utility Fund	1,100,000.00	1 year	Project Complete
83	Cutler Ridge Section 3 Drainage Improvement	Cutler Bay	Flood, Flood/Storm Surge, Sea Level Rise, Storm Surge, Technological Disruption, Health	Florida Small Cities Department of Economic Opportunity (CDBG) and Stormwater Utility Fund. Submitted as part of Legislative Priority 2018-06; State Appropriations granted $200,000 for design.	1,325,000.00	18 months	Project Complete
77	Emergency Operations Center (EOC) Relocation/Expansion Project	Doral	Flood, Other	General Fund	Unknown	FY 2018-2019	Project Complete

55	NE 34th Avenue Drainage Improvements	Aventura	Flood	City of Aventura	770,000.00	10/1/22 - 6/1/23	75% complete
64	City of Hialeah City-wide Storm water Master Plan	Hialeah	Flood, Flood/Storm Surge, Health, Storm Surge	Match will be provided with General funds upon approval	775,000.00	36 months	Funding Applied for
65	Coral Gables Country Club Emergency Generator	Coral Gables	Power Failure	Potential	800,000.00	1 year	Future Unfunded Project
65	Youth Center Emergency Generator	Coral Gables	Power Failure	Potential	350,000.00	1 year	Future Unfunded Project
67	Aventura Parking Lot Injection Well	Mount Sinai	Flood, Flood/Storm Surge, Sea Level Rise, Storm Surge	Unsecured	1,000,000.00	1 years	Future Unfunded Project
73	130-1 NW 99th Terrace Connector	Medley	Flood, Flood/Storm Surge, Storm Surge	State Legislation and FEMA	2,034,700.00	2024	Funding Applied for
73	Homestead JD Redd Park Wind Mitigation Retrofit	Homestead	Wind	RFP-DEM-22-23-026: Hurricane Loss Mitigation Program	194,000.00	1 year	Funding Secured
73	Citywide Critical Asset Management System	Aventura	Technological Disruption, Flood, Flood/Storm Surge, Power Failure, Other	Unsecured	95,000.00	1 to 2 years	Project in Planning Stage
74	Vizcaya Village Flood and Wind Mitigation (Garage & Mechanic's Shop)	Vizcaya Museum and Gardens	Flood, Flood/Storm Surge, Health, Power Failure, Sea Level Rise, Storm Surge, Wind	Potential - HMGP	2,000,000.00	Dec. 31, 2026	Future Unfunded Project

74	Vizcaya Casino Flood & Wind Mitigation	Vizcaya Museum and Gardens	Flood, Flood/Storm Surge, Sea Level Rise, Wind, Storm Surge	Potential - HMGP	900,000.00	09/30/2026	Project Deferred
74	Emergency By-Pass Pump Sanitary/Storm	Coral Gables	Health, Flood/Storm Surge, Power Failure, Sea Level Rise	Potential	200,000.00	1 year	Future Unfunded Project
75	EOC Generator and Enclosure	University of Miami	Power Failure, Wind, Flood, Security Breach, Technological Disruption	HMGP DR-4673 Hurricane Ian	926,386.00	36 months	Future Unfunded Project
75	Vizcaya Drainage Improvement - Main Gardens	Vizcaya Museum and Gardens	Flood, Flood/Storm Surge, Sea Level Rise, Storm Surge	Potential - HMGP	900,000.00	09/30/2026	Project Deferred
76	6th Avenue Drainage Improvements	Homestead	Flood, Health	Federal This is a 50/50 matching grant.	2,900,000.00	3 Years	Funding Secured
77	Phoenix Manor I - External Hardening	Banyan Community Health Centers	Wind, Power Failure, Health	HMGP-DR-4673 - Hurricane Ian + In-kind & cash match	2,807,577.01	36 months	Funding Applied for
77	Leslie Estates Road and Drainage Project - Phase III	Miami Gardens	Flood	Stormwater along with CITT Funding with State Appropriation Funding.	1,500,000.00	2025	Funding Secured
80	Banyan Health RRC Load Path Hardening	Banyan Community Health Centers	Wind, Health	FEMA HMGP-DR-4673 Hurricane Ian + in-kind match + cash match (potential)	1,142,199.74	36 months	Funding Applied for

80	Stormwater Improvement Project Sub Basin NW 33 ST	Doral	Flood/Storm Surge, Flood	75% Federal Share 25% City of Doral-Stormwater Fund	973837.44	3 years	Future Unfunded Project
81	Vizcaya Drainage Improvement -East side of estate	Vizcaya Museum and Gardens	Flood, Flood/Storm Surge, Sea Level Rise, Storm Surge, Power Failure, Technological Disruption	Potential - HMGP	1,800,000.00	09/30/2026	Future Unfunded Project
81	City-wide Flood Sensors	Hialeah	Flood, Flood/Storm Surge, Sea Level Rise, Storm Surge	The match will be paid from the City of Hialeah General Fund	2,776,920.16	36 months	Funding Applied for
81	City of Hialeah - Drainage Improvement Project 1	Hialeah	Flood, Flood/Storm Surge, Storm Surge	Match will be paid from General Funds	2,168,390.30	36 Months	Funding Applied for
82	Upgrading Critical Facility Generators for Enhanced Support and Resilience	Miami Shores	Power Failure, Health, Security Breach, Technological Disruption	Our Matching Portion would come from our Capital Budget.	750,000.00	12 months	Future Unfunded Project
82	Hardened 911 Communication and Emergency Operations Center	Aventura	Wind, Flood/Storm Surge	General Funds, Police Forfeiture Funds	2,500,000.00	1 to 2 years	Future Unfunded Project
83	Emergency Power Generator for Police & Emergency Operations Center	Aventura	Power Failure	City of Aventura, FY 24 general funds	550,000.00	1 Year	Project in Planning Stage

84	Emergency Shelter Generator Replacement	MacTown	Health, Power Failure, Technological Disruption, Security Breach	HMGP or County or City funds	548,002.00	6 months	Funding Applied for
84	City of Hialeah - Drainage Improvement Project 3	Hialeah	Flood, Flood/Storm Surge, Storm Surge	Match will be paid from General Funds	5,216,255.60	36 Months	Funding Applied for
85	Utility Undergrounding - Phase 2	Key Biscayne	Flood, Health, Power Failure, Other, Wind, Technological Disruption	General Obligation Bond	8,500,000.00	2027	Future Unfunded Project
85	Utility Undergrounding - Phase 3	Key Biscayne	Health, Power Failure, Security Breach, Technological Disruption, Wind, Other, Flood, Flood/Storm Surge	General Obligation Bond	8,500,000.00	2030	Future Unfunded Project
85	7 Generators for 7 traffic light intersections throughout the city	West Miami	Power Failure	Potential 2023 HMGP grant application cycle	40,000.00	2 years or more	Future Unfunded Project
86	Drainage and Roadway Improvements Residential and Commercial areas (Zones 3, 4, and 5)	Opa-Locka	Flood, Flood/Storm Surge, Health	City of Opa-Locka and State Revolving Loans from Florida Department of Environmental Protection	21,577,269.00	36 months	Project in Planning Stage

86	Jackson Memorial Generator Plant Upgrade	Jackson Health System-Miami Dade County Public Health Trust	Power Failure, Health, Technological Disruption, Other	BRIC, HMGP, FLDEO	5,000,000.00	30 months	Future Unfunded Project
86	Stormwater Improvement Project Sub Basin E7	Doral	Flood, Flood/Storm Surge	FEMA Hazard Mitigation Grant Program cycle for Hurricane Nicole (FEMA 4680-DR-FL)	515,181.63	3 years	Future Unfunded Project
87	Improvements to NE 213th Street Basin	Aventura	Flood, Flood/Storm Surge	Stormwater Utility Fund	8,000,000.00	3 Years	Project in Planning Stage
87	Stormwater Pump Station 1 & 2, pump replacement and upgrades	West Miami	Flood, Health, Power Failure	HMGP and State funds	571,000.00	1 year	Funding Applied for
87	Uninterruptible Power System Police Department	Homestead	Power Failure, Technological Disruption	Hurricane Ian (FEMA 4673-DR-FL) 75% with 25% Match	79,000.00	1 year	Funding Applied for
87	Retrofit of Fire Department Headquarters Building	Hialeah	Health, Wind	Match will be paid with General funds	595,414.00	36 Months	Funding Applied for
87	West Miami Standby Generators for four (4) Lift Stations	West Miami	Flood/Storm Surge, Health, Power Failure	Potential funding source is HMGP for the October 20, 2023, application	300,000.00	2-3 years	Project in Planning Stage

				cycle. Funding match of 25%			
87	Westchester Emergency Department	Mount Sinai	Health, Other	Legislative appropriation request	4,000,000.00	2024-2025	Project in Planning Stage
88	Miami-Dade, FL: Miami-Dade Fire Rescue Station 03 Hardening Project	Fire Rescue-Miami Dade County	Wind	Potential Hazard Mitigation Grant Program (HMGP)	1,000,000.00	TBD	Future Unfunded Project
88	Dade Chase Admin Building	Banyan Community Health Centers	Wind, Power Failure, Health	HMGP-DR-4673-Hurricane Ian and In-kind and cash match	1,168,171.61	36 months	Funding Applied for
88	City of Hialeah - Drainage Improvement Project 2	Hialeah	Flood, Flood/Storm Surge, Storm Surge	Match will be paid from General funds	1,278,870.25	36 Months	Funding Applied for
89	Miami-Dade, FL: Miami-Dade Fire Rescue Station 34 Hardening Project	Fire Rescue-Miami Dade County	Wind	Potential Hazard Mitigation Grant Program (HMGP)	1,250,000.00	TBD	Future Unfunded Project
89	Miami Fire Rescue - Fire Station 7 Hardening	Miami	Flood/Storm Surge, Storm Surge, Technological Disruption, Wind, Flood, Security Breach	Hazard Mitigation Grant Program (HMPG)	551,325.00	48 Months	Funding Applied for
89	Yacht Club Drive Seawall Hardening	Aventura	Storm Surge	City of Aventura and FDEP	3,000,000.00	9/1/23 - 9/1/25	Project in Planning Stage

89	Stormwater Drainage and Roadway Improvements to NE 191 Street System	Aventura	Flood, Flood/Storm Surge, Storm Surge	Aventura Stormwater Utility Fund	6,500,000.00	1 to 2 years	Project in Planning Stage
89	Improvements to NE 27th Avenue System	Aventura	Flood, Flood/Storm Surge	Stormwater Utility Fund	4,000,000.00	1 to 2 years	Project in Planning Stage
90	Perform Immediate Flood Control and Mitigation	Key Biscayne	Flood/Storm Surge, Flood, Sea Level Rise, Storm Surge	State appropriations, Village stormwater revenue fund, and general fund from CIP	1,055,250.00	2025	Funding Secured
90	Miami-Dade Fire Rescue Stations 01, 03, & 15 Hardening Project Including Roof	Fire Rescue-Miami Dade County	Wind	Potential Hazard Mitigation Grant Program (HMGP)	1,953,487.20	TBD	Funding Applied for
90	Roof Replacement	Mount Sinai	Health, Wind, Other, Technological Disruption	HMGP: Hurricane Nicole	4,974,680.00	2027	Future Unfunded Project
91	Miami-Dade Fire Rescue Headquarters Hardening Project	Fire Rescue-Miami Dade County	Wind	Potential Hazard Mitigation Grant Program (HMGP)	Unknown	TBD	Future Unfunded Project
91	Miami-Dade Fire Rescue Stations 34, 51, 53, & 56 Hardening Project	Fire Rescue-Miami Dade County	Wind	Potential Hazard Mitigation Grant Project (HMGP)	2,163,277.20	TBD	Funding Applied for

91	Roof, Wind and Enclosure Protection	Mount Sinai	Wind, Power Failure, Other, Technological Disruption, Health	Hazard Mitigation Grant Program (HMGP) DR-4673 Hurricane Ian	$3,000,000.00	2027	Future Unfunded Project
91	Miami Fire Rescue - Fire Station 5 Hardening	Miami	Security Breach, Storm Surge, Technological Disruption, Power Failure, Wind, Flood/Storm Surge	Hazard Mitigation Grant Program (HMPG)	714,477.74	48 Months	Funding Applied for
92	Miami-Dade Fire Rescue Stations HQ IT, 21, 54 & 55 Generator Installments	Fire Rescue-Miami Dade County	Wind, Power Failure, Flood/Storm Surge	Potential Hazard Mitigation Grant Program (HMGP)	1,274,548.80	TBD	Funding Applied for
92	Generator Replacement for Water Treatment Facility	North Miami Beach	Power Failure	Currently, working with WIFIA funds and Water Revenues Bond	3,358,216	1 year	25% complete
92	Improvements to NE 207 Street Basin	Aventura	Flood, Flood/Storm Surge	Stormwater utility Fund	2,500,000.00	1 to 2 years	Project in Planning Stage
93	Miami-Dade County Building Resilient Infrastructure and Communities Direct Technical Assistance	Emergency Management	Flood/Storm Surge, Sea Level Rise	This grant program provides technical assistance, not grant funding.	Unknown	3 years	Project in Planning Stage
93	Miami Fire Rescue - Fire Station 1 Hardening	Miami	Flood, Flood/Storm Surge, Health, Power Failure, Sea Level Rise, Security Breach, Storm	Hazard Mitigation Grant Program (HMPG)	375,000.00	48 Months	Funding Applied for

			Surge, Technological Disruption, Wind				
0	Presidential Estates Pump Station and Drainage Improvements	Public Works-Miami Dade County	Flood, Flood/Storm Surge, Sea Level Rise	Applying for Grants	3,000,000.00	1 year after funding is identified	Future Unfunded Project
0	Drainage Conveyance west of NE 10 AVE at Lake Belmar	Public Works-Miami Dade County	Flood, Flood/Storm Surge, Sea Level Rise, Storm Surge, Wind	Applying for Grants	1,000,000.00	2 years from funding allocation	Project in Planning Stage
0	NE 26 AVE Pump Station and Drainage System Hardening	Public Works-Miami Dade County	Flood, Flood/Storm Surge, Sea Level Rise, Storm Surge	Applying for grants	3,000,000.00	2 years from funding allocation	Future Unfunded Project
0	Public Works Department Compound Flood Protection	Coral Gables	Flood	Potential	500,000.00	1 year	Future Unfunded Project
0	2023 Friedland Manor Pump Stations & Dry Retention Pond Restoration	Florida City	Flood	HMGP	1,383,031.18	TBD	Future Unfunded Project
0	Hazard Mitigation Wind Retrofit Fire Station 2	Miami Beach	Wind	HMGP	Unknown	Unknown	Project Complete
0	Hardening of Affordable Housing Neptune Wind Retrofit	Miami Beach	Wind	HMGP	Unknown	Unknown	Project Complete

0	Public Works Yard	Miami Beach	Flood	None obtained	Unknown	Unknown	Future Unfunded Project
0	Madeleine Village Wind Retrofit & Flood Proofing	Miami Beach	Wind, Flood	HMGP	Unknown	Unknown	Construction/ Project Begun
0	Elevation of 2 Repetitive Loss Private Properties	Miami Beach	Flood/Storm Surge	FEMA FMA - selected for further review.	Unknown	Unknown	Funding Secured
0	United Way Miami Ansin Building Wind Retrofit (TB)	United Way	Wind	HMGP	877,027.00	TBD	Funding Applied for
0	Swale Re-shaping Projects (as needed)	Miami Gardens	Flood	Stormwater Funding	150,000.00	2024	Funding Secured
0	NW 171 St and NW 2 Court Drainage Project	Miami Gardens	Flood	Stormwater Funding	400,000.00	2025	Funding Secured
0	16411 NW 37 Court Drainage Project	Miami Gardens	Flood	Stormwater Funding	150,000.00	2024	Funding Secured
			2024				
BCR	**Project Title**	**Agency**	**Hazards Mitigated**	**Funding Source**	**Estimated Costs**	**Completion Timeframe**	**Status**
61	Critical Facility Improvement	El Portal	Health, Power Failure, Sea Level Rise, Security Breach, Storm Surge, Technological Disruption	Federal, state, county	1,800,000.00	One year	Project in Planning Stage

64	Biscayne Gardens Pump Station Retrofit	Public Schools-Miami Dade County	Flood, Flood/Storm Surge, Sea Level Rise	SWU, GOB, FEMA, FDEP, Grants	2,500,000.00	2 years after funding is approved	Project in Planning Stage
65	Drainage Improvement Project for NE 185th Street from NE 2nd Court to Primary Canal C-9	Public Works-Miami Dade County	Flood, Flood/Storm Surge, Sea Level Rise	SWU, FEMA, FDEP, Grants	770,500.00	2 years after funding is identified	Project in Planning Stage
65	Drainage Improvement Project for NE 189 St from NE 4 CT to NE 6 Ave	Public Works-Miami Dade County	Flood/Storm Surge, Flood, Sea Level Rise	SWU, FEMA, FDEP, Grants	715,000.00	2 years after funding is identified	Future Unfunded Project
65	SW 16 St from SW 73 Ave to SW 72 Ave Drainage Improvements	Public Works-Miami Dade County	Flood, Flood/Storm Surge, Sea Level Rise	SWU, GOB, FEMA, FDEP grants	500,000.00	2 years after funding is approved	Project in Planning Stage
65	Storm Water Improvements to the 58th Street Collections Building in Miami-Dade County	Solid Waste-Miami Dade County	Flood, Flood/Storm Surge	Florida Department of Environmental Protection (FDEP) Resilient Florida Grant	1,200,000.00	December 2028	Funding Applied for
68	Miami-Dade County, FL; Homeless Assistance Center - South Hardening Project	Homeless Trust	Wind	HMGP	2,928,111.00	TBD	Funding Applied for

71	Main Library Resilience Grant	Libraries-Miami Dade County	Flood, Flood/Storm Surge	Florida Department of Environmental Protection	1,500.00	TBD	Funding Secured
72	Recreation Community Center Expansion	West Miami	Flood, Flood/Storm Surge, Health, Power Failure, Wind, Other	Potential BRIC FY 2024-2025	6,700,000.00	2-3 years	Construction/ Project Begun
74	Recreational Center Hardening	West Miami	Power Failure, Flood/Storm Surge, Wind, Other	Potential HMGP	1,000,000.00	2-3 years	Project in Planning Stage
75	City of Hialeah - Critical Facility Wind Retrofit	Hialeah	Wind	City of Hialeah General Funds	5,833,771.85	36 Months	Funding Applied for
75	City of Miami Fire Station #13 Flood Mitigation	Miami	Flood, Flood/Storm Surge, Storm Surge	BRIC	900,000.00	36 Months	Future Unfunded Project
77	Kendall Campus, Building 6 Hurricane Wind Projection	Miami Dade College	Wind	Potential HMGP	2,111,772.00	TBD	Future Unfunded Project
77	Royal Green Drainage Improvements	Public Works-Miami Dade County	Flood, Flood/Storm Surge, Sea Level Rise	SWU	4,500,000.00	2 years after funding is approved	Project in Planning Stage
78	Miami-Dade County; Chapman Partnership North Hardening, Wind Retrofit-Infrastructure Retrofit	Homeless Trust	Wind, Other	HMGP	1,296,610	TBD	Funding Applied for

79	Northeast Dade Aventura Library Resilience Upgrade Grant	Libraries-Miami Dade County	Flood/Storm Surge, Flood, Sea Level Rise	Potential FDEP	2,500,000.00	TBD	Funding Applied for
81	Construct Zone 1 Upgraded Stormwater Infrastructure Outfalls	Key Biscayne	Flood	Potential HMGP	$1,468,202	2027	Future Unfunded Project
81	Drainage for Sub-Basin 41	Palmetto Bay	Flood, Flood/Storm Surge	Unidentified/ Potential HMGP	1,270,000.00	36 months	Future Unfunded Project
81	Drainage for Sub-Basin 11	Palmetto Bay	Flood, Flood/Storm Surge	Unidentified/ Potential HMGP	1,450,000.00	36 months	Future Unfunded Project
81	Miami Dade NW 39 St from NW 29 Ave to 30 Ave Drainage Improvement	Public Works-Miami Dade County	Flood, Sea Level Rise	Grants, SWU, GOB	1,500,000.00	2 years after funding is approved	Funding Applied for
81	NW 7 Street (Midway Pump Station) Improvements	Public Works-Miami Dade County	Flood	Grants, SWU, GOB	1,500,000.00	2 years after funding is approved	Future Unfunded Project
83	City of South Miami Stormwater Masterplan	South Miami	Flood, Flood/Storm Surge, Sea Level Rise	Mitigation Federal Non-Disaster Programs, FMA and BRIC	278,045.00	12/2025	Project in Planning Stage
86	Lakes by the Bay Basin Design	Cutler Bay	Flood, Flood/Storm Surge, Health, Sea Level Rise, Storm Surge, Other	Partially Funded with ARPA	10,052,509.00	1 year	Funding Applied for

87	#2 Freidland Pump Capacity Upgrade	Florida City	Flood, Flood/Storm Surge, Storm Surge	Self-funded	275,000.00	12 Months	Future Unfunded Project
90	Jackson Memorial Hospital Solar and Generator Project	Jackson Health System-Miami Dade County Public Health Trust	Health, Power Failure, Technological Disruption, Other	2024 FEMA BRIC	12,000,000.00	9 months	Future Unfunded Project
91	MDFR USAR Complex Retrofit	Fire Rescue-Miami Dade County	Wind, Storm Surge	Potential HMGP	3,434,733.75	3 years	Funding Applied for
91	Jackson Health System Information Technology Security Project	Jackson Health System-Miami Dade County Public Health Trust	Health, Power Failure, Security Breach, Technological Disruption	1. FEMA Cybersecurity Grant 2. FEMA BRIC 3. FEMA FMA	16,000,000.00	24 months	Future Unfunded Project
91	Jackson Memorial Hospital Wind Retrofit and Rollup Doors Project	Jackson Health System-Miami Dade County Public	Flood/Storm Surge, Health, Wind, Other	FEMA BRIC	8,000,000.00	18 months	Future Unfunded Project

		Health Trust					
93	MDFR (RWD) Retrofit at Stations #14, 43, and 50	Fire Rescue-Miami Dade County	Flood/Storm Surge, Wind	Potential HMGP	2,315,550.30	3 years	Funding Applied for
93	MDFR (WD) Retrofit at Stations #48, 52, 55, 57, 65, and 66	Fire Rescue-Miami Dade County	Wind, Flood/Storm Surge	Potential HMGP	2,785,944.00	3 years	Funding Applied for
93	Jackson Memorial Hospital Geothermal Chiller Cooling	Jackson Health System-Miami Dade County Public Health Trust	Power Failure, Health, Technological Disruption, Other	HMGP	6,000,000.00	16 months	Future Unfunded Project
95	Miami-Dade County Miami River Canal C-6 Basin Improvements Project Phase 2 (Secondary Canals)	Regulatory and Economic Resources - Miami Dade County	Flood, Sea Level Rise	Stormwater Utility and FDEP Resilient Florida Program	17,500,000.00	2029	Funding Applied for
95	Miami-Dade County Snake Creek Canal C-9 Basin Improvements	Regulatory and Economic Resources - Miami	Flood, Sea Level Rise	Stormwater Utility and FDEP Resilient Florida Program	11,000,000.00	2029	Funding Applied for

	Project Phase 3 (Secondary Canals)	Dade County					
95	Stormwater Improvements-Northeast Transfer Station Phase II	Solid Waste-Miami Dade County	Flood, Flood/Storm Surge, Sea Level Rise	FDEP Resilient Florida Grant Program matching source Waste Disposal Operating Fund	700,000.00	January 2028	Funding Applied for
95	Stormwater Improvements-West Transfer Station Phase II	Solid Waste-Miami Dade County	Flood, Flood/Storm Surge, Sea Level Rise	FDEP Resiliency Florida Grant Program and DSWM Waste Disposal Operating Fund	700,000.00	June 2028	Funding Applied for
0	MDFR HQ Windows/Glass Replacement	Fire Rescue-Miami Dade County	Wind, Storm Surge, Flood/Storm Surge, Other	UASI 2023 Federal Legislative Request	1,000,000.00	1 year	Funding Applied for
0	Par 3/Bayshore Park Retention Lake	Miami Beach	Flood	Resilient FL Grant Awarded	Unknown	2025-2026	Funding Secured
0	First Street Neighborhood Improvement Project	Miami Beach	Flood, Flood/Storm Surge, Sea Level Rise	Unsecured. FDEP Resilient FL Program, USDOT Protect Program, and PROTECT.	Unknown	TBD	Funding Applied for
0	Mitigation of Air Rescue Helicopter Hangers Air Rescue North	Fire Rescue-Miami Dade County	Flood, Flood/Storm Surge, Wind, Other	Potential BRIC	1,500,000.00	1 year	Future Unfunded Project

0	Chuck Petzoldt Library State Public Library Construction Grant	Libraries-Miami Dade County	Other	Florida Public Library Construction Grant - State funded-	9,400,000.00	TBD	Funding Secured
0	Miami-Dade Fire Wells	Fire Rescue-Miami Dade County	Wildfire	Potential BRIC	1,500,000.00	3 years	Future Unfunded Project
0	Miami-Dade County, MDFR HQ Storm Water Mitigation and Drainage System	Fire Rescue-Miami Dade County	Flood, Flood/Storm Surge	Potential BRIC	2,500,000.00	3 years	Future Unfunded Project
0	Brickell Roadway and Drainage Improvements	Miami	Flood/Storm Surge, Sea Level Rise, Storm Surge	Unknown	1,300,000.00	Unknown	Project Complete
0	Commerce Way Drainage Improvements	Miami Lakes	Flood	Stormwater Utility System Revenue Bonds Series 2021	2,900,000.00	Unknown	Project Complete
0	Upgrade of Pump Station 137 – Mashta Island	Water and Sewer-Miami Dade County	Flood, Storm Surge, Sea Level Rise	Unknown	3,000,000.00	Unknown	Project Complete
58	Granada Pro Shop Hurricane Mitigation - Impact Windows	Coral Gables	Wind	Post-Disaster Funding Program	150,000.00	Unknown	Project Complete
63	Pump Station Cocoplum 1 Emergency Generator	Coral Gables	Flood/Storm Surge, Health, Power Failure, Sea Level Rise	Sanitary Sewer Fund	Unknown	12/1/2020	Project Complete

68	North Campus, bldg. 900 Hurricane Protection	Miami Dade College	Flood, Flood/Storm Surge	Unknown	55,052.00	Unknown	Project Complete
73	Kendall Campus Bldg. 9000	Miami Dade College	Wind	HMGP	206,521.00	1 year	Project Complete
76	North Central Library Hardening Project	Libraries-Miami Dade County	Wind	FEMA PDM 2019 and HMGP 2020	35,293.71	Unknown	Project Complete
82	South Dade Regional Installation of Roof Replacement and Impact Windows Storefront	Libraries-Miami Dade County	Flood, Wind	HMGP 2018 - PDM 2019 PDM funding approved for FY20-21	Unknown	2018	Project Complete
84	Venetian Islands – Neighborhood Improvements	Miami Beach	Flood, Flood/Storm Surge, Sea Level Rise, Storm Surge	Unknown	Unknown	2020	Project Complete
85	City #2 Gravity Sewer Capacity Improvement Project	Coral Gables	Flood/Storm Surge	HMGP	1,565,000	2/28/2024	Project Complete

CASE STUDIES

Miami-Dade County has a rich history of mitigating against hazards as well as a dedication to it in the present. As a county, our greatest mitigation efforts began following Hurricane Andrew through FEMA's Hazard Mitigation Assistance programs. Since then, we have been committed to reinforcing our critical infrastructure and property to withstand disasters. This section is meant to capture some of the substantial recent efforts made by the Local Mitigation Strategy Working Group which have contributed to our resilience.

2020-2024 Projects Summary

The summary below depicts active mitigation projects for which WebEOC data was readily available and updated by partners; it is not reflective of all mitigation actions undertaken by Miami-Dade County departments, municipalities, or partners within this timeframe.

# of projects

128

Infrastructure

Projects that involve the engineering of infrastructure systems (energy, telecom, water, transportation) to be more resistant to the impacts of hazards.

71

Property Protection

Projects that involve the modification/retrofit of existing buildings or structures to protect them from a hazard, or remove them from the hazard area.

29

Emergency Services Equipment

Projects that invest in equipment to protect people and property, or increase the capacity of emergency response during and immediately following a disaster event.

8

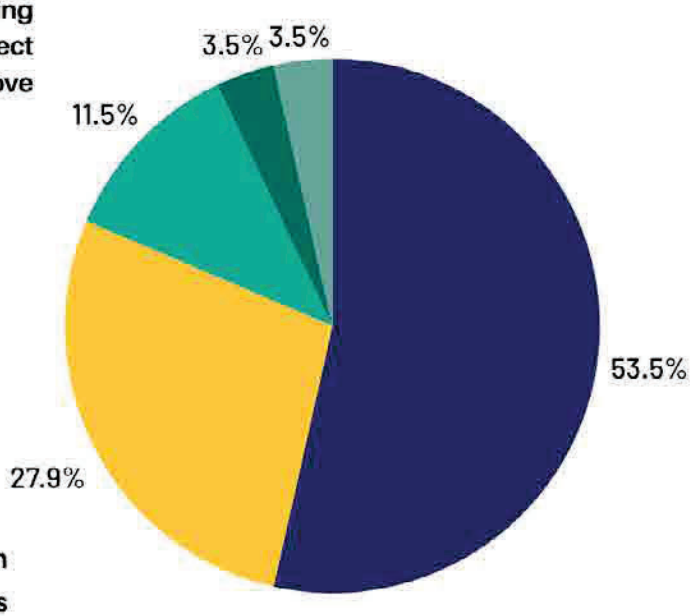
Planning

Projects centered on administrative or planning actions and processes that influence the way systems, land, or buildings are upgraded or built.

11

Coastal & Natural Resource Protection

Projects focused on preserving or restoring the functions of natural or coastal systems in addition to minimizing the hazard losses.



TOTAL:247



County Department

MIAMI DADE PUBLIC LIBRARY SYSTEM

Building Envelope Retrofits
2012-2023

What was done?

Over the course of eleven years, MDPLS has completed retrofit projects to bring eight of their facilities into code compliance. The scope of work consisted of replacing existing windows, doors, and roofs with wind resistant high-impact ones. Additionally, in 2023, the North Dade Regional Library Branch was arrayed with the first-ever large-scale solar panel installation on a county building.



How did it help?

These projects have successfully protected the integrity of the building envelope and reduced potential damage from wind events. By doing so, MDPLS has guaranteed the continuity of vital services to many communities after disasters like hurricane Irma in 2017.

How much did it cost?

Each project ranged from $26,000 to $650,000

What hazards does it mitigate?

Wind, Hurricanes











Municipality

CUTLER BAY

Saga Bay Water Quality Improvement Project 2022

Before



What was done?

The project consisted of drainage improvements, exfiltration trench for water quality treatment, roadway resurfacing, pavement markings, and site restoration.

How did it help?

This project is one of many that have improved the stormwater management system to prevent flooding in Cutler Bay neighborhoods.

How much did it cost?

$840,000

What hazard does it mitigate?

Flooding

After





Municipality

CITY OF MIAMI

Brickell Roadway & Drainage Improvements 2024



What was done?

Street improvements were done to include milling and resurfacing, a pump station, deep drainage wells, and limited roadside reconstruction along streets.

How did it help?

The area where the project was completed is known to flood significantly. After the drainage improvements, the effects of flooding have decreased, making the busy area more accessible for the public during and after heavy rain events.

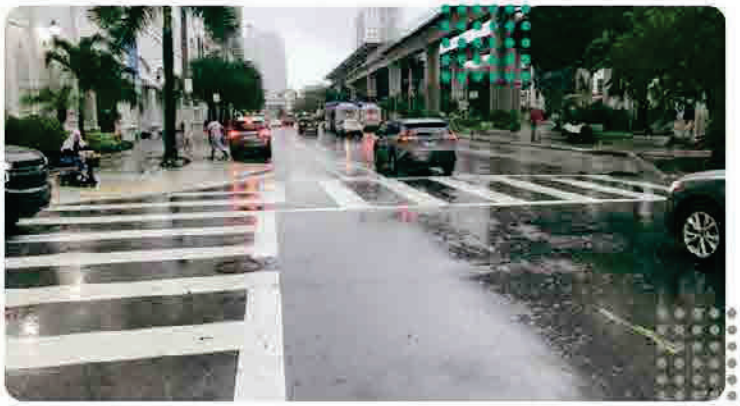


How much did it cost?

$1.3 Million

What hazard does it mitigate?

Flooding





County Department

DEPARTMENT OF TRANSPORATION & PUBLIC WORKS



Improved Flood Control Structures 2019

What was done?

Three flood control structures: Dressels Canal Basin, North Line Canal Basin, and Snapper Creek Canal Basin, along NW 117th Avenue were upgraded to allow better water management during rain events. Improvements included the redesign of the structure, upgrades to the control system for remote monitoring and operation, and motorizing existing flood gates.

How did it help?

Automating the system has kept workers safer during storms and provided more efficient operations. These upgraded structures allow for better water management to help reduce flooding that impacts residents in three different canal basins within the County.

How much did it cost?

$850,000

What hazard does it mitigate?

Flooding





Municipality & County

MIAMI BEACH & MIAMI DADE COUNTY

Raising Dade Boulevard 2017

What was done?

City of Miami Beach and Miami Dade County cooperated to raise a section of Dade Boulevard more than 2 feet to reduce impacts from King Tide flooding. This new elevation builds in additional height above the King Tide levels.

How did it help?

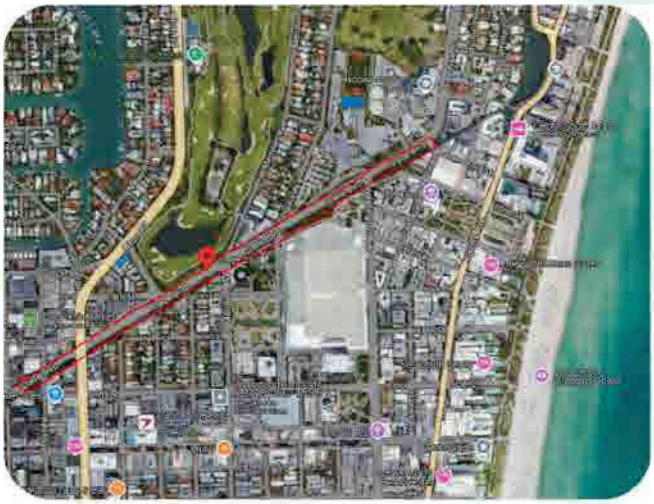
Before the elevation project, Dade Boulevard was flooded during high tide, causing traffic issues, decreased access, and increased damage to the road and to vehicles passing through saltwater. After the elevation project, Dade Boulevard is dry and accessible. Dade Boulevard is one of the first County-owned roadways to be elevated to prepare for sea level rise.

How much did it cost?

$1.9 Million

What hazards does it mitigate?

Flooding, Sea Level Rise, Storm Surge, Hurricanes







Municipality

TOWN OF MIAMI LAKES



Commerce Way Drainage Improvements 2024

What was done?

The Commerce Way Drainage Improvement project is an integral part of the Town's comprehensive plan to reduce flooding. The project includes the addition of catch basins, French drains, manholes, valley gutters as well as restoration and resurfacing of the existing roadway surface, and new pavement markings.

How did it help?

The new system increased the stormwater management capacity and mitigated flooding in the area.

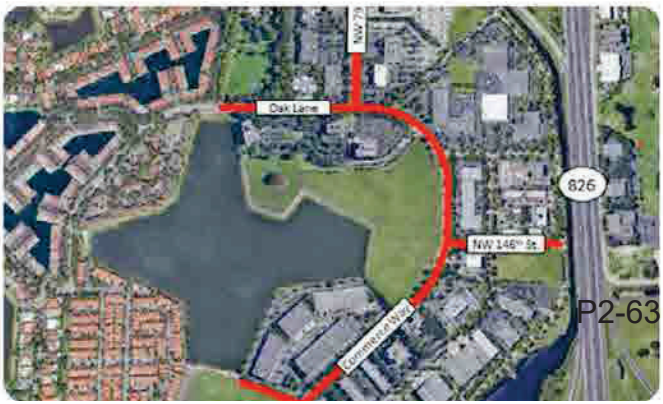
How much did it cost?

$2.9 Million

What hazard does it mitigate?

Flooding









Museum & Gardens

VIZCAYA

Tiger Dam Project 2021

The Problem



The Solution



What was done?

The project consisted of installing a flood control system called a Tiger Dam around the designated perimeter of Vizcaya. The system is composed of a series of inflatable tubes made of reinforced vinyl that withstand effects of storm surge and debris damage.

How did it help?

The Tiger Dam protects Vizcaya grounds from active flooding, which can result from storm surge, wave action, and debris. After Hurricane Irma, Vizcaya experienced millions of dollars of damages and workers took thousands of hours to restore the grounds. Since the dam was installed, Vizcaya has better mitigated against flooding events.

How much did it cost?

$590,000

What hazards does it mitigate?

Flooding, Storm Surge, Hurricanes





Municipality

MIAMI BEACH

Affordable Housing Wind Retrofit Project 2023

What was done?

This project hardened an affordable housing facility, increasing its resilience to hurricane force winds. Standard windows were replaced with impact windows that provide protection from winds up to 171 MPH. A complete roof replacement, concrete and stucco repair, and other storm protections was also completed on this facility.







How did it help?

The retrofit for this building has minimized damage from wind and wind-driven rain caused by events such as hurricanes. The project secured safe and sanitary living conditions for vulnerable residents while bringing the property into compliance with local building code during the 30-year affordability period.

How much did it cost?

$1.7 Million

What hazards does it mitigate?

Wind, Hurricanes







County Department

WATER & SEWER DEPARTMENT

Upgrade of Pump Station 137
Mashta Island, Key Biscayne 2024





What was done?

This project was a groundbreaking effort for WASD, as the department introduced a fully submergible pump station control panel for the first time ever. WASD also collaborated with RER to decide on the elevation of the pump station based on the County's unified sea level projection. The project site was particularly vulnerable, sitting at a very low elevation with the crown of the road and sidewalk between 4-4.5 ft in a flood zone. To meet the flood hardening requirements, a special waterproof electrical housing was developed that can function through submerged conditions. Other project enhancements included a new wet well for more storage capacity and a new water tight hatch that secures against water intrusion.

How did it help?

The project increased capacity and efficiency of the sanitary sewer system and decreased vulnerability to flooding. These improvements allow WASD to continue providing high-quality services to protect public health and sensitive aquatic habitat. The collaboration between RER and WASD also benefited many other subsequent projects that harden pump stations while keeping elevations harmonized with the nearby landscape.

How much did it cost?

$3 Million

What hazard does it mitigate?

Flooding, Sea Level Rise, Storm Surge, Hurricanes

Miami-Dade County

2025

PART 3:

THE FUNDING

MIAMI-DADE
DEPARTMENT OF
EMERGENCY
MANAGEMENT

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PROGRAM OVERVIEW

Miami-Dade County LMS Part 3: The Funding outlines the major funding sources available for mitigation measures. These sources are categorized into Pre-Disaster, Post-Disaster and Other Programs. Pre-Disaster programs refer to funding sources that are made available through yearly budgetary cycles as authorized through federal or state legislatures. Post-disaster programs refer to funding sources that are typically only made available after presidentially declared disasters. Both categories will directly fund disaster mitigation projects. The Other Programs category is for funding sources that may fund projects that do not have disaster mitigation as the primary goal but provide disaster mitigation as ancillary benefits.

As new funding opportunities arise over time, this document will be updated and the LMS Chair will disseminate this information to the LMS Working Group (LMSWG). This document serves as a resource to help stakeholders identify potential funding options.

This resource is by no means an exhaustive compendium of information or complete guide needed to submit the necessary information for the various grant programs. Individual interested parties are responsible for gathering all necessary grant requirements, where possible, the LMS Chair will assist as much as possible with guidance and information.

Some grant programs require the listing of your projects in the LMS project list. Some grant programs also require a support letter from the LMS.

PRE-DISASTER FUNDING PROGRAMS

Beach Management Funding Assistance			
Source of funding	Federal/State	**Resource Type**	Grant
Hazard	Beach Erosion	**Support Recovery**	No
Department and Agency	Florida Department of Environmental Protection (FDEP)		
Type of Mitigation Action	Restoring		
National Mitigation Framework Core Capability	Threats and Hazards Identification		
Eligible Applicants	Recognizing the importance of the state's beaches, the Florida Legislature in 1986 adopted a posture of protecting and restoring the state's beaches through a comprehensive beach management planning program. The program evaluates beach erosion problems throughout the state seeking viable solutions. The program is authorized by Section 161.101, Florida Statutes, and rules of Chapter 62B-36, Florida Administrative Code.		
Restrictions	Projects must be accessible to the public, located on the Gulf of Mexico, Atlantic Ocean or Straits of Florida, be designated by the department as a critically eroded beach, and be consistent with the state's Strategic Beach Management Plan.		
Available Grant or Program Funding	FY 2023-2024 $30,079,000		
Cost Sharing	Financial assistance in an amount up to 50% of beach projects and up to 75% of inlet project costs is available to Florida's local governments, including county and municipal governments, community development districts and special taxing districts.		
Website	https://floridadep.gov/rcp/beaches-funding-program		

Coastal Partnership Initiative Grants (CPI)			
Source of funding	State	**Resource Type**	Grant
Hazard	Climate change, Natural hazards and disasters	**Support Recovery**	Yes
Department and Agency	Florida Department of Environmental Protection (FDEP)		
Type of Mitigation Action	Coastal restoration		
National Mitigation Framework Core Capability	Risk and Disaster Resilience Assessment; Long-term Vulnerability Reduction		
Eligible Applicants	Through the CPI, the Florida Coastal Management Program (FCMP) makes federal specifically, the National Oceanic and Atmospheric Administration (NOAA), funds available for Florida's 35 coastal counties, and all municipalities within their boundaries, that are required to include a coastal element in their comprehensive plan.		
Restrictions	Projects must occur on publicly owned land, or land held in a conservation easement. Federal and privately owned lands/structures are not eligible. NPOs are not eligible to receive funds for construction projects, habitat restoration, exotic plant removal or land acquisition.		
Available Grant or Program Funding	$10,000 to $60,000 for construction projects, habitat restoration, invasive plant removal or land acquisition; and $10,000 to $30,000 for planning, design and coordination activities.		
Cost Sharing	Grant recipients are required to provide 100% match		
Website	https://floridadep.gov/rcp/fcmp/content/coastal-partnership-initiative		

Coastal Zone Management Fund (CZMA)			
Source of funding	Federal	**Resource Type**	Grant
Hazard	Coastal and wetland restoration	**Support Recovery**	No
Department and Agency	National Oceanic and Atmospheric Administration (NOAA)		
Type of Mitigation Action	Protection and development of the coastal zone		
National Mitigation Framework Core Capability	Risk and Disaster Resilience Assessment		
Eligible Applicants	The Coastal Zone Management Act (CZMA) Section 309 outlines the Coastal Zone Enhancement Program, a federal program administered by the National Oceanic and Atmospheric Administration (NOAA) Office for Coastal Management that encourages state and US territory coastal management programs to enhance their coastal resource management. Under Section 309, states and territories are incentivized to develop and implement strategies that improve specific areas of their coastal programs.		
Restrictions	Projects must be within the coastal zone management boundary or coastal county.		
Available Grant or Program Funding	$207 million over 5 years (2023-2028); up to $6 million per project		
Cost Sharing	Neither competitive nor non-competitive funds will require a match.		
Website	https://floridadep.gov/rcp/fcmp/content/coastal-zone-enhancement-program-czma-section-309		

Community Assistance Program State Support Services Element (Available Grant or Program Funding-SSE)			
Source of funding	Federal	**Resource Type**	Grant
Hazard	Flood	**Support Recovery**	Yes
Department and Agency	Federal Emergency Management Agency (FEMA)		
Type of Mitigation Action	Reduce flood risks in flood prone areas.		
National Mitigation Framework Core Capability	Risk and Disaster Resilience Assessment		
Eligible Applicants	SSSE program is to support the State National Flood Insurance Program (NFIP) Coordinating Agencies to reduce risk and help to avoid losses from flood events as they provide technical assistance and floodplain management support to flood prone and NFIP-participating communities within their states or territories. SSSE strives to leverage state knowledge and provide support to communities through activities that effectively reduce flood losses.		
Restrictions	SSSE funds cannot be used for: conducting floodplain studies, developing floodplain maps, web-based digital mapping platforms, and the Association of State Floodplain Managers dues/memberships.		
Available Grant or Program Funding	$15,000,000		
Cost Sharing	75% federal 25% non-federal		
Website	https://www.fema.gov/floodplain-management/community-assistance-program		

Continuing Authorities Program (Available Grant or Program Funding) Aquatic Ecosystem Restoration			
Source of funding	Federal	**Resource Type**	Grant
Hazard	Flood	**Support Recovery**	No
Department and Agency	U. S. Army Corps of Engineers (USACE)		
Type of Mitigation Action	Flood mitigation		
National Mitigation Framework Core Capability	Threats and Hazards Identification		
Eligible Applicants	Continuing Authorities Program (Available Grant or Program Funding) authorizes USACE to plan, design and construct small scale projects under existing program authority from Congress. Local governments and agencies seeking assistance may request USACE to investigate potential water resource issues that may fit a particular authority. Floodplain Management Services (FPMS), Section 206 of the Flood Control Act of 1960, provides full technical services and planning guidance of floodplain management. The program develops data on obstructions to flood flows, flood formation and timing, and flood depths or stages.		
Restrictions	Funding cannot support construction.		
Available Grant or Program Funding	The maximum federal limit is $10 million per project.		
Cost Sharing	Available Grant or Program Funding projects are conducted in two phases: a feasibility phase and design and implementation phase. Both phases are cost-shared between the federal government and non-federal sponsor.		
Website	https://www.saj.usace.army.mil/Sect206AquaticEcosystemRestoration/		

Florida Beaches Funding Program			
Source of funding	State	**Resource Type**	Grant
Hazard	Beach and coastal erosion	**Support Recovery**	No
Department and Agency	Florida Department of Environmental Protection (FDEP)		
Type of Mitigation Action	Beach restoration and nourishment.		
National Mitigation Framework Core Capability	Threats and Hazards Identification		
Eligible Applicants	Funding for Florida's critically eroded beaches is managed by the Beach Management Funding Assistance Program. The program provides and manages grants to local governments for planning and implementing beach and inlet management projects on the Gulf of Mexico, Atlantic Ocean or Straits of Florida to protect upland structures and infrastructure, provide critical habitat for threatened and endangered species, provide recreational opportunities, and support local economies through tourism.		
Restrictions	Projects must be accessible to the public, located on the Gulf of Mexico, Atlantic Ocean or Straits of Florida, be designated by the department as a critically eroded beach, and be consistent with the state's Strategic Beach Management Plan.		
Available Grant or Program Funding	$315 million		
Cost Sharing	75% program funding for inlet projects and 50% for beach projects.		
Website	https://floridadep.gov/rcp/beaches-funding-program		

Flood Mitigation Assistance Grant Program (FMA)			
Source of funding	Federal	**Resource Type**	Grant
Hazard	Flood	**Support Recovery**	No
Department and Agency	Federal Emergency Management Agency (FEMA)		
Type of Mitigation Action	Reduce or eliminate risks of flood damage to buildings and structures.		
National Mitigation Framework Core Capability	Risk and Disaster Resilience		
Eligible Applicants	As appropriated by the Consolidated Appropriations Act, the Flood Mitigation Assistance (FMA) Grant Program provides resources to assist states, tribal governments, territories and local communities in their efforts to reduce or eliminate the risk of repetitive flood damage to buildings and structures insurable under the National Flood Insurance Program (NFIP) as authorized by the National Flood Insurance Act of 1968, as amended.		
Restrictions	Applicants and sub-applicants must have a FEMA approved mitigation plan as the application deadline to apply for mitigation projects in accordance with Title 44 CFR Part 201.		
Available Grant or Program Funding	Based on fiscal year funding from FEMA e.g., $800 million for FY 2023		
Cost Sharing	FMA insured properties 75% federal 25% non-federal, FMA repetitive loss 90% federal 10% non-federal, and FMA severe repetitive loss 100% federal 0% non-federal.		
Website	https://www.floridadisaster.org/dem/mitigation/flood-mitigation-assistance-program/		

Resilient Florida Grant Program			
Source of funding	State	**Resource Type**	Grant
Hazard	Flooding and sea level rise	**Support Recovery**	No
Department and Agency	Florida Department of Environmental Protection		
Type of Mitigation Action	Effectively identifying and addressing the impacts of flooding and sea level rise.		
National Mitigation Framework Core Capability	Threats and Hazard Identification		
Eligible Applicants	The Resilient Florida program includes a selection of grants that are available to counties, municipalities, water management districts, flood control districts and regional resilience entities. To effectively address the impacts of flooding and sea level rise that the state faces, eligible applicants may receive funding assistance to analyze and plan for vulnerabilities, as well as implement projects for adaptation and mitigation.		
Restrictions	Infrastructure projects to mitigate the effects of flooding and sea level rise on water resources (e.g., wastewater, drinking water, stormwater, green infrastructure).		
Available Grant or Program Funding	$500 million		
Cost Sharing	Each project in the plan must have a minimum 50% cost share unless the project assists or is within a financially disadvantaged small community.		
Website	https://floridadep.gov/rcp/florida-resilient-coastlines-program/content/resilient-florida-grants		

Hurricane Loss Mitigation Program (HLMP)			
Source of funding	State	**Resource Type**	Grant
Hazard	Hurricanes	**Support Recovery**	Yes
Department and Agency	Florida Division of Emergency Management (FDEM)		
Type of Mitigation Action	Minimizing damage caused by hurricanes		
National Mitigation Framework Core Capability	Community Resilience; Risk and Disaster Resilience Assessment; Long-term Vulnerability Reduction		
Eligible Applicants	The Florida's Division of Emergency Management created the Hurricane Loss Mitigation Program (HLMP) to act as a specialized, state-funded mitigation program aimed at minimizing damage caused by hurricanes. The program funds activities that promote property resiliency through retrofits made to residential, commercial, and mobile home properties. Grant funds awarded under HLMP qualify as state financial assistance under the Florida Single Audit Act. F.S. Section 215.971. The Catalog of State Financial Assistance number (CSFA#) for HLMP is 31.066. Eligible proposers under this RFP include governmental entities and nonprofit organizations.		
Restrictions	Individual homeowners are ineligible to apply		
Available Grant or Program Funding	$7 million annually		
Cost Sharing	N/A		
Website	https://www.floridadisaster.org/dem/mitigation/hurricane-loss-mitigation-program/		

Planning Assistance to States Program (USACE)			
Source of funding	Federal	**Resource Type**	Planning Assistance
Hazard	Flooding and other Water Resource Challenges	**Support Recovery**	No
Department and Agency	U.S. Army Corps of Engineers (USACE)		
Type of Mitigation Action	Planning		
National Mitigation Framework Core Capability	Threats and Hazards Identification		
Eligible Applicants	The USACE is the Federal Government's largest water resources development and management agency. There a two types of planning assistance offered through the PAS program: Comprehensive Plans and Technical Assistance. Comprehensive Plans plan for the development, utilization, and conservation of the water and related resources of drainage basins, watersheds, or ecosystems located within the boundaries of that State Technical Assistance provided through the PAS program includes support of planning efforts related to the management of state water resources.		
Restrictions	No more than $5 million in Federal funds for PAS comprehensive planning efforts may be expended in a State, Tribe, or U.S. Territory per fiscal year.		
Available Grant or Program Funding	N/A		
Cost Sharing	50% federal 50% non-federal		
Website	https://www.usace.army.mil/Missions/Civil-Works/Technical-Assistance/Planning-Assistance/		

Residential Construction Mitigation Program (RCMP)			
Source of funding	State	**Resource Type**	Grant
Hazard	Wind damage	**Support Recovery**	Yes
Department and Agency	Florida Division of Emergency Management		
Type of Mitigation Action	Retrofit homes against wind drive forces.		
National Mitigation Framework Core Capability	Threats and Hazards Identification		
Eligible Applicants	This grant program provides retrofit measures rather than rehabilitative work to structures, which serves to protect homes against wind drive forces such as hurricanes. Services include re-roofing, load path reinforcement and opening (windows/shutters) protection. eligible proposers under this request for proposal (RFP) include governmental entities, nonprofit organizations, and qualified for-profit organizations.		
Restrictions	Individual homeowners are ineligible to apply.		
Available Grant or Program Funding	$10 million		
Cost Sharing	N/A		
Website	https://www.miamidade.gov/global/service.page?Mduid_service=ser1541438535801741		

Waterways Assistance Grant Program (WAP)			
Source of funding	State	**Resource Type**	Grant
Hazard	Beach Erosion	**Support Recovery**	No
Department and Agency	Florida Inland Navigation District (FIND)		
Type of Mitigation Action	Improving accessibility to navigable waterways.		
National Mitigation Framework Core Capability	Threats and Hazards Identification		
Eligible Applicants	The Waterway Assistance Program is a grant program established by the Florida Legislature and the District for the purpose of financially cooperating with local governments to increase public access associated with the Atlantic Intracoastal Waterway and associated waterways within the District. Eligible waterway related projects include navigation channel dredging, channel markers, navigation signs or buoys, boat ramps, docking facilities, fishing & viewing piers, waterfront boardwalks, inlet management, environmental education, law enforcement equipment, boating safety programs, beach re-nourishment, dredge material management, environmental mitigation, and shoreline stabilization.		
Restrictions	Water-related projects must be located on natural, navigable waterways within the District.		
Available Grant or Program Funding	$10-12 million		
Cost Sharing	75% for public navigation projects and 50% for other eligible projects. Cash and other grant funds may be utilized as the local match.		
Website	https://www.aicw.org/grants_and_assistance_programs/index.php		

POST-DISASTER FUNDING PROGRAMS

Community Development Block Grant Disaster Program (CDBG)			
Source of funding	Federal	**Resource Type**	Grant
Hazard	Natural Disasters	**Support Recovery**	Yes
Department and Agency	Housing and Urban Development (HUD) and Community Planning and Development		
Type of Mitigation Action	Planning, disaster mitigation		
National Mitigation Framework Core Capability	Long-term Vulnerability Reduction		
Eligible Applicants	Community Development Block Grant Disaster Recovery (CDBG-DR) grant funds are appropriated by Congress and allocated by HUD to rebuild disaster-impacted areas and provide crucial seed money to start the long-term recovery process. Members of the public impacted by a disaster cannot receive CDBG-DR funds directly from HUD. Funds are awarded to state and local governments which become grantees. Those who receive grant money include state agencies, non-profit organizations, economic development agencies, citizens and businesses.		
Restrictions	Individuals nor communities can apply for funds.		
Available Grant or Program Funding	Funds based on Congressional appropriations that vary by year and cannot supplant other Federal funds.		
Cost Sharing	N/A		
Website	https://www.hudexchange.info/programs/cdbg-dr/		

Economic Development Association (EDA) Disaster Supplemental Funding			
Source of funding	Federal	**Resource Type**	Grant
Hazard	Natural disasters	**Support Recovery**	Yes
Department and Agency	Economic Development Administration		
Type of Mitigation Action	Flood Mitigation, infrastructure restoration		
National Mitigation Framework Core Capability	Community Resilience; Long-term Vulnerability Reduction		
Eligible Applicants	This Congressionally appropriated funding program is designed to promote long-term economic development and assist in the construction of public works and development facilities needed to initiate and support the creation or retention of permanent jobs in the private sector in areas experiencing substantial economic distress.		
Restrictions	Must be in a Presidentially declared community or region.		
Available Grant or Program Funding	Based on Presidential declaration and Congressional funding.		
Cost Sharing	Based on Presidential declaration and Congressional funding.		
Website	https://www.eda.gov/strategic-initiatives/disaster-recovery/supplemental		

Emergency Watershed Protection Program (EWP)			
Source of funding	Federal	**Resource Type**	Eligible funding program
Hazard	Floods and Natural disasters	**Support Recovery**	Yes
Department and Agency	United States Department of Agriculture		
Type of Mitigation Action	Alleviates hazards to life and property caused by floods and other natural disasters.		
National Mitigation Framework Core Capability	Infrastructure systems		
Eligible Applicants	Recovery projects begin with a local sponsor or legal subdivision of state or tribal government. Eligible sponsors include cities, counties, towns, conservation districts, or any federally recognized Native American tribe or tribal organization. Interested public and private landowners must work through a sponsor.		
Restrictions	The EWP Program cannot be used to address the same structural issue or practiced 3 times within 10 years, for existing operation and maintenance, to repair, rebuild, or maintain any transportation facilities, utilities, or similar facilities,		
Available Grant or Program Funding	Based on eligibility, ranking, and implementation.		
Cost Sharing	N/A		
Website	https://www.nrcs.usda.gov/programs-initiatives/ewp-emergency-watershed-protection/florida/emergency-watershed-protection#assistance		

Flood Mitigation Assistance Swift Current			
Source of funding	Federal	**Resource Type**	Grant
Hazard	Flood	**Support Recovery**	Yes
Department and Agency	Federal Emergency Management Agency (FEMA)		
Type of Mitigation Action	Reduce infrastructure damage caused by flooding.		
National Mitigation Framework Core Capability	Threats and Hazards Identification		
Eligible Applicants	The Flood Mitigation Assistance Swift Current (Swift Current) effort provides funding to mitigate buildings insured through the National Flood Insurance Program (NFIP) after a major disaster declaration following a flood-related disaster event to reduce risk against future flood damage.		
Restrictions	Swift Current funding is only available to property owners that have a current flood insurance policy under the NFIP and a history of repetitive or substantial damage from flooding.		
Available Grant or Program Funding	FY 2024 $300 million		
Cost Sharing	75% federal 25% non-federal		
Website	https://www.fema.gov/grants/mitigation/learn/flood-mitigation-assistance/swift-current#overview		

Hazard Mitigation Grant Program (HMGP)			
Source of funding	Federal/State	**Resource Type**	Grant
Hazard	Natural Disasters	**Support Recovery**	Yes
Department and Agency	Florida Division of Emergency Management (FDEM)		
Type of Mitigation Action	Long-term mitigation measures following a major disaster declaration.		
National Mitigation Framework Core Capability	Long-term Vulnerability Reduction		
Eligible Applicants	The Hazard Mitigation Grant Program is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. It is a partnership that is designed to assist states, local governments, private non-profit organizations and Indian Tribes in implementing long-term hazard mitigation measures following a major disaster declaration. The process of selecting eligible mitigation projects to be submitted for funding consideration has been delegated to each county's Local Mitigation Strategy Working Group (LMSWG) in accordance with 27P-22 of the Florida Administrative Code.		
Restrictions	Must be a government entity, private non-profit, or Indian tribe. An eligible mitigation project is required based on the HMGP eligibility criteria Project Eligibility Criteria.pdf (floridadisaster.org) eligibility for funds begin at the county level with the Local Mitigation Strategy Working Group (LMSWG) and requires active and mandatory participation.		
Available Grant or Program Funding	Based on Presidential Declaration		
Cost Sharing	75% federal 25% non-federal		
Website	https://www.floridadisaster.org/dem/mitigation/hazard-mitigation-grant-program/		

Hazard Mitigation Grant Program Post Fire			
Source of funding	Federal	**Resource Type**	Grant
Hazard	Wildfires	**Support Recovery**	Yes
Department and Agency	Federal Emergency Management Agency (FEMA)		
Type of Mitigation Action	Reduce the risk of future damage, hardship, loss or suffering caused by fire		
National Mitigation Framework Core Capability	Long-term Vulnerability Reduction		
Eligible Applicants	Assistance is available for states, federally recognized tribes, and territories affected by fires resulting in a declaration of a Fire Management Assistance Grant (FMAG). FMAG is available to help communities implement hazard mitigation measures after wildfire disasters in any area affected by a fire. FMAG declaration provided under Section 1204 of the Disaster Recovery Reform Act of 2018 amended Section 404 of the Stafford Act. Under an FMAG declaration made to a state or territory, federally recognized tribes with burned land from the FMAG declared event may request an HMGP Post Fire award as recipients.		
Restrictions	Applicants must have a FEMA-approved mitigation plan to receive HMGP Post Fire funding.		
Available Grant or Program Funding	Projects are required to be cost-effective, meaning future benefits must equal or exceed project costs.		
Cost Sharing	75% federal 25% non-federal		
Website	https://www.fema.gov/grants/mitigation/learn/post-fire		

Public Assistance Hazard Mitigation Program (406 Mitigation)			
Source of funding	Federal	**Resource Type**	Grant
Hazard	Natural Disasters	**Support Recovery**	Yes
Department and Agency	Federal Emergency Management Agency (FEMA)		
Type of Mitigation Action	Disaster recovery		
National Mitigation Framework Core Capability	Long-term Vulnerability Reduction		
Eligible Applicants	FEMA's Public Assistance Program (PA) provides supplemental grants to state, tribal, territorial, and local governments, and certain types of private non-profits so communities can quickly respond to and recover from major disasters or emergencies. PA provides funding for the repair, restoration, reconstruction, or replacement of a public facility or infrastructure damaged or destroyed by a disaster.		
Restrictions	An applicant must be a state, territory, tribe, local government, or certain type of private nonprofit organization. Facilities must be a building, public works system, equipment, or improved and maintained natural features. Work is either "emergency" or "permanent" and must be a declared incident within the designated disaster area. Costs are expenses tied directly to eligible work, and must be documented, authorized, necessary and reasonable. Eligible costs are labor, equipment, materials, contract work, and management costs.		
Available Grant or Program Funding	Adjusted annually based on large or small projects; FY 2024 $1,037,000 for small projects.		
Cost Sharing	75% federal 25% non-federal is shared between Applicant and Recipient.		
Website	https://www.fema.gov/assistance/public/hazard-mitigation		

Safeguarding Tomorrow through Ongoing Risk Mitigation (STORM)			
Source of funding	Federal	**Resource Type**	Grant
Hazard	Flood	**Support Recovery**	Yes
Department and Agency	Federal Emergency Management Agency (FEMA)		
Type of Mitigation Action	Reduce risks of future flood damage		
National Mitigation Framework Core Capability	Threats and Hazards Identification		
Eligible Applicants	The National Flood Insurance Program (NFIP) helps reduce the impacts of flooding through risk mapping, mitigation, and administering flood insurance. The local government is considered the sub-applicant and will develop a sub application with any interested property owners. The local government will then submit the sub-application to the appropriate state, tribal or territorial government on the property owner's behalf. Eligible Individual Flood Mitigation Projects include the following project types which may be referenced in the Hazard Mitigation Assistance Program and Policy Guide. Funds will be made available to states, territories, and federally recognized tribal governments that receive a major disaster declaration following a flood-related disaster event and meet all other eligibility criteria.		
Restrictions	Funding is only available to property owners that have a current flood insurance policy under the NFIP and a history of repetitive or substantial damage from flooding.		
Available Grant or Program Funding	$500 million over a 5-year period (2021-2026)		
Cost Sharing	N/A		
Website	https://www.fema.gov/grants/mitigation/learn/flood-mitigation-assistance/swift-current		

OTHER PROGRAMS

Brownfields Economic Redevelopment Grants			
Source of funding	Federal	**Resource Type**	Grant
Hazard	Contaminated/Polluted Sites	**Support Recovery**	No
Department and Agency	Environmental Protection Agency (EPA)		
Type of Mitigation Action	Cleanup and Redevelopment		
National Mitigation Framework Core Capability	Community Resilience		
Eligible Applicants	The EPA Brownfields and Land Revitalization Program supports states, Tribal Nations, communities and other stakeholders in working together to prevent, assess, safely clean up and sustainably reuse brownfield sites. A brownfield site is real property, the expansion, redevelopment or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant or contaminant. EPA's Brownfields Program provides competitive funding for brownfield projects: Assessment, Revolving Loan Fund (RLF), Cleanup, Multipurpose, and Bipartisan Infrastructure Law (BIL).		
Restrictions	For-profit organizations, individual entities and nonprofit organizations are exempt from taxation under section 501(c)(4) of the Internal Revenue Code that lobby are not eligible to receive Brownfields Grants.		
Available Grant or Program Funding	FY 2024 $232 million		
Cost Sharing	No cost share: Assessment, BIL. RLF $20%, Multipurpose $40,000		
Website	https://www.epa.gov/resilient-investments/brownfields-program-grants#background		

Clean Water State Revolving Fund (CWSRF)			
Source of funding	State	**Resource Type**	Revolving Fund Program
Hazard	Clean water scarcity	**Support Recovery**	No
Department and Agency	Florida Department of Environmental Protection		
Type of Mitigation Action	Optimizing water quality.		
National Mitigation Framework Core Capability	Community Resilience		
Eligible Applicants	This fund is composed of three programs: Clean Water State Revolving Fund, Drinking Water State Revolving Fund, and State Revolving Fund Management. The Clean Water and the Drinking Water SRF Programs are funded through money received from federal grants as well as state contributions. These funds then "revolve" through the repayment of previous loans and interest earned. While these programs offer loans, grant-like funding is also available for qualified small, disadvantaged communities, which reduces the amount owed on loans by the percentage that the community qualifies. While these programs offer loans, grant-like funding is also available for qualified small, disadvantaged communities, which reduces the amount owed on loans by the percentage that the community qualifies.		
Restrictions	The terms of the loan may not exceed 30 years or the useful life of the project.		
Available Grant or Program Funding	$8.5 billion		
Cost Sharing	80% federal 20% non-federal		
Website	https://floridadep.gov/wra/srf		

Derelict Vessels Removal Program			
Source of funding	State	**Resource Type**	Grant
Hazard	Marine debris	**Support Recovery**	Yes
Department and Agency	Florida Fish and Wildlife Conservation (FWC)		
Type of Mitigation Action	Removal of derelict vessels		
National Mitigation Framework Core Capability	Long-term Vulnerability Reduction		
Eligible Applicants	The FWC, pursuant to sections 206.606 and 823.11, F.S., has a program to provide grants to reimburse local governments for removing derelict vessels from the public waters of the state. The program is funded by an appropriation from the Florida Legislature. The FWC's Derelict Vessel Grant Guidelines allow for the receipt of these grant applications on a continuing basis with no deadlines if funding is available. eligibility includes an opportunity for the vessel owner to challenge the derelict vessel determination in criminal court and/or in an administrative hearing.		
Restrictions	Grant funds under this program will not be directly awarded to NGOs or private citizens. Vessel cases in which administrative hearing opportunities weren't offered to vessel owners will not be considered for state funding assistance.		
Available Grant or Program Funding	FY 2024 $3.7 million		
Cost Sharing	The FWC will pay 100% reimbursement to the grantee for all eligible vessels in the grant contract.		
Website	https://myfwc.com/boating/grants-programs/derelict-vessel/		

Emergency Solutions Grant Program (ESG)			
Source of funding	Federal	**Resource Type**	Grant
Hazard	Housing crisis, Unhoused individuals	**Support Recovery**	Yes
Department and Agency	Housing and Urban Development		
Type of Mitigation Action	Housing assistance		
National Mitigation Framework Core Capability	Community Resilience		
Eligible Applicants	The Homeless Emergency Assistance and Rapid Transition to Housing (HEARTH) Act of 2009 amended to the McKinney-Vento Homeless Assistance Act, revised the Emergency Shelter Grants Program and renamed it to the Emergency Solutions (ESG) program. The ESG Interim Rule took effect on January 4, 2012. The change in the program's name addresses the needs of homeless people in emergencies or transitional shelters by assisting them regain stability in permanent housing.		
Restrictions	ESG funds must be used for five program components: street outreach, emergency shelter, homelessness prevention, rapid re-housing assistance, and HMIS; as well as administrative activities (up to 7.5%).		
Available Grant or Program Funding	FY 2024 Florida $6,058,545 Miami-Dade County $1,052,096		
Cost Sharing	City and County recipients must match grant funds with an equal amount of contributions, which may include cash, donated buildings or materials, and volunteer services. States must match all but $100,000 of their awards, but must pass on the benefits of that $100,000 exception to their subrecipients that are least capable of providing matching amounts. Territories are exempt from the match requirement.		
Website	https://www.hud.gov/program_offices/comm_planning/esg		

Florida Forever Grant Program / Florida Communities Trust (FCT)			
Source of funding	State	**Resource Type**	Grant
Hazard	Deteriorating infrastructure and water system	**Support Recovery**	No
Department and Agency	Florida Department of Environmental Protection (FDEP)		
Type of Mitigation Action	Improving natural resources		
National Mitigation Framework Core Capability	Threats and Hazards Identification		
Eligible Applicants	FCT helps Florida communities create local recreational opportunities, ensure public access to our beautiful beaches, protect our historical and cultural resources, preserve Florida's commercial fishing heritage and traditional working waterfronts, and provide clean air and drinking water essential to creating livable communities.		
Restrictions	If any applicant has three or more active Grant Agreements at the time of the project selection meeting, the Applicant is not eligible		
Available Grant or Program Funding	$15.7 million FY 2024-2025		
Cost Sharing	N/A		
Website	https://floridadep.gov/lands/land-and-recreation-grants/content/florida-communities-trust		

Household Hazardous Waste Program			
Source of funding	State	**Resource Type**	Grant
Hazard	Hazardous waste	**Support Recovery**	No
Department and Agency	Florida Department of Environmental Protection (FDEP)		
Type of Mitigation Action	Proper removal of household hazardous waste		
National Mitigation Framework Core Capability	Community Resilience		
Eligible Applicants	In 1985 the Florida Legislature initiated the Hazardous Waste Collection Center Grant Program to encourage the establishment and operation of a statewide network of local hazardous waste collection centers. These facilities provide collections of non-regulated hazardous waste from households and as well as short-term storage of potentially hazardous waste generated by small businesses.		
Restrictions	Funding is available only to counties that are operating permanent hazardous waste collection centers.		
Available Grant or Program Funding	Up to $100,000 per county		
Cost Sharing	25% match from County.		
Website	https://floridadep.gov/waste/waste-reduction/content/household-hazardous-waste-grants		

Rivers, Trails, and Conservation Assistance Program (NPS-RTCA)			
Source of funding	Federal	**Resource Type**	Direct Technical Assistance (DTA)
Hazard	Conservation projects	**Support Recovery**	No
Department and Agency	National Park Service		
Type of Mitigation Action	Provide DTA to agencies, organizations, communities, and non-profits for conservation and outdoor recreation projects.		
National Mitigation Framework Core Capability	Community Resilience		
Eligible Applicants	This program extends and expands the benefits of the National Park Service throughout the nation to connect all Americans to their parks, trails, rivers, and other special places. It also assists community groups, National Parks, nonprofits, state and local governments, tribes plan parks and trails, conserve and improve access to rivers and natural areas, and create recreation opportunities through locally led partnerships.		
Restrictions	NPS-RTCA is not a grant-funding program		
Available Grant or Program Funding	N/A		
Cost Sharing	N/A		
Website	https://www.nps.gov/orgs/rtca/whatwedo.htm		

LMS

Miami-Dade County

2025

PART 4:

THE APPENDICES

MIAMI-DADE
DEPARTMENT OF
EMERGENCY
MANAGEMENT

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Appendix A: List of LMS Changes

Page/Part	Location	Change
P1	Through out	Removed references to LMS Coordinator and replaced with LMS Chair
P1-7	LMS Sub-Committees	Added description regarding the formation and disbandment of sub-committees
P1-8	Five-Year Update	Section was updated to include the LMS-PUMP
P1	Municipal Integration of Mitigation Measures	This section was updated based on submissions from respective municipalities and moved to the appendix
P1-24	Mitigation Goals and Objectives	Updates made based on input from partners focusing in on vulnerable populations and future expected conditions
P1-31	Analysis of all Hazards from THIRA	Updates to criteria for inclusion or exclusion of hazards based on partner input, epidemics/pandemics and extreme heat added for further consideration for LMS
P1-30	Hazard Identification and Risk Assessment	Updates to information about hazards based on Miami-Dade County 2020 THIRA and partner input
P2-6	Prioritizing Mitigation Projects	Section renamed from Prioritizing Mitigation Initiatives. The criteria to rank mitigation initiatives was replaced with the qualitative BRIC criteria
P2-19	Project List	Project list was updated based on information submitted by partners on WebEOC – No longer considered appendix
P2-55	Case Studies	What used to be Part 6–Completed Projects in the 2020 LMS, was moved to Part 2 - Appendix 3 and updated with recently completed projects – No longer considered appendix
P3	The Funding	This part was edited to present more information about funding sources, funding sources were removed or added based on availability
P3-1	The Funding	Added table of contents
P4-6	Appendix A	Updated with changes made for this revision
P4-9	Appendix B	Updated with current membership
P4-12	Appendix C	Updated with current membership
P4-19	Appendix H	Updated with latest information from integrated documents
P4-35	Appendix J	Updated with latest version from THIRA
P4-80	Previously Appendix K	Removed appendix that had unnecessary maps
P5-2	Introduction	Updated status of CRS communities
P5-9	Assessing the Hazard - Flooding	Updated figures 1-3 with most recent versions

Page/Part	Location	Change
P5-12	Rainy Season	Updated with information from most recent rainy season
P5-13	Significant Flood Events	Updated with information from most recent THIRA
P5-22	Flood Regulations in Miami-Dade County	Updated Table 6 with most recent data
P5-24	Flood Regulations in Miami-Dade County	Updated Figure 11 with most recent data and changed the way data is mapped
P5-25	Flood Regulations in Miami-Dade County	Updated data in Table 7 with most recent data
P5-27	Flood Regulations in Miami-Dade County	Updated Figures 12 – 15 with most recent data, changed the way data is mapped
P5-31	Flood Regulations in Miami-Dade County	Updated Table 8 with most recent data
P5-34	Storm Surge	Updated Table 9 with most recent data
P5-35	Storm Surge	Updated Figures 17 – 23 with most recent data, changed the way data is mapped
P5-48	Repetitive Losses	Updated Figures 26 and 27 with most recent data, changed the way data is mapped
P5-50	Repetitive Losses	Updated tables 12 and 13 with most recent data
P5-73	Appendix B	Updated excerpts with information from the latest Hurricane Guide
P5-76	Appendix C	Updated news press releases with recent samples

Appendix B: LMS Working Group and Subcommittee Agencies 2025 [1]

Chair: Robin Yang, Miami-Dade County Department of Emergency Management

Co-Chair: Diannis Barban, Miami-Dade County Department of Emergency Management

Colleges and Universities

Agency	Position Title	Name
Florida International University	Assistant Vice President, Division of Operations and Safety	Amy B. Aiken
Miami-Dade College	Senior Director, Resource Development	Phillip Dickey
University of Miami	Executive Director of Emergency Management	Matthew Shpiner

Miami-Dade County Departments and Constitutional Offices

Agency	Position Title	Name
Aviation Department	Assistant Aviation Director	Ralph Cutie
Regulatory and Economic Resources Department	Division Chief of Stormwater Management	Marina Blanco-Pape
Cultural Affairs Department	Capital Projects Chief	Marie Denis
Solid Waste Department	Administrative Officer 3	Paulette Philippe
Transportation and Public Works Department	Project Engineer	Daryl Hildoer
Internal Services Department	Division Director	Terrence Thompson
Libraries	Grants Analyst	Jeff Rosenberg
Public Housing and Community Development Department	Assistant Director	Elissa Plancher
Miami-Dade Sherrif's Office	Grants Administrator	Dorcas Perez
Seaport	Grants Administrator	Kelli Gay
Water & Sewer Department	Chief Resilience & Sustainability Officer	Debbie Griner
Animal Services Department	Grants Coordinator	Veronica Navarrete
Fire Rescue Department	Grants Bureau Manager	Katrina Hollis-Baker
Resilience Office	Resilience Program Manager	Karina Castillo
Parks, Recreation and Open Spaces Department	Assistant Director, Planning, Design and Construction Excellence Division	Joe Cornely

[1] EMAP (2016) 4.2.4

Municipalities

Agency	Position Title	Name
Aventura	Public Works & Transportation Director	Jake Ozyman
Bal Harbour	Grants Consultant	Kristina Brown
Bay Harbor Islands	Public Works Director	David Hernandez
Biscayne Park	Village Clerk	Pamela Latimore
Coral Gables	Internal Audit & Grants Coordinator	Elsa Fuentes
Cutler Bay	Public Works Director	Alfredo Quintero
Doral	Media & Emergency Management Specialist	Natalie French
El Portal	Village Manager	Christia E. Alou
Florida City	Executive Director	Jon Ward
Golden Beach	Administrative Lieutenant	Yovany Diaz
Hialeah	Building Inspector	Lilibet Muniz
Hialeah Gardens	Public Works Director	Jose Lopez
Homestead	Emergency Manager	Stephen Taylor
Indian Creek Village	Village Manager	Guillermo Olmedillo
Key Biscayne	Village Manager	Steven C. Williamson
Medley	Chief	Jeanette Said Jinete
Miami	Hazard Mitigation/Disaster Recovery Specialist	Loretta P. Jeanty
Miami Beach	Grants Management Division Director	Krystal M. Dobbins
Miami Gardens	Assistant Director Public Works	Bernard Buxton-Tetteh
Miami Lakes	Grants and Governmental Affairs Manager	Olivia Shock
Miami Shores	Public Works Director	Chris Miranda
Miami Springs	Assistant Public Works Director	Lizette Fuentes
North Bay Village	Public Works Director	Marlon Lobban
North Miami	Public Works Director	Wisler Pierre-Louis
North Miami Beach	Assistant Director of Community Development Department	Mitchell Austin
Opa Locka	Capital Improvement Programs Manager	Adelina Gross
Palmetto Bay	Grant Administrator	Christina Cotto
Pinecrest	Administrative Services Manager	Eduardo Pozas
South Miami	Capital Improvement Program Project Manager	Aurelio J. Carmenates
Sunny Isles Beach	City Manager	Kelly Ajo
Surfside	Town Manager	
Sweetwater	Engineering Manager	Elena Proto
Virginia Gardens	Mayor	Fred Deno
West Miami	Grants Manager	Jenny Polynice-Hall

Hospitals and Health Care

Agency	Position Title	Name
Jackson Health System	Senior Grant Writer	Leslie Ann-Bolden
Mount Sinai Medical Center	AVP, Safety, Security, EM	April Hoyt
Banyan Community Health	Vice President of Administration	Mark Aprigliano

Other Government Agencies

Agency	Title	Name
Miami-Dade Public Schools	Director, Property Loss Control	William B. Wever Jr.

Non-Profit Organizations

Agency	Title	Name
Camillus House, Inc.	Director, Grants	Shelley-Anne Glasgow-Wilson
Casa Familia, Inc.	Senior IDD Housing Consultant	Deborah Lawrence
MACtown, Inc.	Consultant	Robert Ruano
Vizcaya Museum and Gardens	Director of Corporate, Foundation & Government Relations	Talmage Thornhill
United Way	Associate Vice President	Marline Monestime

Regional Organizations

Agency	Title	Name
South Florida Water Management District	External Affairs Lead Miami Dade, Broward, and Monroe	Armando Vilaboy

Appendix C: LMS Committees

Local Mitigation Strategy Steering Committee: 2024

Agency	Title	Name
Florida International University	Research Associate	Tiffany G. Troxler
National Weather Service, Miami Field Office	Warning Meteorologist	Robert Molleda
City of Doral	Emergency Management Specialist	Natalie French
City of Miami	Hazard Mitigation/Disaster Recovery Specialist	Loretta Jeanty
University of Miami	Emergency Preparedness Manager	Anna Simko
Mount Sinai Medical Center	Administrative Director, Engineering	April Hoyt
FIU International Hurricane Research Center	Associate Director and Meteorologist	Erik Salna
Town of El Portal	Volunteer	Hugh Gladwin
Miami-Dade College	Senior Director, Resource Development	Philip Dickey
Miami-Dade Office of Resilience	Resilience Program Manager	Karina Castillo
South Florida Water Management District	Intergovernmental Coordinator	Armando Villaboy
Jackson Health System	Senior Grant Writer	Leslie-Ann Bolden

LMS Sub-Committees

In order to streamline the LMSWG's activities, subcommittees may be formed, each addressing an area of concern, as needed. The formation and disbandment of sub-committees is done in correlation with the trending issues that are addressed by the LMSWG members. Examples of potential sub-committees is listed below.

- Financial and Grants
- National Flood Insurance Program and the Community Rating System
- Training
- Bylaws

Appendix D: 2025 Miami-Dade County Resolution Adopting the LMS and Municipal Resolutions

Appendix E: 2025 State of Florida Approval Letter

Appendix F: 2025 FEMA Approval Letter

Appendix G: Metropolitan Form of Government

Miami-Dade County has a unique metropolitan form of government, which varies greatly from typical county powers, in that it provides for resolutions, laws, rules, regulations passed by the county to be fully and automatically inclusive of all municipalities within the County.

Specific lines in the Charter that would apply to a document such as the LMS (which is adopted by resolution) being automatically applicable to all municipalities are:

> Section 1.01. Board of County Commissioners: Powers
> Section 1.01, A, 5:
> Prepared and enforce comprehensive plans for the development of the county. *(LMS is a part of the Comprehensive Emergency Management Plan)*
>
> Section 1.01, A, 21:
> Exercise all powers and privileges granted to municipalities, counties, and county officers by the Constitution and laws of the state, and all powers no prohibited by the Constitution or by this Charter
>
> Section 1.01, A, 22:
> Adopt such ordinances and resolutions as may be required in the exercise of its powers, and prescribe fines and penalties for the violation of ordinances
>
> Section 6.02. Municipalities: Municipal Powers
> Each municipality shall have the authority to exercise all powers relating to its local affairs not inconsistent with this Charter. Each municipality may provide for higher standards of zoning, service, and regulation than those provided by the Board of County Commissioners in order that its individual character and standards may be preserved for its citizens.
>
> Section 9.04 General Provisions: Supremacy Clause This Charter and the ordinances adopted hereunder shall in cases of conflict supersede all municipal charters and ordinances, except as herein provided, and where authorized by the Constitution, shall in cases of conflict supersede all special and general laws of the state.

Specific lines in the Florida Constitution of 1968 that would further apply to a document such as the LMS (which is adopted by resolution) being automatically applicable to all municipalities within Miami-Dade County are:

> Section 6. Schedule to Article VIII. –
> (f) DADE COUNTY; POWERS CONFERRED UPON MUNICIPALITIES. To the extent not inconsistent with the powers of existing municipalities or general

law, the Metropolitan Government of Dade County may exercise all the powers conferred now or hereafter by general law upon municipalities.

Specific lines in the Miami-Dade County Ordinance 8b that would further solidify something like the LMS (which is adopted by resolution) being automatically applicable to all municipalities within Miami-Dade County are:

> Sec. 8B-8. Duties of the Director of the Office of Emergency Management
> 1) The Director or designee shall prepare a Comprehensive Emergency Management Plan and program for the emergency management of Miami-Dade County pursuant to F.S. 252, including, but not limited to elements addressing mitigation activities, preparedness, responses to disasters and emergencies, and recovery operations and submit the Plan and program to the Director of the Division of Emergency Management. State of Florida for review and certification for consistency with the State Comprehensive Emergency Management Plan and compliance with Federal emergency management mandates.

Additionally, the most recent resolution (R-452-10) adopting the LMS further reiterates the fact the municipalities are included in the line:

> **Whereas**, the State of Florida Department of Community Affairs and/or Florida Division of Emergency Management enters into agreements with Miami-Dade County to provide the funding for the County and municipalities to jointly develop a Local Mitigation Strategy to become a component of the Statewide Mitigation Strategy …
>
> **Whereas,** the Local Mitigation strategy meets the State agreement requirements and was accomplished with the participation of local governments, the Schools Board of Miami-Dade County.

Effective comprehensive planning has also been a central focus of the Miami-Dade government from the onset. The power to "prepare and enforce comprehensive plans for the development of the county" was one of twenty-four specified in the County Home Rule Charter in 1957 and a Department of Planning is one of the four departments required by the County Home Rule Charter. The County adopted its first land use plan in 1965 and has since enacted a series of increasingly more refined growth management plans and procedures as required by the Local Government Comprehensive Planning Act of 1975 as amended from time to time. In summary, Miami-Dade has a fifty-two year history of intergovernmental coordination for effective comprehensive planning and plan implementation.

Miami-Dade County Municipalities and Public Schools

Aventura
Bal Harbour
Bay Harbor Islands
Biscayne Park
Coral Gables
Cutler Bay
Doral
El Portal
Florida City
Golden Beach
Hialeah
Hialeah Gardens
Homestead
Indian Creek Village
Key Biscayne
Medley
Miami
Miami Beach
Miami Lakes
Miami Gardens
Miami Shores
Miami Springs
North Bay Village
North Miami
North Miami Beach
Opa-locka
Palmetto Bay
Pinecrest
South Miami
Sunny Isles
Surfside
Sweetwater
Virginia Gardens
West Miami
Public Schools

Adjacent Municipalities

Hallandale Beach
Pembroke Park
West Park
Miramar

Adjacent Counties

Broward
Collier
Monroe

Appendix H: Integration Document[2]

Integration of Policies and Guidance:

The Miami-Dade Local Mitigation Strategy (LMS) integrates essential policies, strategies, and actions to build a disaster-resistant and resilient community. This section reflects the latest developments from key resilience strategies and plans, ensuring alignment with local, state, and federal mitigation policies. The following plans are incorporated into the LMS to ensure Miami-Dade County is better prepared for current and future hazards:

- MDC Resilient305 Strategy
- MDC Sea Level Rise Strategy
- MDC Thrive305 Action Plan
- DEM Post Disaster Redevelopment Plan (PDRP)
- 2050 Long Range Transportation Plan (LRTP)
- MDC Extreme Heat Action Plan
- DEM Recovery Support Function (RSF) Mitigation Annex
- DEM Flood Response Plan
- DEM Recovery Plan (July 2022)
- Southeast Florida Regional Climate Action Plan (RCAP) 3.0
- Watershed Master Plan for the City of Homestead

Resilient305 Strategy

The Resilient305 Strategy was developed as a roadmap to address the unique resilience challenges of Miami-Dade County, the City of Miami, and the City of Miami Beach. The strategy emphasizes addressing natural and man-made disruptions such as sea level rise, flooding, economic inequality, and infrastructure vulnerabilities. It is designed to build on existing networks and to protect the region's people, homes, and economy through collaborative efforts. The strategy is organized into three pillars: **Places**, **People**, and **Pathways**.

[2] EMAP 4.4.3

Key Integration Points:

1. **Places**: This focuses on addressing the vulnerabilities associated with sea level rise, flooding, and critical infrastructure. Projects are prioritized to ensure climate-resilient communities by strengthening physical infrastructure, particularly those exposed to environmental risks like flooding. The focus is on research, planning, and the design of resilient urban areas and ecosystems. The LMS integrates these challenges by prioritizing projects that build climate-resilient communities and mitigate flooding risks.
2. **People**: This pillar highlights socio-economic resilience by targeting underserved populations. Resources and programs aim to address economic inequities by ensuring equitable distribution of resources, especially in vulnerable communities. The goal is to strengthen their capacity to respond to and recover from both natural and economic challenges. The LMS prioritizes mitigation projects that serve underserved populations, focusing on underserved areas to enhance community resilience.
3. **Pathways**: Emphasizes creating networks and collaboration across the public, private, and non-profit sectors. This integration is critical to enhancing regional planning and partnerships, ensuring that resilience goals are embedded into the strategic actions of various stakeholders. The LMS adopts this model to strengthen partnerships and ensure resilience efforts are integrated into regional planning.

Updated Recommendations:

- **Continue to engage with Resilient305 PIVOT Team:** This ensures that resilience goals are continuously aligned with evolving conditions and strategic needs. The PIVOT team will manage the implementation and progress of the Resilient305 Strategy, ensuring that the long-term objectives are met through cross-sector collaboration.
- **Adopt Resilience Metrics:** Implementing resilience metrics aims to create a clear and measurable framework to track the progress of interventions in vulnerable areas, ensuring that resources are effectively addressing the most critical resilience challenges.
- **Expand Community-Driven Planning:** This focuses on increasing public engagement, ensuring that community feedback is incorporated into project prioritization. It aims to empower communities to take part in resilience planning, thereby tailoring projects to local needs.

Sea Level Rise Strategy

The Sea Level Rise Strategy aims to provide a proactive framework for Miami-Dade County to address the effects of rising sea levels on its communities, infrastructure, and environment. It emphasizes adaptation and resilience to long-term sea level changes while promoting sustainable development, environmental conservation, and community involvement.

Key Integration Points:

1. **Adaptation to Sea Level Rise**: The strategy incorporates various adaptive measures, including elevating infrastructure and enhancing stormwater management systems to address long-term sea level risks. It emphasizes the use of engineered solutions like stormwater parks, integration of green and blue infrastructure into projects, and elevating critical equipment to mitigate the risks of future flooding. LMS integrates measures such as elevating infrastructure and improving stormwater management to address sea level rise risks.
2. **Resilient Infrastructure**: Infrastructure investments are prioritized, specifically focusing on raising roads and improving stormwater systems. The strategy also advocates the use of green infrastructure to reduce flooding and protect communities. Infrastructure investments, including raising roads and improving seawalls, are prioritized in the LMS.
3. **Community Engagement**: The plan underscores the importance of engaging communities, particularly those historically underserved or disproportionately affected by environmental changes. This ensures an inclusive approach to addressing sea level rise. LMS prioritizes mitigation measures that focus on underserved communities affected by sea level rise.
4. **Environmental Sustainability**: There is a strong emphasis on protecting natural ecosystems, such as wetlands and mangroves, which serve as critical buffers against flooding and rising sea levels. This approach promotes sustainable development and environmental conservation. The LMS emphasizes protecting natural ecosystems, such as wetlands and mangroves, as natural barriers.

Updated Recommendations:

- **Implement Key Adaptation Projects:** Focus on implementing critical projects in flood-prone areas, including infrastructure upgrades and stormwater management systems. This step aims to mitigate future risks by targeting the most vulnerable regions.

- **Strengthen Building Codes:** Update local building codes to enforce stricter standards for flood resilience, ensuring that new developments can better withstand rising sea levels and the associated risks.
- **Monitor and Update Adaptation Strategies:** Continuously monitor data related to sea level rise and flooding, and regularly revise adaptation plans to reflect the latest scientific and environmental findings. This ongoing process ensures that the county's strategies remain effective in the long term.

Thrive305 Action Plan

The purpose of the Thrive305 Action Plan is to create a community-driven policy framework aimed at addressing systemic issues across Miami-Dade County. These issues include housing, public safety, transportation, and climate resilience, with a focus on equity, inclusivity, and resilience. The plan is based on extensive community input from over 27,000 residents, ensuring that residents' voices drive government priorities.

Key Integration Points:

1. **Community Engagement and Equity**: The Thrive305 Action Plan integrates the principles of community engagement and equity by ensuring that resilience planning is inclusive and that underserved communities are prioritized in mitigation projects. This involves collaborating with civic groups to expand opportunities for traditionally underrepresented groups to participate in decision-making processes. The LMS integrates Thrive305's principles by prioritizing mitigation projects in underserved communities and ensuring that resilience planning is inclusive.
2. **Resilience and Sustainability**: The plan emphasizes future projects that focus on sustainable infrastructure, energy efficiency, and flood resilience. This includes initiatives like the retrofit of older, less efficient housing to make them more resilient to climate risks while also reducing the financial burdens on residents through improved energy efficiency. LMS emphasizes sustainable infrastructure, energy efficiency, and flood resilience in future mitigation projects.
3. **Housing and Infrastructure**: Affordable and resilient housing is a key priority. The plan integrates energy and flood resilience into housing developments to ensure that low-income and vulnerable communities are not disproportionately affected by climate risks. Projects focus on both the development of new housing and the retrofitting of older housing stock to meet modern resilience standards. The LMS ensures affordable, resilient housing developments are a priority, incorporating energy and flood resilience.

4. **Public Safety and Emergency Preparedness**: The Thrive305 Action Plan aligns its mitigation projects with public safety goals, focusing specifically on early intervention and preparedness for vulnerable neighborhoods. This ensures that these communities are better equipped to respond to emergencies, including natural disasters. Mitigation projects are aligned with public safety goals, focusing on vulnerable neighborhoods.

Updated Recommendations:

- **Expand Community Engagement:** Thrive305 recommends increasing efforts to engage marginalized and underserved communities in resilience planning. This includes expanding community discussions, outreach, and participation in policy formation, ensuring that all voices are heard and that the needs of these communities are prioritized.
- **Prioritize Resilient Housing Projects:** The updated recommendations stress the importance of focusing on housing developments that integrate both energy efficiency and flood mitigation. These resilient housing projects should cater to low-income residents, ensuring their homes are safe, affordable, and sustainable in the face of climate challenges.
- **Integrate Public Safety Initiatives:** To support early intervention and preparedness, Thrive305 calls for the integration of public safety measures into all mitigation projects. This includes improving emergency response systems, increasing awareness of resilience planning, and ensuring that all communities, especially the most vulnerable, have access to critical resources during emergencies.

Post Disaster Redevelopment Plan (PDRP)

The Post Disaster Redevelopment Plan (PDRP) aims to integrate long-term recovery, redevelopment, and reconstruction opportunities into the community planning process of Miami-Dade County. It seeks to provide a strategic framework to manage limited resources efficiently during the redevelopment process, ensuring a smooth transition from short-term recovery operations to long-term redevelopment after a disaster. The PDRP outlines the County's vision to build back stronger and smarter after a disaster.

The Post Disaster Redevelopment Plan (PDRP) aims to integrate long-term recovery, redevelopment, and reconstruction opportunities into the community planning process of Miami-Dade County. It seeks to provide a strategic framework to manage limited resources efficiently during the redevelopment process, ensuring a smooth transition from short-term recovery operations to long-term redevelopment after a

disaster. The PDRP outlines the County's vision to build back stronger and smarter after a disaster.

Key Integration Points:

1. **Long-Term Recovery Priorities**: The Local Mitigation Strategy (LMS) integrates the County's long-term recovery goals, prioritizing housing, infrastructure, and economic revitalization after disasters.
2. **Resilient Infrastructure and Housing**: The LMS emphasizes rebuilding infrastructure and housing with higher resilience standards to withstand future disasters.
3. **Sustainable Land Use**: The plan incorporates sustainable land use planning strategies that aim to protect vulnerable coastal and flood-prone areas, minimizing risks.
4. **Economic Recovery**: The LMS supports mitigation projects that safeguard critical economic sectors such as tourism, small businesses, and infrastructure, ensuring a stable and revitalized post-disaster economy.

Updated Recommendations:

- **Aligning Long-Term Recovery Strategies:** The updated recommendations include aligning the County's long-term recovery strategies with the PDRP's resilience goals, ensuring that all redevelopment efforts are focused on sustainability and resilience**.**
- **Coordination with RSFs:** The plan highlights the importance of coordinating with Recovery Support Functions (RSFs) to ensure a collaborative recovery approach that involves federal, state, and local partners.
- **Public Engagement:** Engaging the public in recovery planning is emphasized to ensure community needs are reflected, enhancing the inclusivity and effectiveness of recovery strategies.

2050 Long Range Transportation Plan (LRTP)

The 2050 Long Range Transportation Plan (LRTP) serves as a comprehensive blueprint for the development, management, and operation of a safe, equitable, and efficient multi-modal transportation network for Miami-Dade County. It aims to enhance mobility, safety, security, and resiliency while integrating emerging technologies and ensuring cost-effective solutions for both current and future infrastructure needs. The plan prioritizes improving accessibility, sustainability, and economic competitiveness to support the region's growth and prosperity.

The LRTP's goals include achieving world-class transportation that promotes mobility, safety, innovation, sustainability, equity, and economic competitiveness. It also seeks to ensure seamless connectivity, bolster resilience to climate impacts, and foster economic vitality through strategic investments.

Key objectives include engaging public participation to address future mobility needs, setting measurable goals to assess infrastructure performance, prioritizing transportation projects based on regional needs and cost feasibility, and ensuring alignment of transportation strategies with both local and statewide plans.

Key Integration Points:

1. **Mobility and Connectivity**: The LRTP emphasizes integrating transportation infrastructure that improves access and resilience, particularly during and after disasters. This involves enhancing public transit and non-motorized transportation options to ensure consistent mobility for residents even in disaster scenarios. LMS integrates transportation infrastructure projects that improve access and resilience, especially during and after disasters.
2. **Resilient Infrastructure**: To address flood risks and climate change, the LRTP incorporates projects focused on flood resilience, such as elevated roads and improved stormwater systems. These initiatives aim to reduce disruptions caused by extreme weather conditions and ensure the longevity of infrastructure. LMS includes flood-resilient projects like elevated roads and enhanced stormwater management systems.
3. **Economic Competitiveness**: By supporting transportation projects that maintain business operations during disasters, the LRTP plays a role in preserving economic stability. This focus also aligns with promoting sustainable development to keep Miami-Dade County economically vibrant amid challenges from climate change. The LMS supports transportation projects that ensure business continuity during disasters.

Updated Recommendations:

- **Prioritize Resilient Transportation Projects:** Enhance flood resilience by designing infrastructure capable of withstanding extreme weather, such as elevated roadways and stormwater management systems.
- **Coordinate with the SMART Program:** Collaborate with the SMART Program to implement transit solutions that are not only sustainable but also climate-resilient. This includes integrating emerging technologies and innovative transit options**.**

- **Promote Equitable Access:** Ensure that transportation improvements reach underserved and historically disadvantaged communities, addressing mobility challenges and fostering inclusivity across Miami-Dade County.

Extreme Heat Action Plan

The **Extreme Heat Action Plan** aims to mitigate the health and economic impacts of rising temperatures in Miami-Dade County, with a focus on protecting vulnerable populations and underserved communities. The plan's primary goals are to reduce heat-related health risks, increase the availability and efficiency of cooling infrastructure, and expand urban heat mitigation efforts in high-risk areas. Key objectives include safeguarding outdoor workers and individuals without access to cooling systems, prioritizing cooling infrastructure projects in underserved neighborhoods, and enhancing green infrastructure, such as the urban tree canopy, to reduce temperatures in at-risk areas.

Key Integration Points:

1. **Mitigating Heat-Related Health Risks**: The Local Mitigation Strategy (LMS) incorporates measures aimed at protecting those most at risk, such as outdoor laborers, elderly populations, and individuals without access to air conditioning. This could include early warning systems, public education campaigns, and the creation of energy resilient cooling centers for emergency use.
2. **Cooling Infrastructure**: LMS projects will focus on enhancing shelters and housing through energy-efficient cooling solutions, such as retrofitting buildings with modern HVAC systems and promoting passive cooling techniques like green roofs. Special attention will be given to economically disadvantaged communities that often lack access to reliable cooling options.
3. **Urban Heat Mitigation**: The LMS will promote urban design strategies to reduce heat in densely populated or high-risk areas. Expanding the tree canopy will increase shade and reduce surface temperatures, while installing cooling features such as public misting stations, water fountains, and shaded bus stops will offer immediate relief from heat in public spaces.

Updated Recommendations:

- **Expand Tree Canopy and Cooling Features:** This includes planting more trees and integrating cooling systems, like shade structures and water

features, in parks, playgrounds, and public areas. Underserved communities, often most affected by heat, will be prioritized for these interventions.

- **Ensure Energy Resilience in Critical Facilities:** Critical facilities such as emergency shelters will be equipped with backup power systems, including renewable energy sources like solar panels with battery storage, to ensure cooling capabilities remain operational during power outages caused by heat waves or other climate events.
- **Monitor Heat Risk Reduction Efforts:** This involves establishing a framework for tracking and evaluating the success of heat risk interventions. Metrics might include reductions in heat-related illnesses and deaths, temperature moderation in targeted areas, and improved public access to cooling infrastructure.

Recovery Support Function (RSF) Mitigation Annex

The **Recovery Support Function (RSF) Mitigation Annex** in Miami-Dade County's Emergency Operations Center Recovery Plan ensures the incorporation of long-term risk reduction strategies into the disaster recovery phase. It emphasizes the coordination and alignment of recovery operations with mitigation efforts to build resilience and protect against future hazards. This is part of a larger plan that integrates the **Local Mitigation Strategy (LMS)** into recovery operations, ensuring resilience is at the forefront of redevelopment efforts post-disaster. The overarching purpose of this annex is to reduce risks and enhance resilience during long-term recovery operations post-disaster. This aligns with the County's recovery goals of rebuilding more resiliently than pre-disaster conditions, through hazard mitigation and sustainable redevelopment.

Key Integration Points:

1. **Mitigation Integration in Recovery:** The Local Mitigation Strategy (LMS) actively integrates hazard mitigation into recovery efforts, making sure that every aspect of redevelopment considers long-term risk reduction and resilience. By aligning the LMS with recovery efforts, Miami-Dade County is better equipped to address vulnerabilities exposed during disasters and reduce future risks.
2. **Coordination Across Sectors:** The alignment between LMS and RSF promotes efficient resource allocation and recovery. By ensuring that housing, transportation, and public health sectors are working collaboratively under a unified framework, all aspects of the recovery can be addressed in a coordinated manner, improving outcomes and minimizing delays.

Updated Recommendations:

- **Align LMS with RSF Priorities:** This recommendation calls for deeper integration between Local Mitigation Strategies and RSF frameworks to ensure that all aspects of the recovery plan are harmonized. This alignment will streamline decision-making and resource distribution, ensuring that long-term recovery objectives are met effectively.
- **Leverage RSF Partnerships:** Expanding partnerships across RSFs will enhance the availability of resources for both recovery and mitigation efforts. By involving more stakeholders, including private sector entities and non-profits, Miami-Dade County can better support its recovery initiatives and ensure that risk reduction measures are adequately funded and implemented.

Flood Response Plan

The Miami-Dade County Flood Response Plan aims to enhance preparedness, response, and recovery efforts related to flood hazards. Given the county's vulnerability to various types of flooding, this plan consolidates the efforts of multiple stakeholders, including local, state, and federal agencies, to minimize the impacts of flooding.

Key Integration Points:

1. **Flood Preparedness and Response:** Integration with the Local Mitigation Strategy (LMS) to incorporate stormwater management strategies and flood barrier installations. This includes continuous monitoring of flood risks and strengthening flood defense mechanisms in vulnerable areas. By proactively managing these risks, the LMS ensures the county's readiness for high-risk flood events and minimizes infrastructure damage.
2. **Coordination with Emergency Management**: LMS promotes coordination with the County's Department of Emergency Management (DEM) to ensure an effective, unified response. This collaboration ensures efficient deployment of resources, streamlined communication, and mitigation strategies to reduce risks across the county. Agencies like the U.S. Army Corps of Engineers (USACE) and the South Florida Water Management District (SFWMD) are integral partners in operating and maintaining the canal system to manage floodwaters.

Updated Recommendations:

- **Strengthening Flood Mitigation Projects:** This involves reinforcing infrastructure improvements, such as elevating critical roadways and

enhancing stormwater drainage systems. Projects are designed to minimize flood impact on essential services and reduce the vulnerability of the county's infrastructure. The expansion of these projects includes both urban and coastal flood defenses, considering future risks related to climate change and sea level rise.

- **Expanding Community Awareness Programs:** These programs emphasize educating residents on flood preparedness, flood insurance, and emergency response. Public education campaigns are conducted in multiple languages (English, Spanish, Haitian Creole) to ensure inclusivity and accessibility. The programs particularly target vulnerable populations, including the elderly, low-income households, and those living in flood-prone areas, providing them with the tools to better understand and mitigate their risk.

Recovery Plan (July 2022)

The Miami-Dade County Recovery Plan provides an operational overview and organizational framework implemented during short-term and intermediate phases of the disaster recovery process. As the disaster response evolves into recovery operations, County departments, non-governmental organizations and other partners collaborate to continue operational initiatives until the County has fully recovered or transitions into the long-term recovery phase, if required, when the Post Disaster Redevelopment Plan (PDRP) is activated.

This Plan details a coordinated roadmap for resilient recovery operations, identifies the operational concepts, and provides an overview of organizational structures which bridges the gap between responses to a more resilient recovery. The Recovery Plan addresses policies that promote an all-hazards disaster resilient recovery process amongst all stakeholders including public and private sector agencies and organizations; non-profit and faith-based organizations; municipalities and independent districts, including water control districts and school districts.

Key Integration Points:

1. **Mitigation Integration in Recovery**: The Local Mitigation Strategy (LMS) is a central component in integrating hazard mitigation into recovery efforts. By including LMS in recovery, the aim is to build resilience over the long term. This integration ensures that recovery is not merely a return to the pre-disaster state but involves reconstructing stronger, more resistant infrastructure and communities. LMS ensures that post-disaster recovery incorporates resilient building standards and hazard mitigation.
2. **Coordination Across Sectors**: The Recovery Plan emphasizes the importance of aligning the Local Mitigation Strategy with the Recovery Support

Functions (RSF) structure, which brings together key sectors such as housing, transportation, and public health. This coordination ensures that all sectors are working toward a common goal of reducing risk and enhancing resilience. It also facilitates the flow of information and resources across different recovery activities, which is crucial for timely and effective implementation of mitigation strategies. LMS will align with the Recovery Plan to ensure communities are involved in shaping recovery priorities.

Updated Recommendations:

- **Align LMS with RSF Priorities:** The updated recommendation calls for a direct alignment between the Local Mitigation Strategy and the RSF priorities. This alignment is essential for creating a coordinated approach to long-term recovery. By ensuring that LMS and RSF work together, the county can prioritize actions that reduce risk and support sustainable rebuilding efforts.
- **Engage Communities in Recovery Efforts:** Another key recommendation involves leveraging partnerships within the RSF framework to expand available resources for both recovery and mitigation efforts. These partnerships include public and private sectors, non-governmental organizations, and other stakeholders who can contribute expertise, funding, and resources. By collaborating across these groups, the county can pool resources and enhance the overall capacity for disaster recovery and long-term mitigation.

Southeast Florida Regional Climate Action Plan (RCAP) 3.0

The **Southeast Florida Regional Climate Action Plan (RCAP) 3.0**, developed by the Southeast Florida Regional Climate Change Compact, aims to provide a regional approach to climate adaptation, focusing on the impacts of climate change in Southeast Florida. The RCAP's overarching goals are to promote climate resilience, mitigate risks, and reduce greenhouse gas emissions. It serves as a voluntary framework guiding local and regional efforts to accelerate climate action and adaptation to achieve net-zero emissions by 2050 and strengthen the resilience of communities, institutions, and the regional economy.

Key Integration Points:

1. **Regional Climate Adaptation**: The Local Mitigation Strategy (LMS) incorporates RCAP's focus on sea level rise and flood resilience, ensuring that climate risks such as extreme weather events, rising temperatures, and storm surges are central to local adaptation efforts.

2. **Sustainability and Emissions Reduction**: Prioritizing green infrastructure and emission reduction projects is a core strategy for achieving long-term sustainability. This includes focusing on renewable energy sources and promoting energy efficiency initiatives. LMS projects will prioritize green infrastructure and emission reduction strategies.
3. **Multi-Jurisdictional Collaboration**: Collaborative partnerships among regional stakeholders are essential for addressing shared climate risks. These partnerships involve local governments, academic institutions, and private sector entities working together on climate resilience projects, leveraging resources for comprehensive adaptation. The LMS will strengthen collaboration with regional partners to address shared climate risks.

Updated Recommendations:

- **Integrate RCAP Goals:** The updated recommendations emphasize aligning Local Mitigation Strategy (LMS) projects with RCAP's goals, particularly in promoting regional climate resilience. This involves ensuring all projects contribute to the broader climate adaptation strategy while meeting specific local needs.
- **Coordinate with Regional Partners**: Leveraging the expertise and resources of regional partners is critical for effective climate adaptation. This includes engaging with local governments, state agencies, and private sector stakeholders to implement projects that address both current and projected climate risks, such as sea level rise, infrastructure adaptation, and public health concerns.

Watershed Master Plan for the City of Homestead

Key Integration Points:

1. **Flood Risk Reduction and Resilience:** The Watershed Master Plan (WMP) for the City of Homestead aligns with the goals and objectives of the Miami-Dade County Local Mitigation Plan as it aims to reduce flood risks, enhance resilience and guide sustainable development.

2. **Promotion of CRS Guidelines:** The WMP also follows CRS guidelines to evaluate run off from design storms, protecting wetlands and controlling development peaks and volumes. The LMS plan lists promoting the CRS program as its one of its principal goals.

3. **Consideration of Future Conditions:** The WMP also addresses the assessment of sea level rise and climate change impacts to the jurisdiction. The goals and objectives of the LMS plan call for mitigation of future conditions to ensure mitigation actions take into account expect increasing risks due to climate change and its related effects.

4. **Public Outreach and Stakeholder Engagement:** The WMP emphasized public outreach and stakeholder engagement through meetings, websites, and feedback mechanisms to ensure inclusive decision-making. The LMS Plan also emphasizes the importance of inclusive planning actions to ensure that community stakeholders have a say of mitigation planning.

5. **Vulnerability Analysis Data:** The WMP utilizes data and inundation modeling that highlights risks to hospitals, schools, repetitive loss properties so mitigation efforts can be prioritized. This plan is in alignment with the goals and objectives of the LMS plan.

Updated Recommendations:

- **Project Inclusion in the LMS:** WMP recommended solutions (e.g., pump stations, detention basins, green infrastructure) should continuously incorporated into the LMS's project list for prioritization, funding, and implementation, ensuring alignment for between the WMP and the LMS.

- **Pursue Collaboration between the LMS and its partners:** Both the WMP and the LMS seek to pursue outreach opportunities and collaboration with stakeholders and the public. Both Homestead and the LMS should work together to collaborate with LMS partners to engage in public outreach and planning workshops.

Appendix I: Municipal Integration of the LMS

Miami-Dade County and its participating jurisdictions have incorporated mitigation into their planning processes, policies and/or ordinances. Those planning processes, policies and/or ordinances are listed below by participating jurisdiction. The municipalities continuously strive to expand and improve upon their mitigation measures as is illustrated below and with the extensive listing of mitigation projects identified in *Part 2*. As such, Miami-Dade County and its participating jurisdictions participated in planning meetings to discuss barriers and challenges to integrating mitigation into their own jurisdictions. Based on the information collected from these meetings, the LMS, the County and its participating jurisdictions will work together to address gaps that are within the scope of the LMS to address. Some of the gaps that were identified and proposed solutions include:

- Need for alternative funding sources
  - Seek and provide workshops related to novel or less known funding sources
- Knowledge gaps related to application processes
  - Seek and provide workshops to assist participants with navigating complex application processes
- Lack of a forum or platform to discuss common mitigation issues
  - Create and develop thematic sub-committees to address most significant mitigation issues

Aventura

The City of Aventura reported the last update on Municipal Integration occurred on September 8, 2020, when Resolution No. 2020-62 was approved as the city's Floodplain Management Plan.

City of Aventura Comprehensive Plan[3]
Transportation Element
Policy 1.9: The City of Aventura, in consultation with the Florida Department of Transportation, shall evaluate the impacts of proposed development and redevelopment on its transportation system, Strategic Intermodal System facilities, and the adopted level of service standards of transportation facilities, and identify strategies to alleviate or mitigate such impacts in coordination with the developer and other agencies as appropriate. The City shall coordinate with FDOT, Miami- Dade County, and other jurisdictions in the county in the development of common methodologies for measuring such impacts.
Infrastructure Element

[3] https://www.cityofaventura.com/DocumentCenter/View/184/Comprehensive-Plan-PDF?bidId=

Objective 4: Aventura shall protect and preserve the biological and hydrological functions of the wetlands identified in the Land Use Element. Future impacts to the biological functions of publicly and privately-owned wetlands shall be mitigated. Publicly acquired wetlands shall be restored and managed for their natural resource, habitat and hydrologic values.
Capital Improvements Element
Objective 3: Future development will be permitted only when the adopted level of service standards for those services listed in the CIE will be upgraded or maintained at adopted levels of service, or when demonstrated negative impacts on hurricane evacuation clearance times will be mitigated, by ensuring that adequate fiscal resources are made available including, the proportionate cost of improvements necessitated by the development.
Conservation & Coastal Management Element
Policy 10.2: Structures which suffer recurring damage to pilings, foundations or load-bearing walls shall be required to rebuild landward of their current location to modify the structure to structurally enhance the structure, institute or mitigation measures or delete the areas most prone to damage. **Policy 10.14:** The City shall implement its local mitigation strategy in accordance with the guidelines provided in the Local Mitigation Strategy: A Guidebook for Florida Cities and Counties in order to fulfill the State requirements relating to post-disaster planning, repair, and reconstruction.

Bal Harbour

Below is the section of this Village's Comprehensive Plan that integrates with the Miami-Dade County LMS.

Comprehensive Plan for Village of Bal Harbour	**December 1988**
Future Land Use Element	
Objective 9J-5.006(3)(b)4: Protect natural and historical resources. Policy: Developments and construction that adversely impact on the quality of the natural environment shall not be allowed.	
Coastal Management Element	

Objective 2.2 Hazard Mitigation and Coastal High-Hazard Areas: the Village of Bal Harbour shall ensure that building, development and redevelopment activities are carried out in a manner which minimizes the danger to life and property from hurricanes. Development within coastal high-hazard areas shall be restricted and public funding for facilities with coast high-hazard areas shall be curtailed.

- Policy 2.2.01: The hazard mitigation section of the Dade County Hurricane Procedure Plan shall be reviewed and updated on a 5-year basis. In the rewrites, the Emergency Management Director shall identify specific actions that could be implemented to reduce exposure to natural hazards.
- Policy 2.3.06: The Recovery Task Force shall propose comprehensive plan amendments which reflect the recommendations in any interagency hazard mitigation reports or other reports prepared pursuant to Section 406 of the Disaster Relief Act of 1974 (PL 93-288).
- Policy 2.3.07: If rebuilt, structures which suffer damage in excess of fifty (50) percent of their appraised value shall be rebuilt to meet all current requirements, including those enacted since construction of the structure.
- Policy 2.3.08: Structures which suffer recurring damage to pilings, foundations, or ·loadbearing walls shall be required to rebuild landward of their current location, to modify the structure to structurally enhance the structure, institute other mitigation measures or delete the areas most prone to damage.

Bay Harbor Islands

Below is the section of this Village's Comprehensive Plan that integrates with the Miami-Dade County LMS.

The most recent actions taken by the town were:

- On August 8, 2016 the Town of Bay Harbor Islands passed Ordinance No. 991 amending Chapter 23 of the Town's adopted Code of Ordinances entitled Zoning and Planning relating to the allowable height of docks.

- On May 13, 2019 the Town of Bay Harbor Islands passed Ordinance No. 1032 amending the Code of Ordinance that repeals the town's existing Chapter 7 ½ entitled Flood Damage Prevention. This updated ordinance updated the flood plain maps, designated a flood plain administrator, and adopted procedures and criteria for development in flood hazard areas, etc.

- September 14, 2020 Town of Bay Harbor Islands passed Resolution No. 2210 for adoption of the 2020 Miami-Dade County Local Mitigation Strategy as the city's Floodplain Management Plan.

Town of Bay Harbor Islands Code of Ordinances	**December 2013**
Article 1 General Provisions	
Sec. 11-5. - Seasonal and periodic flooding; protection of lives.	

(a)The regulation of areas subject to seasonal and periodic flooding as provided in the comprehensive plan, policies 1.1(4) (page 35), 3.2 (page 36), 5.2 (page 37), and objectives 3 (page 36) and 5 (page 37) shall be implemented by the Code of Ordinances, including sections 5-17, 5-23.1(A)(3), (4) and sections 23-11(A)(5) and 23-12(12).

(b)While it is hereby declared that Dade County has retained the primary responsibility for seasonal and periodic flooding throughout the county as provided in county Ordinance Nos. 57-22 and 57-30, as amended, the town's Code of Ordinances shall further implement the goals and objectives of the county ordinances by requiring compliance with all minimum federal flood insurance elevations for all new construction and for which land use densities and intensities have been adopted in further support thereof.

(c)The protection of lives as provided in the comprehensive plan, policy 5.2 (page 37), shall be implemented by the Code of Ordinances, including section 5-1, and by virtue of the Miami-Dade County retention of primary responsibility for hurricane evacuation, including responses to lifesaving and other types of emergency evacuation. The town shall continue to coordinate and assist the county by providing minibus mass transportation to designated areas, information dissemination, and such other acts as shall complement the overall mass transit/public notice and evacuation procedures implemented by Miami-Dade County, Florida. While the county has retained the right to regulate land subdividing through the subdivision regulations, nevertheless the town shall continue to coordinate its efforts with the appropriate county agencies.

(d)The town has adopted and shall maintain in full force and effect written hurricane procedures, as amended from time to time.

(e)Drainage facilities for flooding and a nonpoint pollution, as provided in the town's comprehensive plan, policies 1.1.1, 1.1.2 (page 58); 1.3.1 (page 59); 2.1.1 and objective 2 (page 60); capital improvements policies 1.2, 1.3, 1.4 (page 19); and land use policy 1.3 (page 37) shall be implemented by the Code of Ordinances, including sections 5-1 and 5-17, in that the town collects and discharges storm water runoff through inlets for the residential districts and into two drainage wells for the commercial districts. The town shall continue to coordinate its efforts with Dade County, particularly with reference to protecting and preserving Biscayne Bay. The town shall continue to review its land development regulations to ensure the standards as indicated in the town's comprehensive plan.

(Ord. No. 488, § 5, 5-29-90; Ord. No. 733, § 4, 12-8-03)

Article III Provisions for Flood Hazard Reduction

Sec. 7½-26. - General standards.

In all areas of special flood hazard, all development sites including new construction and substantial improvements shall be reasonably safe from flooding, and meet the following provisions:

(1) New construction and substantial improvements shall be designed or modified and adequately anchored to prevent flotation, collapse, and lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.

(2) New construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.
(3) New construction and substantial improvements shall be constructed by methods and practices that minimize flood damage.
(4) Electrical, heating, ventilation, plumbing, air conditioning equipment and other service facilities, including duct work, shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.
(5) New and replacement water supply systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems.
(6) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharges from the systems into floodwaters.
(7) On-site waste disposal systems shall be located and constructed to avoid impairment to them or contamination from them during flooding.
(8) Any alteration, repair, reconstruction or improvements to a building that is in compliance with the provisions of this chapter shall meet the requirements of "new construction" as contained in this chapter.
(9) Any alteration, repair, reconstruction or improvements to a building that is not in compliance with the provisions of this chapter, shall be undertaken only if said nonconformity is not furthered, extended, or replaced.

(10) All applicable additional federal, state, and local permits shall be obtained and submitted to the floodplain administrator along with the application for development permit. Copies of such permits shall be maintained on file with the development permit. State permits may include, but not be limited to, the following:

(a) *South Florida Water Management District:* in accordance with F.S. § 373.036(2)(a)—Flood protection and floodplain management.

(b) *Department of Community Affairs:* in accordance with F.S. § 380.05—Areas of critical state concern, and F.S. Chapter 553, part IV—Florida Building Code.

(c) D*epartment of Health:* in accordance with F.S. § 381.0065—On-Site Sewage Treatment and Disposal Systems.

(d) *Department of Environmental Protection, Coastal Construction Control Line:* in accordance with F.S. § 161.053—Coastal Construction and Excavation.

(11) Standards for subdivision proposals and other new proposed development (including manufactured homes):

(a) Such proposals shall be consistent with the need to minimize flood damage.

(b) Such shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize or eliminate flood damage.

(c) Such proposals shall have adequate drainage provided to reduce exposure to flood hazards.

(12) When proposed new construction and substantial improvements are partially located in an area of special flood hazard, the entire structure shall meet the standards for new construction.

(13) When proposed new construction and substantial improvements are located in multiple flood hazard risk zones or in a flood hazard risk zone with multiple base flood elevations, the entire structure shall meet the standards for the most hazardous flood hazard risk zone and the highest base flood elevation.

Biscayne Park

Below is the section of this Village's Comprehensive Plan that integrates with the Miami-Dade County LMS.

2025 Comprehensive Plan Adopted Component	September 25, 2023
Chapter 6: Conservation Element	
Policy 4.2 The Village will encourage the implementation of low impact development techniques and green building standards that reduce the negative environmental impacts of development and redevelopment by: reducing building carbon footprints to the maximum extent feasible, and locating building sites away from environmentally sensitive areas; promoting the preservation of natural resources; providing for on-site mitigation of impacts (i.e. retention and treatment of stormwater runoff, water reuse, Master Stormwater Management Systems); promoting energy conservation through design, landscaping and building techniques (i.e. solar power, increased tree canopies); promoting water conservation and recycling through landscaping and building design; ensuring sustainably sourced building practices (i.e. use of environmentally friendly building materials, recycled materials), and; considering the development and implementation of a green building certification program, with associated regulations, incentives and standards.	
Public Facilities Element	
GOAL- DRAINAGE: **Drainage** THE DRAINAGE GOAL FOR DRAINAGE IS FOR THE VILLAGE OF BISCAYNE PARK IS TO MAINTAIN AND ENHANCE THE LOCAL DRAINAGE SYSTEM TO AFFORD REASONABLE PROTECTION FROM PREDICTABLE FLOODING. Drainage objectives to achieve the goal and which also address the requirements of paragraphs 163.3177 (6) (c), F.S for this mandatory plan element: **OBJECTIVES AND POLICIES** Objective 1 To review on an annual basis information on the performance of stormwater drainage facilities. **Policy 1.1** The Village will continue to comply with the 10-Year Design Storm Level of Service Standard for stormwater drainage until such time that changed or projected flooding conditions necessitate employment of a different standard. **Policy 1.2**	

The Village will continue to maintain and monitor local drainage. The Village must ensure the flood protection level of service provided to residents is maintained and/or improved.

Policy 1.3
All stormwater shall remain on-site before and after construction. Stormwater shall be required to be retained onsite utilizing a properly designed drainage system (e.g., seepage or infiltration). Any grading and draining improvements, reconstruction within any parcels will require a review and approval, demonstrating with signed and sealed engineering calculations, that the required retention of stormwater onsite is being achieved with a properly engineered stormwater management system that the reconstruction, grading, and drainage improvements shall not negatively impact the adjacent properties.
At a minimum, the County Flood Criteria adopted in Miami-Dade County in October 2022 or subsequent standards in effect at the time of review and approval shall be required. Most current and stringent groundwater data available at the time of the review and approval from the Village, County, or other agencies, shall be used.

Coral Gables

Below is the section of this City's Comprehensive Plan that integrates with the Miami-Dade County LMS.

City of Coral Gables Comprehensive Emergency Management Plan, Annex I, Mitigation	**October 2009**
Annex I, Mitigation	
• **Section B:** Coral Gables Mitigation Programs and Department Responsibilities • Note: Details and further information is contained in the Miami-Dade County Local Mitigation Strategy. (Page 3.) • • • **Mitigation Projects Completed.** • The City's Local Mitigation Strategy identifies mitigation projects that have been completed and provides a list of future projects to be implemented as funding becomes available. (Page 6.)	
Public Safety Element	

Objective SAF-2.2:
Assure that future development or redevelopment maintains or reduces hurricane evacuation times. The City establishes an out-of-county hurricane evacuation time for a category 5 hurricane of 16 hours. Mitigation is permitted to achieve and maintain these standards.
Policy SAF-2.3.2: Annually incorporate recommendations of interagency hazard mitigation into the Comprehensive Plan and Post-Disaster Redevelopment Plan. The redevelopment plan shall identify areas which may warrant post-disaster redevelopment, including elimination of unsafe conditions and inappropriate land uses, and limitation of redevelopment in areas of likely repeated damage.

Cutler Bay

On September 16, 2020 the Town of Cutler Bay passed Resolution No. 20-52 for adoption of the 2020 Miami-Dade County Local Mitigation Strategy; authorizing the Town Manager to identify and prioritize hazard mitigation grant program projects to become a part of the Local and Statewide hazard mitigation strategy. The Town also adopted a Climate Change Element via Ordinance 16-09 in October 19, 2016.

Town of Cutler Bay Growth Management Plan
Future Land Use Element
Policy FLU-8C: New schools will minimize negative impacts on surrounding areas through site location, configuration, access and development. Conversely, new development and redevelopment shall minimize and/or mitigate negative impacts on existing school facilities. **Policy FLU-9M:** The Town shall require developers to identify and mitigate constraints based on soils, topography, and floodplains.
Housing Element
Monitoring Measures H2-1: 1. Land Development Regulations that mitigate regulatory barriers or provide incentives for the provision of a variety of housing types. 2. Number of cost burdened households by income, age, and special needs group and tenure; and 3. Housing costs
Coastal Management Element
Policy CM-3C: The Town will establish development standards in the Land Development Regulations for siting future water-related uses that address land use compatibility, availability of upland support services, existing protective status of ownership, hurricane contingency planning, protection of water quality, water depth, environmental disruptions, mitigation actions, availability for public use, economic need, and feasibility **Objective CM-4:** Through compliance with Federal Emergency Management Agency (FEMA) regulations and by targeting repetitive flood loss and vulnerable properties for mitigation, the Town will reduce natural hazard impacts.

Objective CM-7: The Town will coordinate with the Miami-Dade County Office of Emergency Management (OEM) to develop and implement post-disaster redevelopment and hazard mitigation plans that reduce or eliminate exposure of life and property to natural hazards towards the protection of health, safety, and welfare.

Policy CM-7A: Inconsistencies are found with the policies under this objective and the post disaster redevelopment and hazard mitigation plans of the Miami-Dade County Office of Emergency Management (OEM), the Town will notify and coordinate with OEM.

Policy CM-7D: Recovery Task Force shall review and decide upon emergency building permits; coordinate with Miami-Dade County, state and federal officials to prepare disaster assistance applications; analyze and recommend to the Town Council hazard mitigation options including reconstruction or relocation of damaged public facilities; develop a redevelopment plan; and recommend amendments to the Growth Management Plan and other appropriate policies and procedures.

Objective CM-8: The Town will reduce the exposure of life and property to hurricanes through the planning and implementation of pre-disaster hazard mitigation measures. Pre-disaster planning for post-disaster redevelopment shall direct population concentrations away from the undeveloped identified high-risk areas during post-disaster redevelopment.

Policy CM-8C: During pre-disaster planning, hazard mitigation proposals shall be developed by the Town in conjunction with other agencies and, where appropriate, included in the Town's Emergency Response Plan or the Growth Management Plan.

Policy CM-8D: As the Town locates facilities, the Town shall determine the feasibility and necessity of relocating public buildings away from high-risk areas. The Town shall develop a formal process and guidelines for evaluation alternative to the replacement or repair of public facilities damaged by hurricanes such as abandonment, relocation, or repair and reconstruction with structural modifications. The costs; environmental impacts; mitigation effects; community impacts; economic development issues; employment effects; legal issues; consistency with local, regional and state plans; time period for implementation; and availability of funds should be evaluated for each alternative.

Objective CM-9: During post-disaster recovery and redevelopment, the Town shall implement its Emergency Response Plan (ERP) and applicable Growth Management Plan policies and assist hurricane damaged areas with recovery and hazard mitigation measures that reduce the potential for future loss of life and property.

Policy CM-9D: The Town will enforce applicable recommendations of post-disaster hazard mitigation plans required under Section 406 of the Disaster Relief Act of 1974.

Conservation Element

Policy C-6A: Wetlands that are to be protected will be identified based on the type of wetland, function, size, conditions, location, and overall resource value. The wetlands shall be used for purpose that are compatible with their natural values and functions, and shall be protected by using such tools as compensatory wetland mitigation and dedication of conservation easements for preserving open space. All development with the potential to impact wetland areas shall be consistent with SFWMD regulations, and the minimum standards afforded by Chapter 24 of the Miami-46
Dade County Code. Activities in wetland areas may be permitted provided all applicable local, regional, state and federal external environmental agency permits have been obtained and one of the following standards is satisfied:

1. Such an activity is necessary to prevent or eliminate a public hazard.
2. Such an activity would provide direct public benefit, which would exceed those lost as a result of the modification.
3. Such an activity is proposed for habitats in which the functions and values currently provided are significantly less than those typically associated with such habitats and cannot be reasonably restored.
4. Because of the unique geometry of the site, it is the unavoidable consequence of development for uses that are appropriate given site characteristics.

Climate Change Element

Policy CC-2A: The Town of Cutler Bay shall encourage greener, more energy-efficient and climate resilient construction practices by:
1. Requiring that the construction or renovation of Town-owned facilities meets Florida Green Building Coalition, US Green Building Council Leadership in Energy and Environmental Design (LEED), or other acceptable commercial building standards;
2. Encouraging commercial builders to require that the construction or renovation of commercial facilities meets Florida Green Building Coalition, US Green Building Council Leadership in Energy and Environmental Design (LEED), or other acceptable commercial building standards;
3. Encouraging licensed Town personnel to maintain LEED Green Associate certification;
4. Re-evaluating finish floor elevation standards with respect to projected sea level rise scenarios and flooding potential, and;
5. Incorporating building design specifications that increase resistance to more frequent and/or intense storm events.
Policy CC-2B: The Town of Cutler Bay shall evaluate risk from sea level rise or climate change related impacts in the location and design or new infrastructure, as well as the fortification or retrofitting of existing infrastructure, specifically within areas east of Old Cutler Road.
Policy CC-2C: The Town of Cutler Bay shall make the practice of adapting the built environment to the impacts of climate change an integral part of its planning

processes, including comprehensive planning, building codes, land development regulations, resource management, flood control and stormwater management, coastal management, community development and capital planning.
Policy CC-2E: The Town of Cutler Bay shall implement strategies and practices to improve resilience to coastal and inland flooding, salt water intrusion, and other climate change impacts.
Policy CC-2G: The Town shall develop a sea level rise checklist for use when analyzing new Town projects.
Policy CC-3A: New roadways in the Town of Cutler Bay shall be designed to: prevent and control soil erosion; minimize clearing and grubbing operations; minimize storm runoff; minimize exposure to and risk of climate change impacts such as increased flooding, and; avoid unnecessary changes in drainage patterns.
Policy CC-3B: The Town of Cutler Bay shall require new construction, redevelopment, additions, retrofits or modifications of property to: incorporate permeable driveways consisting of porous concrete, open cell unit pavers (turf block), flagstone, or brick pavers; reduce total impervious area, and; employ other techniques to reduce run-off, capture and reuse rain water, allow the infiltration of water into the underlying soil, and recharge the Biscayne Aquifer.
Policy CC-4A: The Town of Cutler Bay shall coordinate with the Miami-Dade County to identify any existing septic tanks that may be currently at risk of malfunctioning due to high groundwater levels or flooding, and develop programs to abandon these systems and/or connect users to the public sewer system.
Policy CC-4D: The Town of Cutler Bay shall continue to develop regulations that require new construction, and redevelopment to: manage stormwater runoff; incorporate porous materials; reduce total impervious area, and; employ other techniques to reduce runoff, capture and reuse rainwater, and recharge the Biscayne Aquifer.

https://www.cutlerbay-fl.gov/com-dev/page/growth-management-plan
https://www.cutlerbay-fl.gov/townmanager/page/town-master-plans
https://www.cutlerbay-fl.gov/publicworks/page/flood-awareness

Doral

On September 9, 2020, the City of Doral adopted Resolution 20-189 which adopts the current Miami-Dade County Local Mitigation Strategy in accordance with the National Flood Insurance Program Community Rating System Requirements as the City's Floodplain Management Plan.

City of Doral Comprehensive Master Plan[4]
Future Land Use Element

[4] https://www.cityofdoral.com/_entity/sharepointdocumentlocation/a7d825a2-238c-ed11-81ac-001dd807078a?file=City-of-Doral-Comprehensive-Plan_%20Revisions_12_2022_Final.pdf

Policy 2.6.1: Coordinate with Miami-Dade County in implementing the approved Local Mitigation Strategy, by assessing the vulnerability of governmental, medical and public safety sites and structures in the City to storm damage, and in developing an action plan, if necessary, to address wind stability and flood protection for key buildings.

Policy 2.6.4: Following the National Response Framework principles, respond to all types of disasters and emergencies with the primary mission of saving lives, and protecting property and the environment. Activate procedures under mutual aid agreements with Miami-Dade County and other area cities when necessary based on event severity. In the case of hurricanes, the City will also immediately implement the recovery policies contained in its adopted Hurricane Preparedness and Recovery Plan.

Policy 2.6.5: All proposed large-scale amendments to this Comprehensive Plan and/or zoning applications shall be evaluated for their impact on hurricane evacuation routes and times, and effect on currently available off-site shelter capacities. Roadway improvements and shelter improvements shall be required, if deemed necessary, to mitigate negative impacts and phased with new residential development.

Infrastructure Element

Policy 5E.2.5: Appropriate local planning, development design standards, and special construction practices shall be required to ensure both short and long-term mitigation of impacts on groundwater created by activities occurring in stream-to-sink basins and in areas where the Floridan Aquifer is unconfined or semi confined. The following provisions shall apply:

a) All new development or modifications to existing development shall provide stormwater treatment.

b) Corrective action to retrofit or upgrade existing hazardous material facilities consistent with standards applicable to new facilities shall be required by the City. The Hazardous Materials Management Code and development regulations establish guidelines and minimum compliance standards for existing facilities.

c) New development activities that involve handling or storing of hazardous materials may be prohibited in areas and shall be subject to the general requirements, siting prohibitions, storage facility standards, secondary containment requirements, and monitoring provisions of the Hazardous Materials Management Code. Where such facilities exist and are proposed to be modified, development review and permitting activities shall include careful evaluation and implementation of engineering and management controls, setbacks and buffers, and monitoring. Existing facilities shall meet the requirements of the Hazardous Materials Management Code pertaining to such facilities.

Conservation Element

Policy 6.4.12: Provide for regular updates to the City's adopted Stormwater Master Plan.

Policy 6.4.13: Protect and enhance the stormwater management systems that recharge the Northwest Wellfield Area. **Policy 6.5.2:** Identify future wetlands to be protected based on the type of wetland, function, size, conditions/location, and overall resource value. These wetlands shall be used for purposes that are compatible with their natural values and functions, and land development regulations shall be adopted to provide these areas with the maximum feasible protection, by using such tools as upland buffers, exotic vegetation removal, hydro period restoration, compensatory wetland mitigation and dedication of conservation easements. Activities in wetland areas may be permitted provided all applicable federal, state, regional and local external environmental agency permits have been obtained.
Intergovernmental Coordination Element
Policy 9.1.18: Coordinate all disaster preparedness programs with the Miami-Dade County OEM to ensure consistency with the County's Comprehensive Emergency Management Plan and the Miami-Dade Local Mitigation Strategy (LMS) and in updating hurricane evacuation shelter assignments.
City's Land Development Code
Section 71-112 – "Required to withstand extreme wind conditions": No more than 15 percent of the required tree planting requirement pursuant to Chapter 71 "Landscaping and Buffers" of the City's Land Development Code, can be trees and palm trees which do not fare well in extreme wind conditions such as hurricanes and tropical storms. Examples are, avocado, black olive, carrot-wood, citrus tree, among other trees specified in Section 71-112.
Low Impact Development Master Plan
City of Doral Low Impact Development (LID) Master Plan: Provides the City with guidelines, recommendations and Best Management Practices (BMPs) to promote the implementation of green infrastructure in new development and re-development projects to maintain natural infiltration of Stormwater, reduce the discharge of specific pollutants into local waterways, provide more aesthetically pleasing developments and reduce the flood impacts in the City Stormwater system. The Planning Department is currently working on an update to the LID Master Plan which will add new LID techniques.
Low Impact Development
Section 74-881 - "Low Impact Development (LID) Practices": The City's Planning and Zoning Department is responsible for implementing the LID Master Plan through the incorporation of the LID BMPs in Section 74-881 of the Land Development Code. The LID's BMPs apply to all new development and re-development projects within the City of Doral. Concurrent with the update to the City's LID Master Plan, the Planning Department is revising Section 74-881 of the LDC which will clarify the goals, provide a list of non-structural and structural LID practices (derived from the Master Plan) and provide for maintenance of LID practices.

In September, 2021, the City of Doral adopted amendments to Section 74-881 Low Impact Development (LID) Practices as follows:

(i) Ensure the water quality and quantity requirements are met, per Section 11.0 of the 2021 LID Master Plan update and the SFWMD ERP Applicant's Handbook Volume II.
(j) Ensure the post-development annual runoff volume does not exceed the pre-development runoff volume, per Section 11.0 of the 2021 LID Master Plan update and the SFWMD ERP Applicant's Handbook Volume II.
(k) Implement erosion and sediment control best management practices during and after construction.
(l) Encourage a maintenance program and a 5-year permit recertification process to be included in the approval conditions, where the City has the authority to request maintenance records of the site's LID practices every five (5) years.

New buildings and redevelopment sites shall incorporate the following low impact development (LID) practices into project design, site and building plans: Developers shall implement the following non-structural LID practices to the maximum extent practical**:
a.) Preservation of Site Topography and Soil Profile
i. Selectively grade and clear land in order to maintain the natural flow path and reduce soil disturbance and compaction,
ii. Prioritize placement of impervious surfaces on clays (if any) and disturbed soils, and placement of infiltration-requiring LID features on highly permeable soils.
iii. Incorporate soil amendments that increase infiltration capacity, storage capacity, or pollutant removal capacity of the soil, and add the nutrients needed for vegetation to stabilize sandy soils.
b.) Preservation and Use of Native and Local Vegetation
i. Preservation and incorporation of conservation areas and wetland habitats
ii. Removal of exotic and invasive vegetation
iii. Retention of existing native vegetation and introduction of native vegetation appropriate to existing site conditions
iv. Conservation of existing native tree canopy
c.) Open Space Design and Conservation
i. Increase the amount of vegetation on the site
ii. Maximize use of open swale systems
iii. Maximize overland sheet flow
iv. Avoid total site clearing
d.) Minimization of Total Impervious Areas
i. Utilize alternative roadway, sidewalk, parking lot, and driveway designs to minimize imperviousness and promote natural infiltration.
ii. Utilize stabilized grass or other similar surfaces for parking spaces

provided above the minimum requirement
iii. Design buildings to maximize the ratio of square footage to roof area.
e.) Reduction of Directly Connected Impervious Areas
i. Direct the site drainage to stabilized vegetated areas
ii. Design site layout to break-up flow directions from large, paved surfaces
iii. Design roof drains to drain to vegetated areas
iv. Locate impervious areas so that they drain to permeable areas
**If not practical, developers must demonstrate that these practices cannot be implemented because of site constraints.

Developers shall implement a minimum of two (2) structural LID practices from the following list, where one meets the water quantity requirement and the other meets the water quality requirement, per Section 11.0 of the 2021 LID Master Plan Update and the SFWMD ERP Applicant's Handbook Volume II. **
a.) Bioretention Basins or Rain Gardens
b.) Tree Box Filters or Infiltration Planters
c.) Vegetated Swales
d.) Filter Strips or Vegetated Buffers
e.) Infiltration Trenches
f.) Exfiltration Trenches or French Drains
g.) Green Roof or Rain Barrels/Cisterns
h.) Permeable Pavement
i.) Retention Pond
j.) Detention Pond
k.) Wet Detention or Retention Pond with Aquatic Vegetation
l.) Parking Stormwater Chambers

**Developers may introduce or propose other LID practices not included in this list for review and consideration by the City.
Recommended design criteria, inspection, operation and maintenance requirements, and approaches for storage and infiltration calculation for the aforementioned LID practices are described in greater detail in the City of Doral Low Impact Development Master Plan Update (2021).

El Portal

Below is the section of this village's comprehensive plan that integrates with the Miami-Dade County LMS.

Village of El Portal Comprehensive Plan	May 2002
Coastal Management Element	
Policy 1.1.1. In conjunction with any redevelopment of the mobile home park Little Farm Trailer Park site, preserve (and mitigate where possible) the natural canal banks to further marine and wildlife habitat. **Policy 9.1.20** Work with Miami-Dade County in implementing the approved Local Mitigation Strategy for hazard mitigation, and by January 2007, the City shall	

Village of El Portal Comprehensive Plan	May 2002
develop a City Emergency Plan to increase public safety and reduce damages and public expenditures.	

Florida City

Below is the section of this town's comprehensive plan that integrates with the Miami-Dade County LMS.

Florida City Community Redevelopment Plan	February 2009
Policy 1.1: Acquire and demolish dilapidated and unsafe structures while providing relocation programs for displaced families if necessary. **Policy 7.1:** Work with appropriate government agencies and utility companies to ensure provision of adequate services including potable water, stormwater, sewer, gas, solid waste, television, and electricity.	

Golden Beach

Below is the section of this village's comprehensive plan that integrates with the Miami-Dade County LMS.

Town of Golden Beach Hurricane and Severe Weather Response Plan	2007
Severe Weather Response Element	
Policy: The Town will have an organized response to hurricanes and other severe weather related emergencies in order to mitigate the effects of severe weather and to return Town services and normal living conditions as soon as possible. Wherever practical; the Town's plan will use the same terminology and references as Miami-Dade County's (MDC) plan. The Town Mayor and Manager or their designees are responsible for determining when this plan will be implemented. The determination to mobilize will be based upon information provided by the National Hurricane Center (NHC) and the Miami-Dade Emergency Operations Center (MDEOC). Additionally, it is the policy of the Town of Golden Beach Police Department is to protect life, property, and maintain order within the community during a weather related emergency. Appropriate levels of police services will be maintained before, during and after a hurricane or severe weather incident.	

Hialeah

Below is the section of this city's Comprehensive Plan that integrates with the Miami-Dade County LMS.

City of Hialeah Comprehensive Plan	2024
Future Land Use Element	

City of Hialeah Comprehensive Plan	2024
Policy 1.2.14: Wetland impacts on the Annexation area. The City, in the development of the northwest area, will mitigate the impact of development on wetlands consistent with environmental requirements and development projections.	
Conservation Element	
The 100-year floodplain needs to be protected to help mitigate the damaging effects of flooding. Protection of these areas is assisted through the National Flood Insurance Program and local Code of Ordinances. Flood criteria must be met before the City will issue any building permits.	
Capital Improvements Element	
Policy 1.4.2: The City shall continue to maintain an inventory of any existing hazards within the City by using the hazards analysis and hazards mitigation criteria established within the Miami-Dade County Comprehensive Emergency Management Plan and shall also identify any grant sources available to mitigate the hazards listed on the hazard inventory.	

Hialeah Gardens

The City of Hialeah Gardens incorporates mitigation into its planning process as follows:

City of Hialeah Gardens 2025 Comprehensive Plan	October 2012
Intergovernmental Coordination Element	
• **Policy 1.1.10** The City shall implement the provisions of the Local Mitigation Strategy (LMS) Guidelines in accordance with the Interlocal Agreement with Miami-Dade County. • **Objective 1.3** Coordinate the impact of development with other jurisdictions to define and implement mutually beneficial goals, ensure consistency among adjacent land uses, and mitigate negative development impacts. This objective shall be made measurable by implementation of its policies.	

The City of Hialeah Gardens has a Division of Emergency Management which is responsible for coordinating disaster preparedness, response, recovery, and mitigation concerns for all City departments.

Homestead

Below is the section of this city's comprehensive plan that integrates with the Miami-Dade County LMS.

City of Homestead Comprehensive Plan	June 2011
Future Land Use Element	
Objective 10: Hurricane Evacuation and Mitigation Ensure that development and redevelopment are consistent with hurricane evacuation plans.	

Measure 2: Maintain hurricane mitigation measures that are consistent with the Miami-Dade County Local Mitigation Strategy (LMS) and facilitate the approved evacuation plans. **Policy 10.1:** Development orders for new development and redevelopment shall be consistent with local and regional hurricane evacuation plans where applicable. **Policy 10.2**: Mitigate any identified deficiencies in storm damage resistance of critical public facilities and construct new facilities, if needed, to assist in the City's evacuation plans.
Objective 11: Hazard Mitigation and Post-Disaster Redevelopment To the extent financially feasible, incorporate all prudent hazard mitigation needs and post-disaster redevelopment procedures into the City's capital improvement planning and Land Development Code. Measure: Number of capital improvement projects and/or amendments to the land development code successfully implemented to address hazardous mitigation needs and post disaster redevelopment procedures.
Hazard Mitigation/ Post-Disaster Redevelopment Element
Policy 4.3: Participate in the preparation/modification of the 409 Hazard Mitigation Plan.
Objective 6: Implementation of the Local Mitigation Strategy (LMS) The City continues to work with the Miami-Dade EOC and other government agencies to implement the policies, ordinances and programs outlined in the LMS. Measure: Coordinate efforts with state and county agencies to bring the community together as a single mitigating entity. **Policy 6.1:** Participate in the improvements in the City's standing and classification in the Community Rating System (CRS), with the related consequences of making flood insurance under the National Flood Insurance Program (NFIP) more affordable and reachable, while improving the effectiveness in coping with flood hazards, problems and emergencies. P**olicy 6.2:** Disseminate information on a repetitive basis with respect to the existence of flood hazards and the availability of measures to mitigate the problems presented by such hazards. **Policy 6.3:** Increase the level of coordination of mitigation management concerns, plans and activities at all levels of government. **Policy 6.4:** Improve and maintain cutting edge, state-of-the-art, and effectiveness of the City's emergency preparedness and disaster response capacity. Policy 6.5: Continue our commitment to the review, update and implementation of the local hazard mitigation strategy.

Indian Creek Village

Below are the new Policies of the Village's Comprehensive Plan that integrates with the Miami-Dade County LMS.

Comprehensive Plan for Indian Creek Village	2024 Update
Coastal Management Element	

GOAL 6.2, Objective A

Policy 5:

The Village shall participate in the Local Mitigation Strategy (LMS) program, which aids in disaster recovery. The LMS is a community-wide group that assesses a community's potential vulnerabilities in the event of a disaster, and develops activities or projects that would reduce those vulnerabilities. If a disaster does occur, the LMS has ready lists of related projects a community can implement to prevent or reduce damages from a similar disaster. The Village shall strive to complete or participate in activities or projects that proactively reduce vulnerabilities.

Policy 6:

The Village shall continue to enforce Chapter 16, Flood Damage Prevention, Village Code of Ordinances (Ord. No. 225, adopted September 8, 2020).

Key Biscayne

On August 25, 2015, the Village of Key Biscayne passed Resolution No. 2015-38 for adoption of the 2015 Miami-Dade County Local Mitigation Strategy; authorizing the Village Manager to identify and prioritize hazard mitigation grant program projects to become a part of the Local and Statewide hazard mitigation strategy.

The Village has a full-time Certified Flood Plain Manager who is responsible for the implementation of the Community Rating System (CRS) and NFIP compliance with assistance from a CRS Coordinator and a Consultant. The Village of Key Biscayne has incorporated mitigation into their planning processes to include the following plans:

Ordinances	**2017-2023**
No. 2017-03 - Repealing and replacing Chapter 10 - Floods - relating to the Floodplain Management Regulations. **No. 2017-08** - Amending Sections 10-63 and 10-73 re Floodplain Management Regulations – expanding the definition of Coastal A Zone and clarifying specific methos of construction and requirements for additional elevation **No. 2023-05** - Creating a Sustainability Advisory Board **No. 2023-09** - Amending the Village Code by revising section 10-63 "Definitions", 10-91 "Permanent Placement" and section 30-41 "Recreational Vehicles and Manufactured Homes"	
Village Wide Vulnerability Assessment	**August 2024**
Resolution No. 2024-41 Adopting the Key Biscayne Vulnerability Assessment Report	

Village of Key Biscayne Code of Ordinances Plan	February 2014
Section 30-73-Site Plan Review Procedures Item (f)(6)g: Description of methods to be implemented during construction to mitigate adverse quantity or quality impacts off-site.	
Village of Key Biscayne Comprehensive Emergency Management Plan	**August 2019**
Annex-IV: Recovery H. Hazard Mitigation Plan/Program	
Resolution No. 2019-55 The Village of Key Biscayne has adopted the Miami-Dade County Comprehensive Emergency Management Plan by reference.	
Village of Key Biscayne Floodplain Management Plan (FMP) – CRS Annual Recertification Annual Progress Report	**September 2020**
Progress on FMP implementation falls within the context of CRS compliance Action Plans followed by the Village. The Action Plan Items are included and tracked through the Miami-Dade County Local Mitigation Strategy (LMS).	
Community Rating System (CRS)	**September 2020**
Repetitive Loss Properties One of the activities involved with the Annual NFIP CRS Re-Certification process is the analysis of Repetitive Loss Areas (RLAs). The purpose of the analysis is to determine possible mitigation solutions to minimize the flood claims.	
Future Land Use Element	
Objective 2.4 Hurricane Evacuation Eliminate or reduce land uses which are inconsistent with applicable Florida Natural Hazards Interagency Work Group Annual Report recommendations and enhance the efforts of the Miami-Dade Office of Emergency Management by providing it with all relevant information. **Policy 2.4.1** The Village shall regulate all future development within its jurisdiction in accordance with the Future Land Use Map which is consistent with the applicable Florida Natural Hazards Interagency Work Group Annual Report. The Village shall periodically review and revise the Future Land Use Map in light of future interagency hazard reports in order to reduce or eliminate uses which are inconsistent therewith.	
Housing Element	
Policy 1.4.4 The Village shall monitor current and future housing needs and explore innovative solutions to increase the affordability and diversity of housing stock while maintaining compliance with the Coastal High Hazard Area and Floodplain Regulations.	
Infrastructure Element	
Objective 1.1 Current Deficiencies and Future Needs; Drainage The Village shall continue to upgrade the drainage system so that stormwater outfalls into Biscayne Bay (and adjacent canals) fully meet National Pollution	

Discharge Elimination System (NPDES) standards no later than December 31, 1998, and the standards of Chapter 17-25, FAC and of Chapter 17-302.500, FAC. The Village shall continue to upgrade onsite drainage standards to ensure that private properties retain at least the first one inch of stormwater on site and permit no more runoff after development than before development.

Policy 1.1.2
During the first phase of drainage master plan implementation the Village shall begin to mitigate to the extent technically and economically feasible direct stormwater outfalls into the canals and Biscayne Bay. Anticipated improvements include a series of catch basins, manholes and pipes for the collection of the stormwater and routing to pollution control structures and drainage wells with emergency overflows. The pollution control devises (grease and oil separator) are to be provided before each drainage well to prevent contamination from entering. Emergency overflow structures is to be constructed at the existing outfalls and would discharge only when the storm events generate more than one inch of runoff. These improvements shall be designed to fully meet the specific standards set forth in Objective 1.1 above.

Conservation and Coastal Management Element

Policy 1.3.1
The Village shall continue to enforce estuarine waterfront protection provisions in the land development code. The provisions will be drafted to ensure that all applicable development permit applications are reviewed in the context of the mangrove protection policies of the State DEP and the waterfront policies of DERM. In particular, DERM Class 1 Permits pursuant to Section 24-48.1 of the Miami-Dade County Code shall be required for all construction seaward of the mean high-water line. Such construction shall be designed to minimize environmental impacts and mitigate unavoidable impacts. This provision shall be interpreted to protect sensitive lands from sea walls and other related construction, but it shall not be interpreted as permitting construction seaward of the State Coastal Construction Control Line in violation of other policies of this Comprehensive Plan.

Objective 1.5 Floodplains
The Village shall amend its floodplain regulations to require all new and/or substantially improved or repaired buildings to be constructed higher than the minimum standards as set forth in the Florida Building Code and floodplain regulations in 44 C.F.R., Part 60.

Policy 1.5.4
The Village shall evaluate and adopt regulations to require or incentivize site low impact development techniques and best management practices to reduce losses due to flooding and resulting insurance claims.

Policy 1.7.14: The Village hereby designates DERM mangrove jurisdictional areas in the Village as environmentally sensitive lands which shall be protected from

development unless their ecological value is replaced via mitigation. These DERM areas are mapped in Figure V-1 of the Data and Analysis of this Plan.

Policy 3.3.3: During post-disaster recovery periods, after damaged areas and infrastructure requiring rehabilitation or redevelopment have been identified, appropriate Village departments shall use the post-disaster redevelopment plan to reduce or eliminate the future exposure of life and property to hurricanes; incorporate recommendations of interagency hazard mitigation reports; analyze and recommended to the Village Council hazard mitigation options for damaged public facilities; and recommend amendments, if required, to the Village Master Plan.

Goal 4 Protect coastal properties and public facilities and infrastructure investment by preparing, adapting and mitigating for climate change impacts

Objective 4.1 Flood Risk Reduction
The Village shall adopt and implement policies, land development regulations, administrative procedures, incentives, or other strategies to reduce vulnerability to sea level rise, high-tide events, storm surge, and stormwater runoff.

Policy 4.1.1
By 2025, the Village shall consider the development of a Resilience Action Plan (RAP) to explore adaptation and mitigation measures which increase resilience to climate change impacts, including the reduction of risk.

Policy 4.1.2
The Village shall review and monitor updates to The Unified Sea Level Rise Projection for Southeast Florida produced by the Southeast Florida Regional Climate Change Compact and consider the projections when evaluating, planning, and designing public facility and infrastructure projects.

Policy 4.1.3

The Village shall encourage the use of living shorelines or other nature-based infrastructure as a shore protection alternative.

Policy 4.1.4
Construction activities seaward of the coastal construction control lines established pursuant to s. 161.053 shall be consistent with Chapter 161 of the Florida Statutes.

Policy 4.1.5
The Village shall maintain flood-resistant construction requirements that are consistent with, or more stringent than, the Florida Building Code and applicable floodplain management regulations as set forth in 44 C.F.R., Parts 59 and 60.

Policy 4.1.6
The Village shall continue to participate in the Community Rating System under the National Flood Insurance Program (NFIP) to achieve flood insurance discounts.

Policy 4.1.7
The Village shall evaluate its policies and regulations on a periodic basis to consider amendments to reduce and/or mitigate flooding impacts and shall ensure amendments do not increase the extent and depth of flood potential.

Policy 4.1.8
The Village shall ensure that all applicable land development regulations and policies are enforced during development review procedures, shall encourage approaches to mitigate flood impacts, and shall evaluate opportunities for offering incentives for exceeding minimum standards.

Medley

Below is the section of this town's comprehensive plan that integrates with the Miami-Dade County LMS.

Town of Medley Municipal Code of Ordinances	**May 2014**
Article V. Provisions for Flood Hazard Reduction	
Sec. 30-71. - General standards. In all areas of special flood hazard, all development sites including new construction and substantial improvements shall be reasonably safe from flooding, and meet the following provisions: (1) New construction and substantial improvements shall be designed or modified and adequately anchored to prevent flotation, collapse, and lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy. (2) Manufactured homes shall be anchored to prevent flotation, collapse, and lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors. This standard shall be in addition to and consistent with applicable State of Florida requirements for resisting wind forces. (3) New construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage. (4) New construction and substantial improvements shall be constructed by methods and practices that minimize flood damage. (5) Electrical, heating, ventilation, plumbing, air conditioning equipment and other service facilities, including duct work, shall be designed and/or located so as	

to prevent water from entering or accumulating within the components during conditions of flooding.

(6) New and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the systems.

(7) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters.

(8) On-site waste disposal systems shall be located and constructed to avoid impairment to them or contamination from them during flooding.

(9) Any alteration, repair, reconstruction or improvements to a building that is in compliance with the provisions of this chapter shall meet the requirements of "new construction" as contained in this chapter.

(10) Any alteration, repair, reconstruction or improvements to a building that is not in compliance with the provisions of this chapter, shall be undertaken only if said non-conformity is not furthered, extended, or replaced.

(11) All applicable additional federal, State of Florida, and local permits shall be obtained and submitted to the Floodplain Administrator along with the application for development permit. Copies of such permits shall be maintained on file with the development permit. State of Florida permits may include, but not be limited to, the following:

a. South Florida Water Management District: in accordance with Chapter 373.036 Florida Statutes, Section (2)(a)—Flood Protection and Floodplain Management.
b. Department of Community Affairs: in accordance with Chapter 380.05 F.S. Areas of Critical State Concern, and Chapter 553, Part IV F.S., Florida Building Code.

c. Department of Health: in accordance with Chapter 381.0065 F.S. Onsite Sewage Treatment and Disposal Systems.

(12) Standards for subdivision proposals and other new proposed development (including manufactured homes):

a. Such proposals shall be consistent with the need to minimize flood damage.
b. Such shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize or eliminate flood damage.

c. Such proposals shall have adequate drainage provided to reduce exposure to flood hazards.

(13) When proposed new construction and substantial improvements are partially located in an area of special flood hazard, the entire structure shall meet the standards for new construction.

(14) When proposed new construction and substantial improvements are located in multiple flood hazard risk zones or in a flood hazard risk zone with multiple base flood elevations, the entire structure shall meet the standards for the most hazardous flood hazard risk zone and the highest base flood elevation.

Miami

The City has a full time Flood Plain Manager who is responsible for the implementation of the Community Rating System compliance and NFIP compliance. The City also has an Office of Resilience and Sustainability that is responsible for environmentally-focused projects, including but not limited to the creation of the City's Climate Action Plan, energy efficiency partnerships, and the adoption of green building initiatives.

The City of Miami has incorporated mitigation into their planning processes to include the following plans:

City of Miami Comprehensive Emergency Management Plan	March 2024

Policy III.B.1: Mitigation
Mitigation efforts include activities that will prevent or reduce the impact of emergency/ disaster results on people, property and environment. Efforts include building codes, land use planning, training and education, structural and non-structural safety measures. Any actions accomplished to prevent an emergency/disaster from occurring or to reduce the effects of an emergency/disaster is mitigation. City departments will enforce all public safety mandates of the Miami City Code to include land use management and building codes; and recommend to the Mayor and City Commission, legislation required to improve the "disaster resistance" of the community.

Policy III.M.2: Activation of City CEMP
a. When an emergency/disaster has occurred or is imminent, the Mayor may declare a state of emergency, activating the emergency response, recovery, and mitigation aspects of the Miami CEMP that apply to the affected area.

b. Portions of the CEMP (certain ESFs) may be activated in support of a field incident commander for smaller, single site, emergency events, without a formal emergency declaration by the Mayor.

c. The resources of all City departments and agencies are considered to be available to minimize the effects of a natural disaster. Voluntary assistance to support City efforts may come from:

- Adjoining communities.
- Private business and industry.
- All other groups or individuals.
- Any additional assistance required at the county, state or federal level. Assistance should be requested through the Miami-Dade County Emergency Operations Center (EOC).

Policy III.P.2: Overview of Initial Federal Involvement
Immediately after an incident, local jurisdictions respond using available resources and notify State response elements. As information emerges, they also assess the situation and the need for State assistance. The State reviews the situation, mobilizes State resources, and informs the DHS/EPR/FEMA Regional Office of actions taken. The Governor activates the State emergency operations plan, proclaims or declares a state of emergency, and requests a State/DHS joint Preliminary Damage Assessment (PDA) to determine if sufficient damage has occurred to justify a request for a Presidential declaration of a major disaster or emergency. Based upon the results of the PDA, the Governor may request a Presidential declaration and defines the kind of Federal assistance needed. At this point, an initial assessment is also conducted of losses avoided based on previous mitigation efforts.

Policy III.P.9: Overview of Initial Federal Involvement
As immediate response priorities are met, recovery activities begin. Federal and State agencies assisting with recovery and mitigation activities convene to discuss State needs.

Policy III.P.11: Overview of Initial Federal Involvement
Throughout response and recovery, mitigation staff at the JFO will examine ways to maximize mitigation measures in accordance with State hazard mitigation administrative plans. Grounded in the local risk, and with State priorities and mitigation plans in place, DHS/EPR/FEMA and State officials contact local officials to identify potential projects and suggest which ones should be included in an early implementation strategy. The strategy focuses on viable opportunities to provide funds, technical assistance, and staff support to incorporate mitigation into the overall community recovery, to include the repair and replacement of damaged or destroyed housing and infrastructure.

City of Miami Hurricane Plan	March 2024

Policy V.G.7: Response and Recovery with Damage Assessment

The responsibilities of the Recovery Action Team (RAT) are:

- Oversee the recovery and reconstruction process and to serve as an advisory body to the City Manager.

- Identify mitigation opportunities and identify recovery resources.
- Ensure coordination of the recovery process.

Attachment V-A.G.1:

Receive and review damage reports and other analyses of post-disaster circumstances and to compare these circumstances with mitigation opportunities identified prior to the disaster in order to identify areas for post-disaster change and innovation. Where needed, the RAT may review alternative mechanisms for achieving these changes and recommend the coordination of internal and external resources for achieving these ends.

Attachment V-A.G.3:

Review damage reports and other analyses of post disaster circumstances and compare these circumstances with mitigation opportunities and identify areas for post disaster development changes.

Attachment V-A.I.2:

Identify funding sources for mitigation and recovery projects including state and federal assistance programs, private-sector funding, and public donations.

Schedule of Recovery Functions (RF)

Attachment V-J.RF #1 Recovery & Redevelopment: To articulate the vision of redevelopment in both the anticipation and in the wake of a catastrophic natural disaster and to use opportunities presented by disaster and lessons learned to improve the community.

Attachment V-J.RF #9 Damage Assessment/Impact Analysis: To determine the disaster's impact on the City and to determine recovery priorities and identify resource needs for City disaster recovery.

Attachment V-J.RF #19 Mitigation: To prepare a post-disaster hazard mitigation plan that will define actions during the recovery period that help prevent repeated future losses and reduce the City's vulnerability to natural hazards.

Attachment V-J.RF #20 Recovery Administration & Finance: To provide a framework for implementing administrative and financial services necessary for disaster recovery.

Miami-Fort Lauderdale UASI THIRA	**2023**
The Miami-Fort Lauderdale UASI THIRA addresses mitigation needs through the recovery and protection core capabilities.	
Miami-Fort Lauderdale Urban Area Security Strategy	**2023**
Mission: Increase preparedness, prevention, protection, mitigation, response, and recovery capabilities within the Urban Areas and the Southeast Florida Region for all hazards, including terrorism.	

Effort: Based on the capability assessment and strategy review, implementation steps are included and updated under each core capability and linked to regional initiatives and activities intended to enhance the preparedness, prevention, protection, mitigation, response, and recovery capabilities of the South Florida metropolitan areas either by:

- Current, proposed, or future funding to enhance or sustain a capability or capacity needed within the jurisdictions or the region; or,
- By reference to existing capabilities where no enhancement is required or currently planned, but access to those capabilities is needed to fulfill the full range of preparedness, prevention, protection, mitigation, response and recovery actions for incidents of all types.

Goal: Protect Critical Infrastructure & Key Resources, Objective: Physical Protective Measures, Step: Establish a joint CIP workgroup to include the private sector to set security goals, identify assets, systems and networks; assess risks and threats annually; implement protective programs; and measure the effectiveness of risk-mitigation efforts.

Goal: Protect Critical Infrastructure & Key Resources, Objective: Risk Management for Protection Programs & Activities- State, regional, local, tribal and private sector entities, in coordination with Federal participation, identify and assess risks, prioritize and select appropriate protection, prevention, and mitigation solutions based on reduction of risk, monitor the outcomes of allocation decisions, and undertake corrective actions. Step: Implement and assess the risk management model within the region and develop a plan to implement appropriate risk mitigation strategies using UASI funds.

Goal: Respond to Disasters- CBRNE, Objective: Infrastructure Systems, Step: Encourage and assist jurisdictions in developing or enhancing recovery and mitigation efforts and plans. Step: Maintain liaison with county Local Mitigation Strategy (LMS) coordinators. Step: Ensure that lifeline facilities are incorporated into mitigation and recovery planning.

Goal: Recover from Terrorism & Other Disasters, Objective: Natural and Cultural Resources- Protect natural and cultural resources and historic properties through appropriate planning, mitigation, response, and recovery actions to preserve, conserve, rehabilitate, and restore them consistent with post-disaster community priorities and best practices and in compliance with appropriate environmental and historical preservation laws and executive orders.

Securing the Cities (STC) Program / September 2022

Securing the Cities – STC Miami Region is to engage local, state, and federal agencies that operate to address the risk posed by the threat of radiological and

nuclear terrorism through a coordinated Preventive Radiological/Nuclear Detection (PRND) program. This program is developed to deter, detect, and report the hazardous handling and/or unauthorized attempts to import, possess, store, develop, or transport illicit radiological/nuclear material within Southeast Florida.

Miami Forever Climate Ready: Extreme Heat Plan / October 2024

Pursuant to City Commission Resolution R-23-0354, the City of Miami developed an Extreme Heat Season Plan to articulate short-term and long-term actions that can be taken to address extreme heat in the City. This Heat Season Plan is organized into three main cooling solutions - Shade, Water, and Design - along with a Heat Response Protocol. The Shade solutions focus on increasing tree canopy, greenery, and shaded structures in public spaces. The Water solutions aim to improve access to water bodies, drinking fountains, and cooling amenities like pools and splash pads. The Design solutions involve policies and programs to help residents cool their homes and workplaces, as well as protect outdoor workers. The Heat Response Protocol outlines the actions different city departments will take during heat season (May 1 – October 31), including notifying the public, aiding vulnerable populations, and coordinating emergency response. The plan includes both short-term (2-3 years) and medium-term (5 years) actions to be implemented.

City of Miami King Tide Action Plan / Ongoing

The City of Miami has developed a King Tide Task Force comprised of representatives from multiple departments to proactively prepare for the King Tide season. The activation begins in July/August and lasts until King Tides subside in the end of November. Activities include building awareness for the dates with the community, verifying the performance of key drainage infrastructure, preparing pumps and temporary flood barriers for deployment as needed, and clearing debris to reduce the hazards in floodwaters.

City of Miami Stormwater Master Plan / 2021

The Stormwater Master Plan (SWMP) provides a strategy for remediating the impacts of flooding, sea level rise, and storm surge. These climate impacts have the capacity to disrupt surface road transportation, sewer and septic system operation, and public health. The Stormwater Master Plan developed a capital infrastructure plan for the City to inform expenditures of the City's general obligation bond allocation for flood mitigation. The SWMP Update has digitized all city records about the stormwater system, integrated resident feedback and reports to ground-truth predictions, developed a Miami flood model, recommend future scenarios for improvements to address sea level rise, and delivered a 20-year capital improvement plan.

City of Miami Critical Facilities and Assets Vulnerability Assessment / October 2024

In 2021, the Florida legislature added a requirement for local governments to conduct a Vulnerability Assessment (VA), defined in Section 380.093, Florida Statute (F.S.). The City developed a VA to establish the baseline condition of critical infrastructure and assets; determine the impacts of current and future climate risks on this infrastructure; understand community needs for new infrastructure; and, develop a process for ensuring that retrofitted and new infrastructure withstands future climate impacts.
To develop this analysis, the City conducted inundation modeling, providing insight into flood extents caused by high tides, coastal storm surge, and compound flooding that could occur during a simultaneous rainfall and high tide event. Projected sea level rise values for the years of 2040 and 2070 were integrated into the flood hazard datasets to map potential increases in flood extent and depth over the coming decades. These maps were used to inform the Vulnerability Assessment and identify City assets at risk from existing and future flood scenarios, aiding in strategic planning and adaptation efforts for the City's resilience.

Resilient Waterfront Enhancement Plan / June 2023

The City's waterfront has been designed based on historical water level conditions that did not account for sea level rise and much of the coastal development is now located within 6 feet of existing sea level. To address ongoing flood vulnerabilities that threaten the City's long-term resilience, the City developed a Resilient Waterfront Enhancement Plan. This plan lays out shoreline enhancement concepts along Biscayne Bay and the Miami River that will mitigate current and future flood risks while also emphasizing nature-based features that support local ecosystems in the design. This work compliments the City's Waterfront Design Guidelines (Appendix B of Miami21) and the City's seawall ordinance that sets minimum seawall heigh standards.

Reimagine Parks Master Plan / July 2023

The Miami Parks Master Plan provides strategic and resilient recommendations for the provision of facilities, programs, services, park land acquisitions, and development. In the Operational Analysis, the City called out Parks role in Emergency Management with park facilities serving as convening spaces during emergency response and recovery. As part of the Vision of the Plan, it is recommended that at least nine park facilities are enhanced to function as resilience hubs to aid in emergency preparedness and response activities.
Policies

5. Flood Damage Prevention: Ordinance 16167 – July 2024

In July 2021, the City Commission approved Ordinance 16167 updating the Chapter 20 of the City ordinance regarding floodplain construction and building requirements to satisfy the requirements of the National Flood Insurance Program and to achieve consistency with the Florida Building Code. These updates addresses development in the special flood hazard areas and nonspecial flood hazard areas, and has certain requirements as to recertification of the drainage to provide clarity for property owners and developers so that the City can combat issues related to sea level rise and incessant flooding.
Website: Ordinance 16167

6. Resolution R-22-0419 – October 2022

The City Commission approved Resolution R-22-0419 that directs the City Manager to adopt a policy requiring City Capital Projects that address stormwater management or flood mitigation to address, as appropriate, heat mitigation, heat and stormwater monitoring, GHG reduction, and future mobility. In addition, this resolution requires that in the Scope of Work (SOW) of such projects, nature-based/low-impact development, a landscape architect, and WEDG and/or Envision certification guidelines be considered where feasible and appropriate. The City developed procurement guidance and an internal policy to implement this directive.
Website: Resolution R-22-0419

7. Seawall Ordinance (Chapter 29) – March 2021

Goal: Miami Forever Climate Ready Goal 3 – Protect and enhance our waterfront

Objectives:

- 3.1 – Reduce the severity, duration, and impact of coastal and riverine flooding on shorelines and surrounding communities
- 3.2 – Update and implement waterfront design standards
- 3.3 – Accelerate investment in features along the waterfront

Seawall elevation is a critical factor to provide protection to waterfront properties and public infrastructure from flooding due to King Tides, storms, and sea level rise. In 2020, the City modified its seawall ordinance to consider raising sea levels, changes include:

- Revised definitions for seawall and require North American Vertical Datum (NAVD88) as standard for all elevation data
- Established standards for permeable erosion barriers such as rip rap, or a land/water interface of another nature
- Set minimum seawall elevations at 6 FT (NAVD88) uniformly throughout Miami, except for those seawalls fronting the Miami River and its tributaries, which will be required to be set at elevation of 4 FT (NAVD88), with ability to increase (cap) another 2 ft

- Require seawall reconstruction to the minimum elevation if the substantial repair threshold is triggered
- Require maintaining seawalls in good repair
- Address transitions with fixed and floating docks
- Require improvements should a property allow tidal waters entering their property to impact adjacent properties or public Rights of Way to be initiated within 180 days, with repairs commencing within 365 days, and repairs being completed within 18 months of owner receiving citation

Approximately 13.7 miles of the 33.9 miles of public shoreline are protected by seawalls. Approximately 39 miles of the 52.3 miles of privately owned shoreline are protected by seawalls. For public walls, we assume 75% of our walls are below 6' NAVD, or 4' NAVD along the Miami River and its tributaries. This means we could see a cost of ~$76M-$136M to raise/replace the city-managed seawalls. For privately owned seawalls, approximately 37.5 miles is below 6' NAVD, or 4' NAVD along the Miami River and its tributaries. This would equate to a replacement cost of ~$277M-$425M. It should be noted, however, that even some of the natural shorelines will need to be fortified (unknown additional cost) and not all existing seawalls will need full replacement, so the prices noted above could be high or they could be low.
Website: Chapter 29 City Code

Miami Beach

The City's Flood Plain Manager implements the Community Rating System and maintains NFIP compliance through floodplain regulation and building inspection. The Environment and Sustainability Department focuses on environmental regulation, sustainability goals, urban forestry and canopy expansion, and resilience studies.

Below are City ordinances and plans that relate to hazard mitigation:

City of Miami Beach Comprehensive Plan 2040	**2019**
Resilient Land Use and Development (RLU)	
Goal RLU 2: Innovative, Sustainable and Resilient Development Encourage innovative development consistent with the historic resources of the City, while ensuring that redevelopment, investment, and new development is constructed utilizing principles of sustainable and resilient development practices.	
Principle 1: Developing a Resilient Future The City shall encourage redevelopment that contributes to community resiliency by meeting all required peril of flood mitigation and storm hazard standards for on-site	

development and shall also prioritize energy efficient development that provides stormwater mitigation, and co-benefit features that contribute to the City's resiliency as a whole.
Climate Resiliency and Sustainability (RSE)
Goal RSE 1 Resilient Development / Adaptation Action Area
Goal RSE 2 Proactive Planning to Increase Resilience to Sea Level Rise and Weather-Related Events: The City shall establish policies and approaches that address the ongoing environmental challenges facing the city and shall engage in proactive planning.
Goal RSE 5 Support Sustainable and Resilient City Operations
Goal RSE 6 Emergency Preparedness: The City shall collaborate and coordinate with appropriate local, regional, state, and national governmental agencies, to the extent possible, toward the implementation of AAA adaptation strategies and to identify risks, vulnerabilities and opportunities associated with coastal hazards and the impacts from sea level rise.
Transportation Element (TE)
Goal TE 3 Transportation Resiliency: Improve transportation resiliency in Miami Beach through sustainable and adaptive improvements that are consistent with regional transportation plans and support hurricane evacuation.
Housing Element (HE)
Goal HE 2 Neighborhood Sustainability: Establish and maintain an energy efficient housing stock that is resilient to a changing climate while maintaining a strong neighborhood and cultural identity.

City of Miami Beach Stormwater Management Master Plan	**March 2024**
1.4 Project Description	
To aid in addressing the challenges of implementing a stormwater management program on a city-side scale, the City has been divided into fifty-six (56) neighborhood project areas. Infrastructure upgrades are proposed for each neighborhood project to: 1) improve runoff capture by increasing the number of inlets, 2) improve stormwater conveyance by installing larger diameter pipes, 3) improve the quality of water discharged from the neighborhood by installing trash racks and structures to remove sediment and nutrients, 4) increase outfall discharge capacity by installing stormwater pumping stations and improving outfall structures and associated seawalls, and 5) ultimately improve resiliency and flood protection through the incremental raising of the roadways.	
City of Miami Beach Fire Department Strategic Plan	**2020 - 2025**
Goals and Objectives	
Goal 12: Conduct a minimum of two one large scale functional exercises simulating active shooter and additional hurricane preparedness and cybersecurity exercises. **Objective 12A:** Begin by training employees on the established plans; build up from drills and tabletops to full scale functional exercises simulating active shooter and hurricane preparedness.	
Miami Beach Code of Ordinances: General Ordinances	
Chapter 54 - Floods	

Sec. 54-34. - Objectives.
The objectives of this article are to:
(1) Protect human life, health and to eliminate or minimize property damage;
(2) Minimize expenditure of public money for costly flood control projects;
(3) Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
(4) Minimize prolonged business interruptions;
(5) Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, roadways, and bridges and culverts located in floodplains;
(6) Maintain a stable tax base by providing for the sound use and development of floodprone areas in such a manner as to minimize flood blight areas; and
(7) Ensure that potential homebuyers are notified that property is in a flood hazard area.

Chapter 54 establishes the floodplain administrator position, adopts regulation for special flood hazard zones, and is periodically updated to maintain compliance and conformity to FEMA policy and the Florida Building Code.

City of Miami Beach Resiliency Code	June 2023

Chapter 4 Landscape Requirements

4.1.1 Intent
It is the intent of these regulations to establish minimum landscape standards for the City of Miami Beach that enhance, improve and maintain the quality of the landscape, and to:

a. Prevent the destruction of the city's existing tree canopy and promote its expansion.
b. Improve the aesthetic appearance of new development and protecting designated historic landscapes.
c. Promote sound landscaping principles through the use of drought and salt tolerant plant species and also to promote planting the right tree and plant in the right place.
d. Promote the use of trees and shrubs for energy conservation, thereby helping to offset global warming and local heat island effects.
e. Provide shade.
f. Improve stormwater management and address flooding and hurricane management.
g. Ameliorate noise impacts and light pollution.
h. Promote the use of canopy trees to sequester carbon dioxide emissions.
i. Improve urban ecology and protect beach ecology.

Chapter 7 Zoning Districts and Regulations

7.1.1 INTENT
This section sets forth regulations that are common to all districts, or which apply to certain building types or uses that are found across multiple zoning districts. Resilience,

Adaptation and Mitigation standards are the most prominent sections in this article but are also accompanied by other regulations that affect the quality of the public realm.

7.1.2 Resilience and Adaptation Standards

This section describes regulations that are intended to promote adaptation to rising sea levels, storm surge, king tide and fair-weather flooding.

7.1.3 ENVIRONMENTAL MITIGATION STANDARDS

7.1.3.1 Purpose

Whereas resilience and adaptation are the response to threats posed by climate change, environmental mitigation represents the strategies that reduce greenhouse gas emissions and ecological degradation that is often associated with the built environment.

Sustainable building practices will promote the economic and environmental health of the city, and ensure that the city continues to become environmentally resilient to combat sea level rise and help curb climate change. This chapter is designed to achieve the following objectives:

j. Increase energy efficiency in buildings;
k. Encourage water and resource conservation;
l. Reduce waste generated by construction projects;
m. Reduce long-term building operating and maintenance costs;
n. Improve indoor air quality and occupant health;
o. Contribute to meeting state and local commitments to reduce greenhouse gas production and emissions; and
p. Encourage sound urban planning principles.

7.1.4 FRONTAGES

7.1.4.1 Purpose

A walkable environment is created by unifying design of the public realm with private frontages that shape the public realm. There are a variety of frontage types, which vary depending on the zoning district and the uses at the eye-level of the pedestrian. This section illustrates how these frontages ought to be designed in order to accommodate future raising of the street.

Seawall Height Ordinance No. 2021-4393

Requires all new seawalls must be constructed to an elevation of 5.7 ft NAVD, or 4 ft NAVD if designed to support a future elevation of 5.7 NAVD. Codifies this requirement and includes that seawalls must be upgraded if the property has new construction or substantial improvements. It should be noted that property owners are encouraged to consider designs using materials to further biodiversity of the City's coastal marine habitat. Establishes overtopping as a trigger for seawall elevation and seawall maintenance requirements. Seawalls must be maintained in good repair as to not allow soil to eroded into the bay or waterway or to allow tidal waters to flow through the seawall and impact adjacent private property(s).

City of Miami Beach Seawall Ten-Year Reconstruction Plan	**October 2021**

Seawall Prioritization and 10-year Plan

The Public Works Department developed a 10-year prioritization list for the reconstruction of the remaining 2.8 miles (out of 5 miles total) of City-owned that had

not yet been elevated or reconstructed as of October 2021. The Department conducted a topographical survey of all seawalls within the City in 2020, an assessment in 2011, and a visual structural inspection in 2015. Seawalls have been prioritized based on elevation, location (those next to private properties and critical infrastructure were prioritized), and condition.	
Buoyant City: Historic District Resiliency & Adaptation Guidelines	**March 2020**
Overview	
The Buoyant City study's primary goal is to better understand and communicate the intersection and relationship between resilience and historic preservation. It illustrates practical steps and proposes new preservation and resilience frameworks, and it demonstrates how specific adaptation strategies might extend the culture and experience of Miami Beach. The study provides valuable tools, such as place-specific design strategies, adaptive project design for historic preservation, and guidelines for designers and developers.	
City of Miami Beach Dune Management Plan	**January 2016**
Statement of Purpose and Objectives	
The purpose of the City of Miami Beach Dune Management Plan ("the Plan") is to outline the framework and specifications that the City will use to foster and maintain a healthy, stable, and natural dune system that is appropriate for its location and reduces public safety and maintenance concerns. The Plan shall guide the City's efforts in managing the urban, man-made dune as close to a natural system as possible and ensuring the dune provides storm protection, erosion control, and a biologically-rich habitat for local species. 1. Reduce to the maximum extent possible the presence of invasive, non-native pest plant species within the dune system. 2. Cultivate and support a dense grassy pioneer zone dune. 3. Maintain a low, stable strand zone comprised of native species. 4. Improve native species diversity of the strand zone. 5. Properly plan dune restoration activities to avoid and minimize potential impacts to sea turtles.	
Flood Mitigation Plan	**2022**
Statement of Purpose and Objectives	
The Miami Beach Flood Mitigation Plan (FMP), adopted in 2022 is in compliance with the federal hazard mitigation planning standards contained in 44 CFR 201.6(b)-(d). The City of Miami Beach developed and submitted all the necessary plan revisions and FDEM staff reviewed and approved these revisions. The City of Miami Beach FMP is compliant with federal standards. Adopted with RESO 2022-32274	
Comprehensive Emergency Management Plan (CEMP)	**Sep 2022**
Statement of Purpose and Objectives	

The City of Miami Beach Fire Department's Division of Emergency Management maintains a Comprehensive Emergency Management Plan (CEMP), which establishes the framework for adequate preparedness and response to all hazards. The CEMP identifies the roles and responsibilities of the departments and division personnel inside and outside the agency for planning, preparation, response, mitigation, and recovery in the event of a disaster.

The CEMP addresses the five phases of emergency management (prevention/protection, preparedness, mitigation, response, recovery) set forth in the State of Florida CEMP, the Miami-Dade County CEMP, and the National Response Framework (NRF). The CEMP also describes how national, State, County and other resources will be coordinated under the National Incident Management System (NIMS) to supplement City resources in response to a disaster. Throughout the CEMP, the Federal Emergency Management Agency (FEMA) Comprehensive Preparedness Guide (CPG) 101 fundamentals and the Whole Community approach strategy are utilized.

Intergovernmental activities are coordinated utilizing a functional approach that groups emergency response organizations according to roles and responsibilities as Emergency Support Functions (ESFs).

The CEMP is accompanied by several annexes, including an ESF annex, annexes that address specific hazards, such as hurricanes and instances of terrorism, and the Continuity annex, which includes the citywide Continuity of Operations Plan (COOP) and the Continuity of Government (COG) plan. Each department in the City uses the CEMP as a guide for developing their departmental emergency response plans, including the departmental COOPs, which are updated yearly prior to hurricane season.

Miami Gardens

The City of Miami Gardens incorporates mitigation actively through Drainage Improvement Projects and other stormwater management practices. The City of Miami Gardens budgets over $2,000,000 annually for drainage improvement projects aimed mitigating localized and area-wide flooding issues. This is highlighted in the Comprehensive Development Master Plan. The projects funded through this appropriation are tracked continually during the year. The City also continuously seeks grant funds to assist in constructing drainage improvements, and leverages local funds as matches to increase the number and scope of grant funded projects.

Drainage improvement projects are implemented and tracked through the City's Stormwater Management Master Plan. In FY 2022, the City completed an update of its Stormwater Master Plan. The plan prioritizes projects based on the vulnerability of an area to flooding, and their degree of flood protection and water quality improvement. In addition, the plan addresses the mitigation of flooding issues in areas where FEMA repetitive loss properties are located in order to minimize or eliminate future insurance claims. Projects developed through the Stormwater Management Master Plan are included in the City of Miami Gardens' contribution to the Miami Dade County LMS Plan.

Below are the sections of the City's comprehensive plan that integrates with the Miami-Dade County LMS.

City of Miami Gardens' Comprehensive Development Master Plan	November 2019
Future Land Use Element	
Objective 2.6: Land Use Compatibility The City shall ensure that the land development regulations contain criteria to mitigate negative impacts that incompatible land uses may have on the neighboring areas.	
Objective 2.12: Hazard Mitigation and Disaster-Preparedness Coordinate the City's Emergency Response Plan with Miami-Dade County and State of Florida to address hazard mitigation and disaster-preparedness for the safety of residents and property in Miami Gardens. **Policy 2.12.1:** The City Public Works Department and City Manager's office shall coordinate with the Miami-Dade County Emergency Management Operations Center for the safety of its citizens. **Policy 2.12.2:** The Public Works Department shall prepare a City Emergency Response Plan to appropriately address emergency/hazard/disaster mitigation program for the safety of Miami Gardens' residents. **Policy 2.12.3:** Coordinate with Miami-Dade County in developing and implementing an Action Plan if necessary, to address flood protection, storm damage precautions. **Policy 2.12.4:** The City's Emergency Response Plan shall include but not be limited to an incident command system structure, delegation of responsibilities for incidents, a medical procedure and materials plan, outreach to the community through identified forums and public information systems, and post disaster mitigation plans that includes designated debris sites and personnel needs.	

Miami Lakes

Below is the section of this village's comprehensive plan that integrates with the Miami-Dade County LMS.

Town of Miami Lakes Comprehensive Plan	November 2019
Land Development Element	
Policy 1.2.4: Develop a code enforcement system in the new Code that is proactive in ensuring that the high standards, which are the hallmark of Miami Lakes, are maintained, and the personnel are very responsive to resident and business owner inquiries. In addition, ensure that the system allows for the mitigation and/or correction of adverse nuisance impacts, such as noise, odor and/or dust, on residential neighborhoods caused by any existing commercial and industrial operations.	
Future Land Use Element	
Objective 1.6: Hazard Mitigation and Disaster Preparedness	

Coordinate with Miami-Dade County and the State of Florida in addressing the hazard mitigation and disaster-preparedness needs of Miami Lakes, and encouraging the elimination and/or reduction of land uses inconsistent with the recommendations of any public agencies charged with managing hazard mitigation and disaster-preparedness. **Policy 1.6.1:** Coordinate with Miami-Dade County in implementing the approved Local Mitigation Strategy, in assessing the vulnerability of governmental, medical and public safety sites and structures in the Town to storm damage, and develop an action plan, if necessary, to address wind stability and flood protection for key buildings.
Conservation Element
Policy 6.7.1: Wetlands that are to be protected will be identified based on the type of wetland, function, size, conditions/location, and overall resource value. These wetlands shall be used for purposes that are compatible with their natural values and functions, and land development regulations shall be adopted to provide these areas with the maximum feasible protection, by using such tools as compensatory wetland mitigation and dedication of conservation easements for preserving open space. All development with the potential to impact wetland areas shall be consistent with South Florida Water Management District regulations.

Miami Shores

Hazard mitigation and disaster recovery is incorporated throughout the Miami Shores Coastal Management Element. The Miami Shores Village Hurricane Plan, 2014 outlines in detail the city and employee activities, duties and responsibilities to be conducted prior and after a hurricane event. The focus is on preparedness prior to a hurricane event and detailed recovery plan post hurricane event.

Miami Shores Coastal Management Element	November 2013
Objective 4: Direct population concentrations away from the coastal high hazard areas, hurricane vulnerability zone and limit coastal high hazard area, hurricane vulnerability zone infrastructure expenditures. Direct population concentrations away from the coastal high hazard areas, hurricane vulnerability zone and limit the expenditure of Village funds on infrastructure within the Coastal High Hazard Area, hurricane vulnerability zone if such infrastructure would have the effect of directly subsidizing development which is significantly more intensive than authorized by this Plan. [9J-5.012 (3) (b) 5 and 6] The Coastal High Hazard Area is defined as the area below the elevation of the category 1 storm surge line as established by a Sea, Lake, and Overland Surges from Hurricanes (SLOSH) computerized storm surge model. Monitoring and Evaluation: Annual record of Village actions to direct away or reduce the population of the hurricane vulnerability zone.	
Policy 4.1: The Village shall restrict development in accordance with the Future Land Use Map of the plan. It is the legislative judgment of the Village that the Future Land Use Map provides the most appropriate way to limit development in the coastal high hazard areas,	

hurricane vulnerability zone consistent with reasonable property rights and long-established land use patterns. [9J-5.012 (3) (c) 9]
Policy 7.2: The Village shall monitor the need for drainage system improvements.
Policy 7.3: The Village shall design infrastructure with consideration to the potential rise in sea level.
Policy 7.4: The Village shall deny any Future Land Use Map density increases in the hurricane vulnerability zone.
Objective 8: Hazard mitigation. In general, the Village shall regulate development so as to minimize and mitigate hazards resulting from hurricanes. In particular, the Village shall ensure that all construction and reconstruction complies with applicable regulations designed to minimize hurricane impact on buildings and their occupants. Monitoring and Evaluation: Record of participation in Miami-Dade County Emergency Preparedness meetings, activities and programs. Annual record of development permits issued in the hurricane vulnerability zone, demonstrating the application of specific standards that result in a reduction in the exposure of human life and property to natural disasters

Coastal Management Element	November 2013
Policy 11.2: The Land Development Code shall be amended to require Special Approval for the repair or replacement of hurricane damaged buildings in the FEMA VE Velocity Zone. The criteria for granting such approval shall be as follows: 1) repair or replacement shall be authorized for principal buildings and their associated accessory buildings and structures when the principal building suffers minor or major damage; and 2) repair or replacement shall be authorized for principal buildings and their associated accessory buildings and structures when the principal building is destroyed provided that the setback from the FEMA VE Zone is the maximum possible consistent with the authorized floor area, other setback requirements and reasonable design standards, but in no case less than 15 feet from the seawall, and provided further that the applicable requirements of Policy 11.3 are also met.	
Policy 11.3: The Land Development Code shall be amended to require Special Approval for the repair or replacement of hurricane damaged buildings in the Hurricane Vulnerability Zone (east of Biscayne Boulevard). The criteria for granting such approval shall be as follows: 1) repair shall be authorized for principal buildings and their associated accessory buildings and structures when the principal building suffers only minor damage; 2) repair or replacement shall be authorized for principal buildings and their associated accessory buildings and structures when the principal building suffers major damage or is destroyed, provided that the resulting buildings fully meet the Florida Building Code and all requirements of the Miami Shores Village land development code and provided further than ground floor elevations conform with the FEMA map. Historic buildings shall be exempt from this policy.	

Miami Springs

Below is the section of this village's comprehensive plan that integrates with the Miami-Dade County LMS.

City of Miami Springs Comprehensive Plan	October 2024
Future Land Use Element	
Objective 1.1: Future Land Use Categories Maintain existing development and achieve new development and redevelopment consistent with the community character statement articulated as the Community Character Goal above and which: 1) protects and preserves single-family neighborhoods as safe, decent, and affordable residential areas; and 2) otherwise coordinates future land uses with the appropriate topography and soil conditions and the availability of facilities and services. **Policy 1.1.3:** The City shall enforce land development code provisions governing subdivisions, signs, and floodplain protection. Such provisions shall be consistent with this plan and with the applicable Florida statutory and administrative code guidelines.	

City of Miami Springs Comprehensive Plan	October 2024

Objective 1.6: Hurricane Evacuation
Coordinate future land uses by encouraging the elimination or reduction of land uses which are inconsistent with applicable interagency hazard mitigation report recommendations and enhance the efforts of the Miami-Dade Office of Emergency Management by providing it with all relevant information. This objective shall be measured by implementation of its supporting policies.
Policy 1.6.1: The City shall regulate all future development within its jurisdiction in accordance with the Future Land Use Map. It shall also consider the most current Interagency Hazard Mitigation Team Report as part of the development regulations. The City shall periodically review and revise the Future Land Use Map in light of future interagency hazard mitigation reports in order to reduce or eliminate uses which are inconsistent therewith.
Policy 1.6.2: The City Manager or designee shall annually assess the City's existing and permitted population densities to determine if changes are significant enough to transmit such data to the Miami-Dade Office of Emergency Management to assist in their hurricane evacuation planning.

Conservation Element

Objective 1.5: Floodplain Protection
Protect and conserve the natural functions of existing floodplains. This objective shall be measured by implementation of its supporting policies.
Policy 1.5.1: The City shall enact and enforce land development code provisions governing floodplain protection. Such provisions shall be consistent with this plan and with the applicable Florida statutory and administrative code guidelines. Floodplain protection regulations shall be consistent with applicable standards promulgated by the SFWMD; the SFRPC; Miami-Dade County's RER; Florida's DEP; and/or other agencies with relevant jurisdiction and/or information. The City shall revise as necessary and enforce flood hazard reduction regulations to ensure: 1) adequate drainage paths around structures to guide storm water runoff; 2) for residential buildings in AE zones, the elevation of the lowest floor and mechanical equipment above the base flood elevation; 3) for nonresidential buildings in AE zones, either the elevation of the lowest floor and mechanical equipment above the base flood elevation or the flood proofing of habitable areas below the base flood elevation; 4) the prohibition of structural fill. The enumeration of specific features of the of flood protection- regulations contained herein shall be interpreted as establishing minimum standards for City regulations, not as precluding additional or higher standards which may have a legitimate public purpose. In addition, the City shall participate in the Community Rating System of the National Flood Insurance Program.

Intergovernmental Coordination Element

Policy 1.2.2: The City shall assist the County in providing information to the residents of the City about services provided directly or indirectly by the County, e.g., solid waste, potable water, sewers, transit, and hurricane response planning. Such information may be disseminated through a City newsletter, City Hall

City of Miami Springs Comprehensive Plan	October 2024
counter handouts, notices posted at the City Hall, and/or other appropriate means.	
Objective 1.4: Support Initiatives to Address Climate Change and Sea Level Rise **Policy 1.4.1:** Support the Miami-Dade WASD and SFWMD in any efforts to evaluate the consequences of sea level rise, changing rainfall and storm patterns, temperature effects, and cumulative impacts to existing structures and existing legal uses. **Policy 1.4.2:** Participate in the Southeast Florida Regional Climate Change Compact to support regional planning efforts and initiatives to adapt to rising sea level in the Lower East Coast (LEC) Planning Area. **Policy 1.4.3:** Work collaboratively with the Miami-Dade WASD, other utilities, and SFWMD to identify the utility wellfields and other users at potential risk of saltwater intrusion within the LEC Planning Area.	

North Bay Village

Below is the section of this village's comprehensive plan that integrates with the Miami-Dade County LMS.

City of North Bay Village Comprehensive Plan	March 2023
Future Land Use Element	
Policy 2.1.7: Ensure that all development orders and permits are consistent with the goals and objectives of the Village's Flood Damage Protection Ordinance and withhold such orders and permits when they conflict with the Ordinance.	
Transportation Element	
Policy 3.2.5: Require that new development and redevelopment plans identify, by means of a traffic-way impact study, and mitigate any negative impacts the plans may have upon streets and walkways to ensure the maintenance of levels of service and safety within the City. Mitigation shall be mandatory to the extent that a development or redevelopment contributes to the identified impact. No development or redevelopment plan shall be permitted without an approved traffic-way impact study and mitigation plan. **Policy 3.3.2:** The City shall require all potential development on the Kennedy Causeway to demonstrate that the anticipated traffic impact will not cause the Causeway to fall below the required Level of Service, or to mitigate any impacts to maintain or improve the required Level of Service.	
Housing Element	
Policy 6.4.3: The Village shall implement and apply a variety of housing affordability strategies for its residents, including but not limited to the following: • Continue to promote flood risk reduction and resilient housing design and construction through the implementation of regulations in the Unified Land Development Code and Building Code and through capital improvement priorities.	

City of North Bay Village Comprehensive Plan	March 2023
Coastal Management Element	

GOAL: Protect human life and the environment and limit destruction in areas subject to natural disaster through implementation of hazard mitigation strategies.

Objective 8.1:
The Village shall continue to coordinate with Miami-Dade County Emergency Operations Center to provide hurricane warning notice and information about evacuation conditions for residents in order to maintain or reduce hurricane evacuation times.

Policy 8.1.1: The Village shall periodically update its Emergency Evacuation Assistance Program to identify and provide notice to citizens who require evacuation assistance.

Policy 8.1.3: Continue the coordination program with Miami-Dade County on hurricane evacuation of the Village's citizens to County-wide shelters (from the pickup point on Treasure Island).

Policy 8.1.4: Upon posting of a hurricane watch, the Village shall contact Village residents identified through the special assistance survey conducted as per Policy 8.1.1 through e-mail and direct phone calls to urge evacuation and establish the need for evacuation assistance upon posting of a hurricane warning.

Policy 8.1.5: The Village shall coordinate with the County and the South Florida Regional Planning Council to reduce or maintain evacuation time to twelve (12) hours. The Village shall adopt an evacuation policy in concert with Miami-Dade County Emergency Operations Center which immediately informs residents when an evacuation order has been issued.

Policy 8.1.6: Critical evacuation roadway links shall receive high priority for annual maintenance and capital improvement expenditures.

Policy 8.1.7: Hurricane Storm Surge Evacuation Zones shall be the areas designated/delineated by Miami-Dade County, as requiring evacuation and/or early evacuation in any storm event impacting Zone B (Orange Zone).

Policy 8.1.8: The Coastal High-Hazard Area, shall be defined as stated in Florida Statutes Chapter 163, as the areas below the elevation of the category 1 storm surge line as established by a Sea, Lake, and Overland Surges from Hurricanes (SLOSH) computerized storm surge model, as described in Florida Statutes 163.3178(2)(h). The area defined should be based upon the most recently available data published by the Florida Division of Emergency Management.

Policy 8.1.10: The Village shall continue to implement programs and policies in conjunction with Miami Dade County to protect residents and businesses from disasters and mitigate hazards. The Village shall implement the post-disaster programs and procedures outlined in the County's Hurricane Procedures, to identify immediate actions necessary to protect the health, welfare, and safety of its residents.

Policy 8.1.11: The Village shall monitor updates to the Miami-Dade County Local Mitigation Strategy (LMS) and the Miami-Dade County Emergency Operations

City of North Bay Village Comprehensive Plan	March 2023

Plan procedures to ensure that all applicable provisions of the hazard mitigation are incorporated and/or addressed in local hazard mitigation procedures.

GOAL: Provide for increased safe and nondestructive public use of natural coastal resources for North Bay Village.

Objective 8.5:

The Coastal High Hazard Areas in the Village shall be the area below the elevation of the category 1 storm surge line as established by a "Sea, Lake, and Overland Surges from Hurricanes (SLOSH) computerized storm surge model".

Policy 8.5.1: The Village shall inventory and identify all reimbursable improvements in the coastal area eligible for federal funding and include this information in the Village's local mitigation strategy plan.

Objective 8.6:

Coastal High Hazard Area Land Use and Infrastructure: Limit Village funds used to improve infrastructure within its planning area that would have the effect of directly subsidizing development above the adopted intensity and density standards of the Village.

Policy 8.6.3: The Village shall prohibit any future proposed land use amendment and/or development or redevelopment activity which would increase the adopted density/intensity of the Coastal High Hazard Area as it currently is defined.

Policy 8.6.6: The Village shall support development measures which integrate innovative climate adaption and mitigation designs where possible

Objective 8.7:

The Village shall address and prepare for the impacts of, sea level rise. All infrastructure projects must consider potential impacts of sea level rise during all project phases. The Village manager will evaluate sea level rise risks to existing infrastructure.

Policy 8.7.5: The Village shall address recurring flooding issues by implementing the 2022 Stormwater Master Plan.

Policy 8.7.10: The Village shall continue the process of lining of wastewater pipes and shall continue to evaluate and implement measures where feasible to flood proof coastal pumping stations and electrical facilities in vulnerable areas.

Policy 8.7.11: The Village shall continue to reinforce increased inflow into the storm water system in vulnerable areas by installing flap gates, sleeve valves and/or duckbill valves as appropriate and:

1. Continue to evaluate the need for new pumping stations in vulnerable areas.
2. Continue to ensure development and redevelopment consider the best available data on minimum floor elevation, including FEMA flood zones.

Policy 8.7.12: The Village shall coordinate with Miami-Dade County to identify Adaptation Action Areas within the Village and assist with multi-jurisdictional solutions to address identified vulnerabilities.

Policy 8.7.13: The Village shall continue to identify and address public buildings and infrastructure vulnerable to sea level rise and other climate change related

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impacts. This analysis shall include public buildings, water and wastewater systems, transmission lines and pump stations, stormwater systems, roads, libraries, parks, fire and police stations and facilities.

Policy 8.7.14: The Village shall identify funding sources to address identified vulnerabilities with priority given to addressing vulnerabilities to critical facilities and infrastructure.

Policy 8.7.15: The design, location and development of infrastructure and buildings operated by or on behalf of the Village shall include evaluation of sea level rise utilizing the Unified Sea Level Rise Projection Report (2019), prepared by the Southeast Florida Regional Climate Change Compact.

Policy 8.7.16: In order to address and adapt to the impacts of climate change, the Village shall continue to improve analysis and mapping capabilities for identifying areas of the Village vulnerable to sea level rise, tidal flooding, and other impacts of climate change.

Objective 8.8:

The Village shall provide immediate response to post-hurricane situations in concert with its post-disaster redevelopment plan, to be adopted within one year of this Plan's adoption, which will reduce or eliminate the exposure of human life and public and private property to natural hazards.

Policy 8.8.1: After a hurricane, but prior to re-entry of the population into evacuated areas, the Village Commission shall meet to hear preliminary damage assessments, appoint a Recovery Task Force, and consider a temporary moratorium of building activities not necessary for the public health, safety, and welfare.

Policy 8.8.2: The Recovery Task Force shall include the Building Official, Public Works Director and other Village staff members as directed by the Village Commission. Staff shall be provided by the Departments whose Directors sit on the Task Force. The Task Force shall be terminated after implementing its responsibility.

Policy 8.8.3: The Recovery Task Force shall review and decide upon emergency building permits; coordinate with Miami-Dade County, State and Federal Officials to prepare disaster assistance applications; analyze and recommend to the City Commission hazard mitigation options including reconstruction or relocation of damaged public facilities; develop are development plan; and recommend amendments to the City's Comprehensive Plan, Miami-Dade County Hurricane Procedure Plan, and other appropriate policies and procedures.

Policy 8.8.5: The Recovery Task Force shall propose Comprehensive Plan amendments which reflect the recommendations in any interagency hazard mitigation reports or other reports prepared pursuant to Section 406 of the Disaster Relief Act of 1974 (PL93-288).

Policy 8.8.7: Structures which suffer recurring damage to pilings, foundations, or load-bearing walls shall be required to rebuild landward of their current location to

City of North Bay Village Comprehensive Plan	March 2023
modify the structure to structurally enhance the structure, institute other mitigation measures, or delete the areas most prone to damage. **Objective 8.9:** The Village will achieve a flood resilient community status by phasing out inappropriate and unsafe development in the coastal areas when opportunities arise, using studies, surveys, and data to assess flooding risks which result from high-tide events, storm surge, flash floods, stormwater runoff, and the related impacts of sea level rise. Assessments will provide the basis for redevelopment practices as identified by the Peril of Flood legislation, (Section 163.3178, F.S.). **Policy 8.9.1:** The Village shall evaluate Miami-Dade County and other local government post-disaster guidelines and propose appropriate guidelines for post-disaster development. The proposed guidelines will also address the relocation, mitigation, or replacement of Coastal High Hazard Area infrastructure and will implement the Village's coastal management element. The post-disaster guidelines shall distinguish between the recovery phase and long-term redevelopment including the removal, relocation, or structural modifications of damage and unsafe structures and infrastructure. **Policy 8.9.13:** The Village will continue to work with the South Florida Regional Planning Council and other agencies at the local, County, Regional, State, Federal, and global levels to address climate change and to encourage best practices with regards to redevelopment and flood mitigation. **Policy 8.9.14:** The Village will continue to investigate participation in the National Flood Insurance Program Community Rating System.	

North Miami

Below is the section of this village's comprehensive plan that integrates with the Miami-Dade County LMS.

City of North Miami 2036 Comprehensive Plan	November 2019
Future Land Use Element	
Objective 1.11: The City shall coordinate with Miami-Dade County, the South Florida Regional Planning Council and the State of Florida in addressing the evacuation, structural integrity and disaster-preparedness needs of North Miami. **Objective Policy 1.11:** The City shall coordinate with the Miami-Dade County and the South Florida Regional Planning Council in implementing the approved Local Mitigation Strategy, by assessing the vulnerability of governmental, medical and public safety sites and structures in the City to storm damage, and in developing an action plan, if necessary, to address wind stability and flood protection for key buildings.	

Policy 1.11.1: The City shall continue to coordinate with the State of Florida, Miami-Dade County and the South Florida Regional Planning Council in implementing the approved Local Mitigation Strategy, by assessing the vulnerability of governmental, medical and public safety sites and structures in the City to storm damage, and in developing an action plan, if necessary, to address wind stability and flood protection for key buildings.

Policy 1.11.2: The City shall continue to work with the South Florida Regional Planning Council's Local Emergency Planning Committee and Miami-Dade County's Emergency Management Department to ensure that City employees are well-trained in the programs, procedures and policies required during a disaster emergency and the longer-term post-disaster redevelopment process.

Policy 1.11.5: All proposed large-scale amendments to this Comprehensive Plan and/or zoning applications shall be evaluated for their impact on hurricane evacuation routes and times, and effect on currently available off-site shelter capacities. Roadway improvements and shelter improvements shall be required, if deemed necessary, to mitigate negative impacts and phased with new residential development.

Housing Element

Policy 3A.4.5: The City shall continue to pursue and maintain funding for the Disaster Mitigation/Recovery Strategy Program to assist with post-disaster repairs and encourage the timely repair of homes damaged as a result of disaster activity.

Policy 3B.3.7: The City shall continue to coordinate with Miami-Dade County Emergency Management to provide short-term emergency shelter opportunities to meet expected demands.

Transportation Element

Objective 2B.3: Coordinate with Miami-Dade Transit and the Miami-Dade Emergency Management Department to help ensure development of an emergency transit plan that provides timely evacuation of the Coastal High Hazard Area during tropical storms and hurricanes.

Policy 2B.3.1: The City Manager shall appoint a City employee to meet with the Miami-Dade Emergency Management Department to coordinate evacuation plans and related issues and report back to the City Manager.

Policy 2B.3.2: Timely evacuation operations shall be established to commence four hours after an evacuation order is issued by the County Administrator.

Coastal Management Element

Objective 5A.2: The City shall implement programs and policies in conjunction with Miami-Dade County to protect residents and business from disasters and mitigate hazards.

Policy 5A.2.2: As part of on-going monitoring and updating procedures, the City shall ensure that all applicable provisions of the hazard mitigation annex of the Miami-Dade County Emergency Operations Plan, and the Miami-Dade County Local Mitigation Strategy (LMS) are incorporated and/or addressed in local hazard mitigation procedures.

Policy 5A.2.4: The City shall implement the provisions included in the Local Mitigation Strategy to provide for debris clearance as well as immediate repair and replacement of public infrastructure required to protect public health and safety.
Policy 5A.2.5: The City shall make every effort to support and implement the initiatives and projects listed in the Local Mitigation Strategy, including both countywide initiatives and the following proposed hazard mitigation projects located in North Miami:

1. Flood Prevention and Mitigation: Basin 13
2. Non-critical Facilities Hazard Mitigation
3. Surge Resistance and Flood Mitigation at Keystone Point and Sans Souci
4. Sanitary Sewer Backup
5. Safeguarding Availability of Potable Water
6. Emergency Portable Stormwater Pumps
7. Gravity Sewer Systems Improvements: Groundwater Infiltration Reduction
8. Emergency Power: Water and Sewer Utility Operations Center
9. Utility Operation Center
10. Replacement Generator for Police Station
11. Correct Water Infiltration at City Hall (EOC) Basement
12. Replacement of U.P.S. for Police Station

Policy 5A.2.10: The City shall promote and educate the public on strengthening their structures against natural disasters by promoting the hardening of structures in accordance with the Florida Comprehensive Hurricane Damage Mitigation Program (My Safe Florida Home).
Policy 5A.3.3: The City shall relieve deficiencies identified in the hurricane evacuation analysis and endeavor to integrate regional and local preparation and evacuation procedures into the City's hazard mitigation measures.
Policy 5A.4.2: Incorporate recommendations found in interagency hazard mitigation reports into the comprehensive plan and post-disaster redevelopment plan.
Policy 5B.2.4: Institute marina siting criteria that address existing protective status of ownership, hurricane contingency planning, protection of water quality, water depth, availability of upland support services, land use compatibility, environmental disruptions and mitigation actions, availability for public use, and economic need and feasibility.

Conservation Element

Objective 6B.1: Through the permitting process continue to preserve and maintain identified wetlands and water quality from the impacts of new development or redevelopment.
Policy 6B.1.1: The City shall deny permit applications for new development or redevelopment projects which may adversely impact existing wetlands and water quality or quantity until satisfactory mitigation and protection measures are performance bonded by the developer.

Policy 6.B.2.4: The City shall continue to provide education programs to educate residents about the polluting effect on the Bay and other natural bodies of water in the City, of run-off containing grass clippings, lawn fertilizers, and other similar type material, and present techniques that can be implemented by residents to mitigate this problem. In addition, the City shall continue to coordinate with the SFRPC's Strategic Regional Policy Plan (Policy 14.14 and 14.17) to educate the public.
Climate Change Element
Objective 12.7: Ensure adequate planning and coordinated response for emergency preparedness and post-disaster management in the context of climate change. **Policy 12.7.1:** The City of North Miami shall ensure adequate planning and response for emergency management in the context of climate change by maximizing the resilience and self-sufficiency of, and providing access to, public structures, schools, hospitals and other shelters and critical facilities. **Policy 12.7.2:** The City of North Miami shall develop plans and monitoring programs to address the impacts of climate change on households and individuals especially vulnerable to health risks attributable to or exacerbated by rising temperatures, to include low income households and the elderly. **Policy 12.7.3:** The City of North Miami shall continue to communicate and collaboratively plan with other local, regional, state and federal agencies on emergency preparedness and disaster management strategies. This includes incorporating climate change impacts into updates of local mitigation plans, water management plans, shelter placement and capacity, review of major traffic-ways and evacuation routes, and cost analysis of post disaster redevelopment strategies. **Policy 12.7.4:** The City of North Miami shall work to encourage dialogue between residents, businesses, insurance companies and other stakeholders, through public education campaigns and workshops, in order to increase understanding regarding the potential impacts of climate change on our coastal communities and evaluate the shared costs of action or inaction in human, ecological and financial terms. **Policy 12.7.5:** The City of North Miami shall work with the Florida Division of Emergency Management and other agencies to incorporate sea level rise and increasing storm surge impacts into the remapping of potential hazard areas in coastal zones by 2018. Revised hazard area designations should better reflect the risks to communities associated with climate change and allow reevaluation of suitability for development or redevelopment in these areas, policies and programs.

North Miami Beach

On August 4, 2015, the City of North Miami Beach passed Resolution No. R2015-68 for adoption of the 2015 Miami-Dade County Local Mitigation Strategy; authorizing the City Manager to identify and prioritize hazard mitigation grant program projects to become a part of the Local and Statewide hazard mitigation strategy.

The City of North Miami Beach is responsible for natural disaster preparedness and emergency management that is addressed in the Comprehensive Plan. This includes response, recovery, and mitigation procedures that are acknowledge throughout all City departments. The City has a Certified Floodplain Manager that administers the Community Rating System (CRS) to reduce flood damage to insurable property, strengthen and support the insurance aspects of the NFIP, and encourage a comprehensive approach to floodplain management.

The primary duties of the Building Official shall be to intake and process permit applications and associated fees; ensure permits are routed for flood elevation review; conduct the review of building permit applications for compliance with structural and technical code requirements for flood-proofing and resistance of combined dynamic, hydrostatic and wind loads; and provide backup certified personnel as needed to assist in the flood elevation review. These duties may be clarified, and other duties may be assigned in memoranda of understanding or in interdepartmental procedures for the administration of the National Flood Insurance Program and Article X of the City North Miami Beach Ordinance (Subdivision and Floodplain Standards). The Building Official ensures that of record of the actual elevation, in relation to mean sea level, of the lowest floor, including basement, of all new or substantially improved structures, flood proof from a registered professional engineer or architect, helps maintain all records pertaining to the provisions of this section and keep them open for public inspection and keeps a file of as-built drawings.

Interagency Coordination: The City Building Official and Director of Public Works are hereby appointed to assist and cooperate with the Director of Community Development Department or designee in carrying out the requirements of the National Flood Insurance Program, and in the administration of this article. The Director of Community Development Department shall develop interagency memoranda of understanding and procedures which shall describe the duties and responsibilities of each agency involved in the administration of this article. The Director of Public Works, the Building Official, and the Chief Code Enforcement Officer of the City shall cooperate with the Director of Community Development Department in the creation of memoranda of understanding and interdepartmental procedures which shall be approved by the City Manager. Each agency shall properly execute its duties and responsibilities as set forth in this article and in the memoranda of understanding and published procedures. In the absence of any interdepartmental guidance regarding any particular incident or program action, the Director of Community Development Department shall direct immediate or interim action to be taken when time is of the essence, which direction may be reviewed and amended by the City Manager.

The Police Department's Crime Prevention Division has a Community Emergency Response Team (CERT) that receives special training for the purpose of enhancing their ability to recognize, respond to, and recover from a major emergency or disaster situation. The CERT basic training that is offered at the City of North Miami

Beach's Police Department, issues a training course that helps residents identify hazards that affects the home, workplace, and neighborhood. The program helps to understand the function of CERTs and their roles in immediate disaster response. For example, the course utilizes prevention techniques such as basic fire suppression strategies and fire safety measures in order to eliminate natural and man-made disasters.

The City of North Miami Beach has incorporated mitigation into their planning processes to include the following plans:

City of North Miami Beach's Comprehensive Plan	**April 26, 2018**
Future Land Use Element	
Objective 1.2: Detail a redevelopment strategy for potential redevelopment areas, including those cited in this plan (see Map 1.16, Volume Four). Redevelopment could include Future Land Use Map designation changes as necessary to facilitate enhancement of these areas. **Policy 1.2.18:** The City should encourage the use of Crime Prevention Through Environmental Design (CPTED) standards in the redevelopment of the City and formalize these standards within the Zoning and Land Development Code, enhancing the safety of the City by limiting design factors which abet crime.	
Objective 1.3: Encourage elimination of uses incompatible with this land use plan. **Policy 1.3.4**: Continue to regulate the use of land in the flood zones in accordance with FEMA requirements and the Land Development Regulations, including not permitting variances from required finished floor elevations. Continue to implement programs and procedures which improve FEMA's Community Rating System score for the City in order to reduce the cost of homeowner's insurance by 5% annually. Continue to annually reduce the number of existing structures which do not comply with these requirements and regulations.	
Objective 1.4: Ensure reasonable protection of natural resources and environmentally sensitive land as new development occurs. **Policy 1.4.1**: Continue to enforce the Oleta River overlay zoning district to achieve maximum reasonable protection of the natural waterfront habitat as development applications are reviewed. **Policy 1.4.2**: The City shall protect and maintain natural resources and environmentally sensitive lands through the implementation of this comprehensive plan and the land development regulations. **Policy 1.4.3:** Coordinate the City's land uses, development, and redevelopment activities with the South Florida Water Management District's Biscayne Bay Surface Water Improvement Plan.	
Objective 1.5: The City shall coordinate with Miami-Dade County, the South Florida Regional Planning Council and the State of Florida in evaluating the impacts of development and redevelopment on hurricane evacuation clearance times, structural integrity, and disaster-preparedness needs.	

Policy 1.5.3: The City shall coordinate with the Miami-Dade County and the South Florida Regional Planning Council in implementing the approved Local Mitigation Strategy by: assessing the vulnerability of governmental, medical and public safety sites and structures in the City to storm damage, and; developing an action plan, if necessary, to address wind stability and flood protection for key buildings. **Policy 1.5.4**: The City shall continue to work with Miami-Dade County to ensure that City employees are well-trained in the programs, procedures and policies required during a disaster emergency and the longer-term post-disaster redevelopment process. **Policy 1.5.5:** The City shall evaluate all proposed large-scale amendments to the Comprehensive Plan and/or zoning applications to determine their impact on hurricane evacuation routes and times, and effect on currently available off-site shelter capacities. Roadway improvements and shelter improvements shall be required to mitigate negative impacts, if deemed necessary, and phased with new residential development.
Infrastructure Element
Objective 1.1: Continue to provide new or improved sewer collection, drainage and/or potable water systems in accordance with the Capital Improvements Schedule, as it is annually updated. **Policy 1.1.2:** The City shall continue its drainage improvement program and continue the supporting catch basin cleaning program so that adequate street drainage can be achieved and maintained.
Objective 1.4: Protect the City's natural drainage and recharge areas by retaining all existing lakes and prohibiting any new development with 100 percent impervious coverage. **Policy 1.4.1**: Through land development code techniques, protect the existing lakes and assure adequate pervious areas in conjunction with new development.
Coastal Management Element
Objective 1.1: Continue to achieve zero (0) net loss of the 2,000 linear feet of natural areas bordering the estuarine areas in the City. **Policy 1.1.2**: As developers apply for permits on the few remaining waterfront sites, the City, in coordination with Miami-Dade County's Shoreline Review Committee when necessary, shall carefully review site plans in order to minimize impacts upon the natural waterfront (and thus the estuary and wildlife), particularly their drainage and tree protection plans; a waterfront zoning overlay district may, in some cases, require mitigation of disturbed natural features through the planting, rip-rap replacement of seawalls, etc. For aesthetic and consistency reasons, seawalls shall continue to be the required shoreline stabilization method for residential areas in Eastern Shores.
Objective 1.3: Achieve a net increase in the environmental quality of the estuary; see policies for measurability. **Policy 1.3.1:** City officials shall coordinate with appropriate local, regional and state agencies to monitor the commercial marinas and assure avoidance of pollution sources by reporting any violations to those agencies. The City shall

also assure review of any proposed marina, coastal drainage project, or waterfront development by the County Shoreline Development Review Committee and Florida DEP to assure conformance with the Biscayne Bay Surface Water Improvement and Management (SWIM) Plan (South Florida Water Management District, 1994).

Policy 1.3.2: Continue the City's street drainage improvement projects in order to minimize pollution from stormwater run-off; take special care in reviewing drainage plans for private development projects located near waterways to assure that adequate on-site retention is provided

Policy 1.3.3: Annually review the development code to assure adequate protection is provided against negative impacts that may result from potential new uses in the coastal area and in any flood hazard areas.

Policy 1.3.5: The City, through its regulatory processes and coordination with appropriate agencies, shall limit specific and cumulative impacts of development or redevelopment upon wetlands water quality, water quantity, surface water runoff, and exposure to natural hazards, wildlife habitat, and living marine resources.

Objective 1.4: The amount of shoreline devoted to water dependent and water related uses shall be maintained at 3,500 linear feet along the Oleta River system and Snake Creek Canal or increased in conformance with the criteria in the following policies. Note that North Miami Beach has very limited vacant privately owned frontage on the estuary.

Policy 1.4.1: Existing water dependent uses and new water dependent uses (i.e., uses which cannot exist or occur without estuarine association) should be maintained and should be regulated through zoning policies which insure environmental compatibility. New uses which increase access or preserve and protect shoreline resources should be encouraged.

Policy 1.4.7: Acquire natural areas and natural habitat for conservation through County, State, or Federal Grants if possible.

Objective 1.6: The City shall enforce the minimum floodplain management regulations of the Federal Emergency Management Agency (FEMA) and the City's Floodplain Standards Ordinance for new and substantially improved buildings.

Policy 1.6.4: The City shall continue to participate in the Community Rating System (CRS) and the National Flood Insurance Programs (NFIP), and distribute information relative to its provisions.

Policy 1.6.5: In an effort to minimize flood insurance premium rates for North Miami Beach residents, the City shall endeavor to maintain or improve its Class 8 rating to a Class 7 or better by performing floodplain management activities that exceed the minimum NFIP requirements of the Community Rating System.

Policy 1.6.6: To prevent further additions to the list of Repetitive Loss (RL) properties published by FEMA, the City shall remain committed to working on eliminating RL properties within the City to a point that qualifies as a category A or B Community.

Policy 1.6.7: The City shall continue to enforce Chapter XXIV Zoning and Land Development Code, in an effort to eliminate an increase in the number of RL properties.
Policy 1.6.8: The City should attempt to promote the acquisition, or retrofit of RL properties.
Policy 1.6.9: The Coastal High Hazard Area is defined as the area below the elevation of the Category 1 storm surge line as established by a Sea, Lake and Overland Surges from Hurricanes (SLOSH) computerized storm surge model. The Coastal High Hazard Area is identified on the Future Land Use Map.

Objective 2.1: The City shall maintain or mitigate the impacts of development on the prescribed hurricane evacuation clearance times identified in the South Florida Regional Planning hurricane evacuation model update.
Policy 2.1.2: Continue to cooperate with Miami-Dade Police and the County Fire Department's Office of Emergency Management, the Red Cross and FEMA through evacuation planning meetings and policies, and in other ways conform to the Metro-Dade Emergency Operations Plan for a Hurricane.
Policy 2.1.3: In order to reduce the potential for loss of life and severe property damage, encourage the reduction of densities and intensities in areas likely to be inundated by flooding resulting from hurricane surge as shown by Map 5.3, Volume Four, implement a building code consistent with FEMA requirements, and when possible through grant funding eliminate the potential for increased residential and urban densities in those areas by purchasing such lands for use as public open space and shoreline access.
Policy 2.1.4: The City shall participate in regional solutions that aim to reduce overall evacuation clearance times.
Policy 2.1.5: The City shall address deficiencies identified in the hurricane evacuation analysis and endeavor to integrate regional and local preparation and evacuation procedures into the City's hazard mitigation measures.

Objective 2.2: The City of North Miami Beach shall provide immediate response to post-hurricane situations in concert with a post-disaster redevelopment plan, which will reduce or eliminate the exposure of human life and public and private property to natural hazards. Measure: This objective shall be measured by progress in implementing its policies.
Policy 2.2.3: The Recovery Task Force shall include the City Manager, Police Chief, Emergency Management Director, Community Development Director, Building Official, Public Works Director, Parks & Recreation Director and other City staff members as directed by the City Council. Staff shall be provided by the departments whose directors sit on the Task Force. The Task Force shall be terminated after implementing its responsibility under Policy 2.2.6.
Policy 2.2.4: The Recovery Task Force shall review and decide upon emergency building permits; coordinate with Miami-Dade County, State and Federal Officials to prepare disaster assistance applications; analyze and recommend to the City Council hazard mitigation options including reconstruction or relocation of damaged public facilities; develop a redevelopment plan; and recommend

amendments to the comprehensive plan, Miami-Dade County Hurricane Procedure Plan and other appropriate policies and procedures.

Policy 2.2.5: Immediate repair and clean-up actions needed to protect the public health and safety include repairs to potable water, wastewater and power facilities; removal of building and/or vegetable debris; stabilization or removal of structures about to collapse; and minimal repairs to make dwellings habitable such as minor roof repairs and other weatherproofing/security measures. These actions shall receive first priority in permitting decisions. Long-term development activities shall be postponed until the Recovery Task Force has completed its tasks.

Policy 2.2.6: The Recovery Task Force shall propose comprehensive plan amendments which reflect the recommendations in any interagency hazard mitigation reports or other reports prepared pursuant to Section 406 of the Disaster Relief Act of 1974 (PL93-288).

Policy 2.2.7: If rebuilt, structures which suffer damages in excess of fifty (50) percent of their appraised value shall be rebuilt to meet all current requirements, including those enacted since construction of the structure.

Policy 2.2.8: Repair or reconstruction of the existing seawalls within the City shall be done using only pre-fabricated concrete or cement, which may be augmented at the base only by decorative material (rip-rap), shall be similar in height and appearance to adjoining lots, pursuant to the Land Development Regulations.

Policy 2.2.9: Following a natural disaster and prior to the implementation of long-term redevelopment, the City shall do the following: Based upon the damage assessment report prepared by the Miami-Dade Public Works Department, the City shall consult with its Public Works officials and consultant engineer to evaluate options for damaged public facilities including abandonment, repair in place, relocation and repair with structural modification, to determine the most strategic approach to long-term development. The evaluation shall include, but not be limited to, issues pertaining to damage caused by natural disaster, cost to construct repairs, cost to relocate, cost to structurally modify, limitations of right-of-way, and maintenance costs.

Objective 2.4: The City's Emergency Preparedness Committee shall review its hurricane preparation plans and post-disaster redevelopment plans annually to ensure that risks are mitigated to the furthest extent possible and that its plans are in conformance with the most recent Objectives and Procedures developed by the Miami-Dade County Evacuation Planning Task Force. The City shall annually review its Hurricane Procedures in March of each year

Policy 2.4.1: Continue to enforce building codes, floodplain regulations, design criteria, and zoning regulations established to protect new structures, reduce redevelopment costs, and mitigate hurricane hazards.

Policy 2.4.2: Zoning district boundaries and land development regulations shall be maintained or revised as necessary to ensure that no new hospitals or mobile homes that do not meet the criteria for manufactured housing are constructed in the coastal area.

Objective 2.6: The City shall take measures towards hurricane preparation, hazard mitigation and plan for post-disaster redevelopment. **Policy 2.6.2:** Encourage public awareness and education regarding appropriate responses to a variety of emergencies as feasible and appropriate utilizing such mechanisms as websites, public access television stations, and newsletters. **Policy 2.6.3**: Coordinate with the County to ensure the availability of emergency shelter for residents required to evacuate areas adversely affected by natural disasters. **Policy 2.6.4**: Work with the South Florida Regional Planning Council in its role as the region's Economic Development District Coordinator to seek hazard mitigation funding from the U.S. Department of Commerce, Economic Development Administration to fund the organizational and training activities of the Business Disaster Mitigation and Recovery Assistance Program. **Policy 2.6.5**: Consider reducing building permit application fees for disaster resistant shutters, doors, windows, and roof clips for businesses participating in the Business Disaster Mitigation and Recovery Assistance Program **Policy 2.6.6**: The City shall ensure that all applicable provisions of the hazard mitigation annex of the Miami-Dade County Emergency Operations Plan, and the Miami-Dade County Local Mitigation Strategy (LMS), are incorporated and/or addressed in local hazard mitigation procedures. **Policy 2.6.7**: The City shall monitor problems and life-threatening situations resulting from natural disaster events and take the necessary steps to ensure that the potential for such problems and situations are minimized in the future. **Policy 2.6.8:** The City shall implement the Local Mitigation Strategy and Post-Disaster Redevelopment Plan to provide for debris clearance as well as immediate repair and replacement of public infrastructure required to protect public health and safety. **Policy 2.6.9:** The City shall make every effort to support and implement the initiatives and projects listed in the Local Mitigation Strategy, including both countywide initiatives and the proposed hazard mitigation projects located in the City. **Policy 2.6.10:** The City will promote the hardening of structures to increase resistance against natural disasters pursuant to the Florida Comprehensive Hurricane Damage Mitigation Program (My Safe Florida Home).
Conservation Element
Objective 1.2: Continue to pursue drainage practices and programs that minimize ground and surface water pollution, including pollution to the Biscayne Aquifer; experience no increase in the amount of properties, developments, or facilities polluting ground water or surface water as the result of non-implementation of such practices and programs. Measure: Number of properties developed or redeveloped without technical review insuring that proposed drainage at the site minimizes ground and surface water pollution. **Policy 1.2.1:** Continue to make street drainage improvements City-wide.
Objective 1.3: Protect existing rare or threatened vegetative communities, natural ecosystems, listed animal species and their habitat, sensitive soils, and

estuarine communities against any further degradation. Achieve 0 net loss of the 2,000 lineal feet of natural shoreline bordering the estuary. **Policy 1.3.4:** Further landscape and extend the linear park along the Snake Creek Canal in an effort to assist wildlife and riverine habitat conservation, including the removal of invasive, nuisance vegetation. **Policy 1.5.6:** Continue to restrict activities known to adversely affect endangered and threatened wild life, and require mitigation measures for activities impacting native vegetative communities.
Objective 1.6: The City shall seek to reduce greenhouse gas emissions to the maximum extent feasible and conserve energy resources. In developing the 2012 Evaluation and Appraisal Report and associated amendments, the City shall establish and adopt a percentage goal for greenhouse gas reduction consistent with Miami-Dade County's greenhouse gas reduction goal. Measure: The number of specific programs initiated to reduce greenhouse gas emissions, percentage reduction of greenhouse gas emissions, acres of mixed use development as a percentage of total development, and the estimated reduction of vehicle miles travelled as a result of these efforts. **Policy 1.6.2**: The City shall require low impact development techniques and green building standards that reduce the negative environmental impacts of development and redevelopment by: reducing building footprints to the maximum extent feasible, and locating building sites away from environmentally sensitive areas; promoting the preservation of natural resources; providing for on-site mitigation of impacts (i.e. retention and treatment of stormwater runoff, water reuse, Master Stormwater Management Systems); promoting energy conservation through design, landscaping and building techniques (i.e. solar power, increased tree canopies); promoting water conservation through landscaping and building design; ensuring environmentally friendly building practices (i.e. use of environmentally friendly building materials, recycled materials), and; considering the development and implementation of a green building certification program, with associated regulations, incentives and standards**.**

Opa-locka

Below is the section of this village's comprehensive plan that integrates with the Miami-Dade County LMS.

Opa-locka Code of Ordinances	**October 2014**
Article VI Flood Damage Protection	
Sec. 7-75. - Purpose. This article is to insure the continued availability of flood insurance through the National Flood Insurance Program; to comply with federally imposed requirements; and to protect the public health, safety and general welfare, by minimizing flood losses in the flood hazard areas of the City of Opa-locka, and to require that uses vulnerable to floods, including facilities which serve such uses,	

be protected against flood damage at the time of initial construction and substantial improvement; control the alteration of natural floodplains, stream channels, and natural protective barriers which are involved in the accommodation of flood waters; control filling, grading, dredging and other development which may increase erosion or flood damage, and; to insure that potential home buyers are notified that property is in a flood area.

Sec. 7-78. - Standards for development within special flood hazard (SFH) areas.

(a) No new construction and substantial improvement of any residential structure or manufactured home shall be permitted in SFH Areas, and no development permit referred to in section 7-77 of this chapter shall be issued therefore, unless said new construction and substantial improvement has the lowest floor (including basement) elevated to or above the regulatory flood (100-year flood) elevation.

Electrical, plumbing, air conditioning and other attendant utilities must be constructed, designed, and/or located so as to prevent water from entering or accumulating within their components during conditions of flooding.

(b) No new construction and substantial improvement of any nonresidential structure shall be permitted in SFH Areas, and no development permit referred to in section 7-77 of this chapter shall be issued therefore, unless said development has the lowest floor (including basement) elevated to or above the level of the base flood (100-year flood). If the lowest permitted floor level of such nonresidential structure (including basement) is below the regulatory flood level then such nonresidential structure together with attendant utility and sanitary facilities shall be flood-proofed to one (1) foot above the level of the base flood; provided that the lowest floor level of such nonresidential structure (including basement) shall be not more than ten (10) feet below the base flood level. Where flood proofing is utilized for a particular structure, a registered professional engineer or architect shall certify that the flood proofing methods are adequate to withstand the flood depth, pressures, velocities, impact and uplift forces associated with the base flood, and a record of such certificates indicating the specific elevation (in relation to mean sea level) to which such structure is flood proofed shall be maintained with the designated official.

(c) All manufactured homes placed, or substantially improved, on individual lots or parcels, in expansions to existing manufactured home parks or subdivisions, in new manufactured home parks, in substantially improved manufactured home parks, shall meet all of the requirements for "new construction", including elevation in accordance with section 7-78(a) and anchoring requirement of section 7-77(c)(2).

(d) All manufactured homes placed, or substantially improved in an existing manufactured home park or sub division shall be elevated so that:

(1) The lowest floor of the manufactured home is elevated no lower than the base flood elevation; or

(2) The manufactured home chassis is supported by reinforced piers or other foundation elements of at least an equivalent strength, of no less than thirty-six (36) inches in height above grade.

(3) The manufactured home shall be securely anchored to the adequately anchored foundation system to resist flotation, collapse and lateral movement.

(4) In an existing manufactured home park or subdivision in which a manufactured home has incurred "substantial damage as the result of a flood, any manufactured home placed or substantially improved shall meet the standards of section 7-78(a) and 7-77(3).

(e) All recreational vehicles placed within this area shall either:

(1) Be on site for fewer than one hundred eighty (180) consecutive days;

(2) Be fully licensed and ready for highway use; or

(3) The recreational vehicle shall meet all the requirements for new construction, including anchoring and elevation requirements of section 7-78(c).

(4) Be on the site for fewer than one hundred eighty (180) consecutive days. A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices and has no permanently attached structures.

(f) Elevated buildings. New construction and substantial improvements of elevated buildings that include fully enclosed areas formed by foundations and other exterior walls below the lowest floor shall be designed to preclude finished living space except allowable uses (i.e. parking, limited storage and building access) and shall be designed to allow for the entry and exit of floodwaters to automatically equalize hydrostatic flood forces on exterior walls. Designs for complying with this requirement must either meet or exceed the following minimum criteria or be certified by a professional engineer or architect:

(1) Provide a minimum of two (2) openings having a total net area of not less than one (1) square inch for every square foot of enclosed area subject to flooding;

(2) The bottom of all openings shall be no higher than one (1) foot above grade; and

(3) Openings may be equipped with screens, louvers, valves or other coverings or devices provided they permit the automatic flow of floodwaters in both directions;

Electrical, plumbing, air conditioning and other utility connections must be constructed, designed, and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

Access to the enclosed area shall be the minimum necessary to allow for parking of vehicles (garage door), (standard exterior door), or entry to

the living area (stairway or elevator); the interior portion of such enclosed area shall not be finished or partitioned into separate rooms or air conditioned.

(g) Notify, in river line situations, adjacent communities and the Florida NFIP Coordinating Office to any alteration or relocation of a watercourse, and submit copies of such notifications to FEMA;

(h) The flood carrying capacity within the altered or relocated portion of any watercourse shall be maintained.

(Ord. No. 12-09, § 2, 4-11-12)

Palmetto Bay

On September 14, 2020, the Village of Palmetto Bay passed Resolution No. 2020-82 adopting Miami-Dade County's Local Mitigation Strategy. This allowed the Village to apply for inclusion into the National Flood Insurance's Community Rating System (CRS) Program.

In addition, the Village of Palmetto Bay has integrated mitigation locally through the following plans:

Village of Palmetto Bay Comprehensive Plan	**2019**
Future Land Use Element	
Objective 1.6 <u>Coastal High Hazard and Disaster Preparedness</u> Coordinate with Miami-Dade County and the State of Florida in addressing the land use planning, evacuation, structural integrity, and disaster-preparedness needs of Palmetto Bay. **Policy 1.6.2** Coordinate with Miami-Dade County in implementing the approved Local Mitigation Strategy, by assessing the vulnerability of governmental, medical, and public safety sites and structures in the Village to storm damage, and in developing an action plan, if necessary, to address wind stability and flood protection for key buildings.	
Transportation Element	

Objective 2B.3 Emergency Transit Plan
Coordinate with Miami-Dade Transit and Miami-Dade Office of Emergency Management (OEM) to help ensure development of an emergency transit plan that will provide a timely evacuation of the Coastal High Hazard Area during tropical storms and hurricanes.

Policy 2B.3.1 The Village Manager shall direct the transportation liaison, established under Policy 2A.2.6 of this Element, to meet with the Miami-Dade Office of Emergency Management at least every twelve months to coordinate evacuation plans and related issues and report back to the Manager.

Policy 2B.3.2 Timely evacuation operations shall be established to commence four (4) hours after an evacuation order is issued by the County Administrator.

Coastal Management Element

Objective 5.3 Flood Protection
The Village will reduce natural hazard impacts through compliance with federal Emergency Management Agency (FEMA) regulations and by targeting repetitive flood loss and vulnerable properties for mitigation.

Objective 5.8 Post Disaster Redevelopment and Hazard Mitigation
Coordinate with the Miami-Dade County Office of Emergency Management (OEM) to develop and implement post-disaster redevelopment and hazard mitigation plans that reduce or eliminate exposure of life and property to natural hazards towards the protection of health, safety, and welfare within the Village.

Policy 5.8.2 The Village shall enforce applicable recommendations of post disaster hazard mitigation plans required under Section 405 of the Disaster Relief Act of 1974

Pinecrest

The Village addresses flooding issues through implementation of the 2015 Stormwater Management Master Plan. The Plan modeled for future conditions at 24-hour, 2-year, 10-year, 25-year, 50-year and 100-year storm events including consideration for sea level rise and prioritized development of drainage project based on the analysis. An update to the 2015 plan is scheduled for 2025. Currently, there are seven Repetitive Loss Properties in the Village of Pinecrest, defined as properties that have submitted flood insurance claims for more than two flood events. To reduce risk to these properties, the Village of Pinecrest has developed and implemented several stormwater management projects to help alleviate localized flooding at locations near or adjacent to the properties.

Since 2011, the Village participates in the Property Assessed Clean Energy (PACE) Program, which provides loans to property owners for solar panels, wind

generators, insulation and shutters. In addition, the Village has achieved the Florida Green Building Council's Silver Certification and is currently seeking Gold Certification, and has adopted green building and development standards as part of its Land Development Regulations.

The Village of Pinecrest has participated in the National Flood Insurance Program (NFIP) since October 13, 1998. The Village's Building and Planning Department is responsible for the review of site development plans and issuance of building permits and customarily reviews all new construction plans for compliance with the requirements of the Florida Building Code and the Village's Land Development Regulations and Floodplain Management Ordinance.

In December 2015, the Village of Pinecrest adopted a Floodplain Management ordinance that incorporates new requirements designed to further protect residents and businesses from flood hazards. Notable changes included an additional one-foot increase in the minimum finished floor elevation of new structures and existing structures that are proposed to be remodeled to an extent greater than 50% of their existing value, defined as "substantial improvement".

On September 8, 2020, the Village of Pinecrest adopted the Miami-Dade County Local Mitigation Strategy (LMS). The LMS has been approved by FEMA and it has been confirmed that it is in compliance with the federal hazard mitigation planning standards contained in 44CFR 201.6 (b)-(d). The LMS is valid until September 15, 2025.

Pinecrest participates in the National Flood Insurance Program's Community Rating System (CRS). On February 27, 2023, the Village was notified that its rating had been modified from Class 8 to Class 7. The Village will continue to coordinate with FEMA and CRS in working to further improve its CRS rating.

The Village has a full time Certified Flood Plain Manager who is responsible for the implementation of the Community Rating System (CRS) and NFIP compliance.

Village of Pinecrest Comprehensive Plan
Future Land Use Element
OBJECTIVE 1-3.5: PROTECTION OF NATURAL RESOURCES. The Village shall maintain Land Development Regulations and shall continue to enforce regulations which ensure that development and conservation activities shall protect natural resources as directed by the below stated policies. **Policy 1-3.5.1: Future Land Use Policies for Managing Environmentally Sensitive Lands.** Policies in the Conservation Element for managing environmentally sensitive natural systems,

including, but not limited to, water resources, wetlands, native habitats and other environmentally sensitive resources shall be carried out through performance criteria in the Land Development Regulations. These and other natural resources identified on the Future Land Use Map series shall be protected and/or preserved pursuant to goals, objectives, and policies stipulated in the Conservation Element.

In addition, the Land Development Regulations shall provide more detailed procedures and performance criteria to implement conservation and natural resource protection. The Land Development Regulations shall also provide for wetland preservation, compensatory wetland mitigation, and dedication of conservation easements for preserving open space. Such policies shall continue to be applied in order to protect and preserve natural resources which may in the future be threatened by development expectations.

Public Facilities Element

GOAL 4-5: PROVISION OF DRAINAGE AND STORM WATER MANAGEMENT PUBLIC FACILITIES. Ensure existing and future land uses have access to drainage and storm water management systems that are environmentally sound, protect and conserve water quality, safeguard investments in existing facilities, abate flood conditions, prevent degradation of the quality of receiving waters and assist in maintaining adopted level of service standards and applicable state laws as well as administrative rules of the Florida Department of Environmental Protection.

OBJECTIVE 4-5.1: PLAN AND COORDINATE SURFACE WATER MANAGEMENT SERVICES TO MEET EXISTING AND FUTURE SURFACE WATER MANAGEMENT NEEDS, INCLUDING IMPLEMENTATION OF THE ENGINEERED STORMWATER MASTER PLAN. To maximize the use of existing surface water management facilities and reconcile existing problems identified in the Drainage Sub-Element Data Inventory and Analysis, the Village shall implement the adopted engineered stormwater master plan which identifies existing and projected short term (2012) and long term (2025) stormwater management needs. The master plan includes an inventory of existing natural and structural features included in the Village drainage system. In addition, the plan provides a detailed assessment of related problems and issues. The plan addresses criteria in Policy 4-5.1.1 and documents findings and recommendations associated with this criterion.

Policy 4-5.1.1: Stormwater Master Plan. The Village has adopted and is implementing on a financially feasible basis, the Stormwater Master Plan and capital improvement program which includes funding recommendations for the construction of drainage improvements.

Policy 4-5.1.2: Drainage Level of Service Standard. The following is the level of service standard for drainage and surface water management applicable to new development which is consistent with the data, analysis and recommendations of

the Master Drainage Plan explained in Policy 4-5.1.1. The level of service standard for new development shall be the Miami-Dade County level of service standards stated below:

- Water Quality Standard: Stormwater facilities shall be designed to meet the design and performance standards established in Ch. 62-25, §25.025, F.A.C., with treatment of the runoff from the first one inch of rainfall on-site to meet the water quality standards required by Ch. 62-302, §62-302.500, F.A.C.
- Water Quantity Standard: Where two or more standards impact a specific development, the most restrictive standard shall apply:

a. Post development runoff shall not exceed the pre-development runoff rate for a 25-year storm event, up to and including an event with a 24-hour duration.

b. Treatment of the runoff from the first one inch of rainfall on-site or the first half inch of runoff whichever is greater. Options for addressing water quantity are provided in the Land Development Code.

Policy 4-5.1.3: Maintenance of Drainage Level of Service Standard through Development Review and Concurrency Management. The Land Development Regulations shall include a development review process and performance standards which require that all future development include an approved system for drainage and storm water management which meets the adopted level of service standard for drainage and all applicable state and county regulations as well as Village performance criteria, including concurrency management regulations.

Policy 4-5.1.5: Priority for Correcting Existing Deficiencies. In developing the annual schedule of capital improvement projects, the Village shall assign highest priority to those projects required for purposes of correcting existing deficiencies including canal bank stabilization to address continued erosion of canals under the jurisdiction of the Village.

Policy 4-5.1.6: Existing Deficiencies Shall Not Be Increased by New Development.
The Village shall issue no development order for new development which would not meet adopted level of service standards. The adequate facilities ordinance shall mandate that future applications for development shall include a written evaluation of the impact of the anticipated development on the levels of services for the drainage. Prior to issuing a site plan or building permit (whichever is first applicable), the Village shall render a finding that the applicant has provided written assurance that the proposed development shall meet adopted level of service criteria. The developer's application shall include written assurances that any required improvements shall be in place concurrent with the impacts of the development.

Policy 4-5.1.8: Stormwater Basin Evaluation Plan. Develop a Comprehensive Stormwater Basin Evaluation that includes review of the effects of sea level rise on the existing system and develop a long-term capital improvement plan to address future infrastructure needs. Coordinate all findings with the adopted Stormwater Master Plan.

Conservation Element

Policy 5-1.3.1: Enforce Policies to Maintain Floodplain. The Village shall maintain the surface
water management and flood damage prevention regulations. New development encroaching into the floodplain shall incorporate flood protection measures sufficient to protect against the 100-year flood. The Village's Stormwater Management and Flood Protection Ordinance shall maintain consistency with program policies of the Federal Insurance Administration. The Village shall monitor new cost-effective programs for minimizing flood damage. Such programs may include modification to construction setback requirements or other site design techniques, as well as upgraded building and construction techniques

Policy 5-1.4.6: Managing and Regulating Wetlands. Wetlands should be used for purposes which are compatible with their natural values and functions and land development regulations shall be adopted to provide these areas with the maximum possible protection. The Land Development Regulations provide for wetland preservation, compensatory wetland mitigation, and dedication of conservation easements for preserving open space. Such policies shall be applied in order to protect and preserve natural resources which may in the future be threatened by development expectations.

Intergovernmental Coordination Element

Policy 7-1.2.1: Coordination of Development and Growth Management Issues. The Village shall pursue resolution of development and growth management issues with impacts extending beyond the Village's political jurisdiction. Issues of regional and state significance shall be coordinated with the South Florida Regional Planning Council, the South Florida Water Management District, and/or state agencies having jurisdictional authority. Issues to be pursued include but are not limited to the following:

1. Impacts of development proposed in the Comprehensive Plan of Miami-Dade County, the Cities of South Miami and Coral Gables, the Village of Palmetto Bay, the region, the state, and any governmental entity that may be created in the future.
2. Land development activities adjacent to the Village's corporate limits within Miami-Dade County or the Cities of South Miami and Coral Gables, the Village of Palmetto Bay, or any other City created in the future.
3. Research regulatory framework and implementation of affordable housing programs.

4. Village of Pinecrest land development activities adjacent to the unincorporated area of the County, or the Cities of South Miami and Coral Gables, the Village of Palmetto Bay, or any other adjacent municipality created in the future.
5. Potential annexation issues.
6. Area-wide drainage and stormwater master plan, proposed improvements and implementing programs and particularly coordination with the South Florida Water Management District regarding the Salinity Dam at Snapper Creek.

Capital Improvements Inventory and Analysis Element

Policy 8-1.3.2: Storm Water Utility. The Village shall continue to use its Storm Water Utility for managing and funding needed drainage improvements through the year 2030. These improvement needs shall be identified in the adopted stormwater master plan. The Village shall amend the capital improvements program to include construction of required infrastructure improvements approved by the Village Council as recommended in the Stormwater Master Plan.

Climate Change Element

Objective 10-1.2: MITIGATION, PROTECTION AND ADAPTATION WITHIN THE BUILT ENVIRONMENT. Improve the climate resiliency and energy-efficiency of new and existing buildings and public infrastructure including municipal buildings.

Policy 10-1.2.1: Encourage Greener, Climate Resilient Construction. The Village of Pinecrest shall, by 2016, encourage greener, more efficient and climate resilient construction practices locally by:

a) Building all new construction of village-owned facilities to published Leadership in Energy and Environmental Design™ (LEED) standards; Florida Green Building Coalition (FGBC) green building standards, or Green Building Initiative (GBI) Green Globes rating standards;

b) Requiring licensed personnel in the Building and Planning Department to maintain LEED Green Associate certification and obtain at least 8 continuing education units (CEUs) of emerging energy efficiency and renewable energy technologies by 2016;

c) Re-evaluating finish floor elevation standards with respect to projected sea level rise scenarios and flooding potential following completion of a comprehensive stormwater basin master plan.

d) Looking for opportunities to access reclaimed and reuse water at municipal facilities and to retrofit municipal buildings to incorporate more sustainable building solutions to improve energy efficiency.

Policy 10-1.2.2: Complete a Vulnerability Assessment for the Identification of Property and Infrastructure at Risk from Sea Level Rise.
The Village of Pinecrest shall complete a vulnerability assessment to further identify property, public investments and infrastructure at risk from sea level rise, storm surge, groundwater contamination and other climate change related impacts by 2016, and shall update this assessment periodically as new sea level rise projections are published. Specifically, the Village shall complete a stormwater vulnerability assessment to further analyze vulnerability to facilities and services, including but not limited to: property; buildings; water and sewer lines; stormwater systems; roads, bridges, and all transportation infrastructure; electric sub stations; and municipal offices and facilities.

Objective 10-1.4: Water, Sewer and Solid Waste. Coordinate with Miami-Dade County in the improvement of the resiliency of existing water resources, and water and wastewater infrastructure to the impacts of climate variability and change in order to protect future water quality and minimize the potential for flood damage and water shortages.

Objective 10-1.6: ADAPTATION ACTION STRATEGIES. Develop and implement adaptation strategies for the Village of Pinecrest to address impacts associated with coastal flooding, tidal events, storm surge, flash floods, stormwater runoff, salt-water intrusion and other impacts related to climate change or exacerbated by sea level rise with the intent to increase the Village's comprehensive adaptability and resiliency capacities.

Policy 10-1.6.2: Collaborate with the South Florida Water Management District in the Review of Policies Regarding Operation of Flood Control Structures. Work in collaboration with the South Florida Water Management District to review, develop and implement strategies to address impacts of rising sea levels on the operation of the flood and salinity control structures at the S22 and S123 outfalls.

Policy 10-1.6.4: Reassess the Village's Required Minimum Finished Floor Elevation.
Consider increasing the minimum required base flood finished floor elevation of all new structures within designated Adaptation Action Areas by one additional foot (freeboard).

Policy 10-1.6.5: Stormwater Drainage Infrastructure. Construct additional stormwater drainage infrastructure necessary to accommodate projected increases in stormwater including drainage wells, injection wells, swales, French drains, and other related structures as recommended in the Village's Stormwater Master Plan.

Policy 10.1.6.6: Collaborate with Governmental Agencies in the Implementation of Mitigation Strategies. Collaborate and coordinate with

appropriate local, regional, and state governmental agencies including the City of Coral Gables, Miami-Dade County, the South Florida Water Management District, and the South Florida Regional Planning Council toward the implementation of Adaptation Action Area adaptation strategies.

Objective 10-1.7: ADAPTATION ACTION AREAS.
The Village of Pinecrest shall continue to identify and designate Adaptation Action Areas as provided by Section 163.3164(1), Florida Statutes, and develop policies for adaptation as required for the protection of areas and facilities in the Village of Pinecrest that are vulnerable to the impacts of rising sea levels and climate change.

Policy 10-1.7.2: Basis for Designation. As the basis for the designation of Adaptation Action Areas, the Village will continue to utilize the best available data and resources such as the Unified Sea level Rise Projection for Southeast Florida in order to identify the risks and vulnerabilities associated with climate change and sea level rise and opportunities to formulate timely and effective adaptation strategies.

Policy 10-1.7.3: Adaptation Action Areas Identified. Those Areas as identified in Figure 11 of the data, Inventory and Analysis, Adaptation Action Areas, that are projected to be impacted by 6 or More Inches of Flooding, are hereby adopted and designated as Adaptation Action Areas.

Objective 10-1.8: INTERAGENCY COORDINATION. Continue to coordinate with Governmental agencies within the South Florida region and other non-governmental entities and academic institutions in the ongoing assessment of existing and projected conditions related to our changing climate and rising sea levels, and continue to collaborate as necessary in the identification and development of effective solutions and strategies to adapt and improve resiliency.

Policy 10-1.8.1: Continue Coordination with Miami-Dade County and Other Participating Counties in the Identification of Modeling Resources and in the Development of Goals, Objectives, and Policies to Address Climate Change. The Village of Pinecrest shall coordinate with Miami-Dade County and other participating counties in the Southeast Florida Regional Climate Change Compact in the identification of modeling resources and in the development of initiatives and goals to address climate change. Additional climate change related objectives and policies that support regional climate change goals shall be integrated into the Comprehensive Development Master Plan as appropriate.

Policy 10-1.8.2: Continue to Coordinate with Other Governmental and Academic
Entities In the Ongoing Analysis of Sea Level Rise. The Village of Pinecrest shall

continue to coordinate regionally with Southeast Florida counties and municipalities, academia, and state and federal government agencies in the analysis of sea level rise, drainage, storm surge and hurricane impacts and the planning of mitigation and adaptation measures. **Policy 10-1.8.3: Continue to Monitor and Coordinate with The Southeast Florida** **Regional Climate Change Compact.** The Village of Pinecrest shall continue to actively monitor the Southeast Florida Regional Climate Change Compact, and shall coordinate with neighboring municipalities to make our community more climate change resilient by sharing technical expertise, assessing regional vulnerabilities, advancing agreed upon mitigation and adaptation strategies, and developing policies and programs.

Below is the section of this city's comprehensive plan that integrates with the Miami-Dade County LMS.

South Miami

Below is the section of this city's comprehensive plan that integrates with the Miami-Dade County LMS.

City of South Miami Comprehensive Plan	2010
Intergovernmental Coordination Element	
Policy 1.3.7 The City will coordinate with the emergency management program of Miami-Dade County y notifying the County of any current or future land use policies or population changes which would affect hurricane shelters or emergency evacuation routes. **Policy 1.3.11** The City will participate with Miami-Dade County in the planning and implementation of the County's Hazard Mitigation Plan, as it impacts the City of South Miami.	
Future Land Use Element	
OBJECTIVE 4.4 Preserve floodplain areas via floodplain management and limiting development within the Special Flood Hazard Area. **Policy 4.4.1** in coordination with the Transit-Oriented Development District, permit more intense development only in those areas which are located outside of the Special Flood Hazard Area. **Policy 4.4.2** Building density and intensity may be transferred from areas within the Special Flood Hazard Area, in order to permit development within the Transit-Oriented Development District, while reducing the permitted intensities within the Special Flood Hazard Areas.	

Sunny Isles Beach

Below is the section of this city's comprehensive plan that integrates with the Miami-Dade County LMS.

City of Sunny Isles Beach Comprehensive Plan	October 2000
Future Land Use Element	
Policy 3P: Applications for rezoning, zoning variances or subdivision approvals for all new development in areas subject to coastal flooding shall be reviewed for emergency evacuation, sheltering, hazard mitigation, and post-disaster recovery and redevelopment.	
Transportation Element	
Objective 3: Transportation Network Safety & Efficiency The City shall improve the safety, and efficiency of the City's roadway system through transportation system management (TSM) techniques, including: access management (Policies 3A-D), improved intersection operations (Policy 3E), traffic calming along residential streets (Policy 3F), mitigation by developers (Policy 3G), accident analysis (Policy 3H, 31), and maintaining visibility for pedestrians, vehicles, and cyclists (Policy 3J).	

Surfside

Below is the section of this town's comprehensive plan that integrates with the Miami-Dade County LMS.

Town of Surfside Comprehensive Plan	January 2010
Future Land Use Element	
Objective 7: Coordination of population with hurricane evacuation plans: Coordinate population densities with the applicable local or regional coastal evacuation plan [9J-5.006 (3) (b) 5] and coordinate future land uses by encouraging the elimination or reduction of land uses which are inconsistent with applicable interagency hazard mitigation report recommendations [9J-5.006 (3) (b) 6]. This objective shall be measured by implementation of its supporting policies. [9J5.006 (3) (b) 5 and 6]. **Policy 7.2:** The Town shall regulate all future development within its jurisdiction in accordance with the goals and objectives of the "The Local Mitigation Strategy for Miami-Dade County and its Municipalities, Departments and Private Sector Partners" (June 2008). The Town shall periodically review and revise the Future Land Use Map in light of future interagency hazard mitigation reports in order to reduce or eliminate uses which are inconsistent therewith. **Policy 5.5**: Consideration for the relocation, mitigation or replacement of any of the existing infrastructure in the Coastal High Hazard Area, as may be deemed appropriate by the Town, shall be coordinate with the state when state funding is anticipated to be needed for implementation of the project. al Management Element	

Policy 6.5: The Town shall adopt a Comprehensive Emergency Management Plan in order to prepare for, respond to, recover from and mitigate potential hazard by December 2011.
Objective 11: Hazard mitigation In general, the Town shall regulate development so as to minimize and mitigate hazard resulting from hurricanes. In particular, the Town shall ensure that all construction and reconstruction complies with applicable regulations designed to minimize hurricane impact on buildings and their occupants. **Policy 11.5:** The Town shall continue to enforce regulations and codes which provide for hazard mitigation, including but not limited to, land use, building construction, placement of fill, flood elevation, sewer, water and power infrastructure, and stormwater facilities. These regulations shall be applied to eliminate unsafe conditions, inappropriate uses and reduce hazard potentials. **Policy 11.6:** The Town shall increase public awareness of hazards and their impacts by providing hazard mitigation information to the public. Information shall address evacuation, sheltering, building techniques to reduce hazards as well as other hazard mitigation issues that could help prevent loss of life and property. **Policy 11.9:** The Town shall, as deemed appropriate, incorporate the recommendation of the hazard mitigation annex of the local emergency management plan and shall analyze and consider the recommendations from interagency hazard mitigation reports. **Policy 11.10:** The Town shall include criteria in the five (5) year schedule of Capital Improvement projects to include consideration for and prioritization for projects that are hazard mitigation initiatives.

Sweetwater

On October 2016, the City adopted a Floodplain Management Ordinance (Ordinance 4230) to meet the requirements of the NFIP and coordination with the Florida Building Code. The model ordinance specifically repealed and replaced the City Chapter 35 named "Floodplain Management Regulations" (Ordinance 3427 September 28, 2009) to satisfy the NFIP, to coordinate with the FBC, and to meet the requirements of section 553.73 (5), F.S. This ordinance applies to all flood hazard areas within the City of Sweetwater.

City of Sweetwater Code of Ordinances	**2016**
Sec. 35-102.3. - Basis For Establishing The Areas of Special Flood Hazard	
The Flood Insurance Study for Miami-Dade County, Florida and Incorporated Areas	
Sec. 35-102.4 Submission of additional data to establish flood hazard areas	
To establish flood hazard areas and base flood elevations, pursuant to Section	

Virginia Gardens

Below is the section of this village's comprehensive plan that integrates with the Miami-Dade County LMS.

Village of Virginia Gardens Provisions for Flood Hazard Reduction Code of Ordinances	**August 2013**
Article X. Floodplain Management	

10.1 Administration: Duties of the Administrator shall include, but are not be limited to: Verify and record the actual elevation (in relation to mean sea level) of the lowest floor (A-Zones) or bottom of the lowest horizontal structural member of the lowest floor (V-Zones) of all new and substantially improved buildings, in accordance with Article 5, Section B (1) and (2) and Section E (2), respectively; Verify and record the actual elevation (in relation to mean sea level) to which the new and substantially improved buildings have been flood-proofed, in accordance with Article 5, Section B (2);
6.11 Stormwater Management Code of Ordinances
6.11.3 Design Standards To comply with the foregoing performance standards, the proposed storm water management system shall conform to the following standards: A. To the maximum extent practicable, natural systems shall be used to accommodate stormwater. B. The proposed stormwater management system shall be designed to accommodate the stormwater that originates within the development and stormwater that flows onto or across the development from adjacent lands. The proposed stormwater management system shall be designed to function properly for a minimum twenty (20) year life. C. The design and construction of the proposed stormwater management system shall be certified as meeting the requirements of this Code by a professional engineer registered, in the State of Florida. D. No surface water may be channeled or directed into a sanitary sewer.

West Miami

Below is the section of this city's comprehensive plan that integrates with the Miami-Dade County LMS.

City of West Miami Flood Damage Prevention	2024
Ordinance Ch. 17, Article III-Flood Damage Prevention	
Sec. 17-43 (d)– Duties and powers of the Floodplain Administrator Substantial improvement and substantial damage determinations. For applications for building permits to improve buildings and structures, including alternations, movement, enlargement, replacement, repair, change or 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: (1) 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;	

(2) 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;
(3) Determine and document whether the proposed work constitutes substantial improvement or repair of substantial damage; and
(4) 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.

Sec. 17-43 (e)– Duties and powers of the Floodplain Administrator
(e) *Modifications of the strict application of the requirements of the Florida Building Code.* The Floodplain Administrator shall review requests submitted to the Building Official that seek approval to modify the strict application of the flood load and flood resistant construction requirements of the Florida Building Code to determine whether such requests require the granting of a variance pursuant to section 17-47 of this article.

City of West Miami Stormwater Masterplan	2025
The City of West Miami is preparing to submit an application to the Florida Division of Emergency Management (FDEM)'s Hazard Mitigation Grant Program Watershed Planning Program. The City has completed a lot of work on our pipes to help increase capacity and remove aged pipes which was guided by a stormwater plan from 1999-2000. This document is now aged out and an updated document is needed to ensure we are keeping up with our mitigation opportunities.	

Appendix J: Community Profile

The Community Profile is the first component of the THIRA and provides valuable intelligence and situational awareness. In many jurisdictions, a detailed and in-depth community profile is developed as a key element of a Hazard Mitigation Plan; however, its utility goes far beyond that plan alone. The Community Profile is an overview of the political governance, economy, geography, climate, population, community assets, future development and trends, and commercial and industrial make-up of Miami-Dade County.

The Community Profile provides Miami-Dade County with a solid foundation for developing a common operational picture for the THIRA, and can also be referenced for other activities, such as emergency training, exercises and actual incidents.

A. Climate

The climate of a region is determined by the monthly or longer weather pattern conditions that exist within a specified area. Miami-Dade County, in Southern Florida, has a tropical climate with high humidity and precipitation. The seasons are determined by the amount of and changes in precipitation. The rainy season usually begins in late May and ends in mid-October, subjecting Miami-Dade County to thunderstorms, tropical storms, and hurricanes. The average annual precipitation in the county is 60.5 inches compared to Florida's annual average of 54.57 inches. The average temperature during the rainy season is 83°F in Miami-Dade County.

Total precipitation in Miami-Dade County varies greatly between the rainy and dry seasons, peaking at 10 inches in June and dipping to less than 2.5 inches in December, January, and February. The dry season lasts from mid-October to mid-May, and has an average temperature of 73 °F in Miami-Dade County. The Gulf Stream regulates the climate variants throughout the state with rare extremes of over 100 °F or below 32 °F. The average annual temperature of Miami-Dade County is 77.2 °F.

B. Geology, Hydrology, and Ecology

Geology

Miami-Dade County is located in the southern portion of Florida, whose geological conditions are considered young and formed around 120,000 years ago during the Pleistocene Period. Just below the ground surface there is Miami Limestone, the Fort Thompson Formations, and Anastasia Formations. Miami Limestone consists of oolitic and bryozoans facies. The oolitic facies are a combination of oolitic, small round grains, limestone and fossils. The bryozoans facies are a sandy fossil limestone. The fossils found include mollusks, bryozoanz, and corals. In some regions, the Miami Limestone reaches a thickness of 40 feet. Fort Thompson Formations underlies the Miami Limestone and consists of sandy soils, marine beds, and brackish and freshwater limestones. The Fort Thompson Formations can reach

thicknesses up to 150 feet. The Anastasia Formations also underlies the Miami Limestone and consists of shelly limestone and coquina limestone. The Miami Limestone is highly porous and permeable and forms much of the Biscayne Aquifer system. The natural marl soils found above the Miami Limestone have been affected by drainage and erosion due to development and agriculture. The Biscayne Aquifer lies just below the surface, and due to the permeability of the soil, makes the aquifer vulnerable to contamination.

Hydrology

The hydrology of Florida is system of low-gradient drainage, high ground water table, and an extensive drainage canal network. There are two major aquifers in Florida that comprise the water table. Aquifers are areas of rock below the ground surface that can produce sufficient amounts of water to efficiently supply the communities within the region. There are three different types of aquifers: unconfined, where the water table is able to move freely without interference due to the lack of aquitard (a non-permeable formation); semi-confined, where the water table is partially confined due to semi-permeable formations; and confined, where the water table is completely confined by non-permeable formations above and below the body of water. The aquifers found within Florida are varying degrees of combinations of all three types.

The Floridan Aquifer encompasses the entire state while the Biscayne Aquifer only supports the southern portion of the state. The Floridan Aquifer produces much of northern and central Florida's water supply, however the southern region of the Aquifer has been polluted by brackish water from deep wells. The Biscayne Aquifer supplies the southern region of the state; mainly Miami-Dade, Broward, and Monroe counties. This aquifer is one of the most productive aquifers in the world, but it is very susceptible to pollution from agricultural and industrial practices because of the permeability of the soil and rock formations.

The extensive system of levees and canals in Miami-Dade County and South Florida, managed by the South Florida Water Management District (SFWMD), transports surface and ground water and protects against flooding and salt water intrusion. Precipitation during the rainy season is the main source of surface water, which travels from the northern and central regions of Florida to the southern region, flowing from Lake Okeechobee. The levees direct and store surface water to prevent flooding and to maintain reserves for use during the dry season. Ground water also flows from the northern regions to the coast and is drawn from field wells from the Biscayne Aquifer.

Ecology

The ecology of Florida is a relationship between organisms and their environments. Due to the unique combinations of Florida's geology, hydrology, and climate, over 20 different ecosystems have been identified by scientists. The various classifications differ depending on the organization and scale of the system being evaluated, but the basic ecosystems include the following:

- **Coral Reefs**: Physical structures built over many decades from layers of calcium carbonate produced by individual coral polyps as they make their skeleton. The coral polyps form colonies and serve as a foundation of the coral reef ecosystem which also includes other associated reef organisms like fish, sponges, and crustaceans. The local coral reef runs parallel to the entire coast of Miami-Dade County.
- **Dunes**: Mounds of sand that are created by coastal winds and are held together by grass vegetation. Over 60% of Florida's coast is comprised of sand and the dunes serve as a protective barrier for inland areas from coastal winds and waves.
- **Freshwater Marshes**: An inland standing body of water, generally year round, with little to no tree or scrub life. Grasses, sedges, and rushes act as a filter to remove particles and pollutants from the waters that flow through. There are four different types of freshwater marshes in Florida: wet prairies, sawgrass marshes, ponds, and aquatic sloughs.
- **Saltmarshes**: Also known as tidal saltmarshes, are coastal wetlands that thrive in the intertidal zone, where land meets open saltwater or brackish water that is regularly flooded by the tides. Saltmarshes are dominated by salt-tolerant herbaceous plants such as herbs, grasses, or low shrubs. Saltmarshes are especially common in coastal and estuarine habitats worldwide, particularly in middle to high latitudes.
- **Freshwater Swamps**: Areas inland where there is considerable standing water during the rainy season and the soils typically dry out during the dry season. There is a variety of vegetation that inhabits the swamps including softwood trees, hardwood trees, vines, and ferns.
- **Upland Hardwoods**: Areas of forest with nutrient clay soil that are typically bordered by sand hills and flatwoods in northern and central regions of the state. There is a vast variety of tree and plant life with no dominating species within the forests. Most of Florida's state parks consist of upland hardwood ecosystem.
- **Bottom Hardwoods**: Areas of forest with wet nutrient soil that typically border lakes, rivers, and sinkholes found throughout Florida. Bottom hardwood forest provides a transition area between the upland hardwoods, swamps, marches, and other wetlands and is dominated by Live Oaks, Red Maples, and Water Oaks. This region typically floods and is constantly changing because of the different climates and regions in which the forest is found.
- **Sand hills**: Areas of forest with permeable, dry, sandy soils that typically do not flood. The forest is dominated by Longleaf Pine and Turkey Oak trees with different grass species blanketing the forest floor. The forest is vulnerable to fire due to the dry, sandy conditions.
- **Scrubs**: Areas with permeable, nutrient poor, sandy soils found on higher elevations where the water table is low. Scrubs are communities of pinelands with an undergrowth of oaks, shrubs, and palmettos, and are fire dependent to regenerate because of the soil conditions and lack of water supply.

- **Flatwoods**: Areas of forest of semi-permeable soil and limestone of level land that makes up 50% of the covered land mass of the state. The forest is dominated by Longleaf Pines and Slash Pines with undergrowth of palmetto, wildflowers, and ferns. Flatwood forests are fire dependent to regenerate not only due to the soil conditions but the competition between the hardwood forest for space and sunlight.
- **Tropical Hammocks**: Areas of hardwood forest with thick mounds of permeable soil and peat bordered by marshes, mangrove swamps, and flatwoods, but typically does not flood due to soil elevation. Hammock forests are dominated by Gumbo-Limbo and Pigeon Plum trees that are only found in southern Florida and contain plant and animal life found nowhere else in the United States.
- **Mangroves**: Mangroves are woody wetland trees and shrubs that flourish above mean sea-level in the intertidal zone of marine coastal environments and estuarine habitats across tropical, subtropical, and, to a lesser degree, temperate regions around the world. Mangroves are salt-tolerant (halophytic) species that are adapted to live in harsh coastal conditions. When referring to the habitat, the term “mangroves” often refers to mangrove forests or mangrove wetlands. In Florida, mangrove forests are comprised of three native species: Red, Black, and White mangroves All three mangrove species have distinct morphological and physiological adaptations that allow them to thrive in saline and flooded environments.

C. Environment

Florida is a peninsula surrounded by two main bodies of water, the Gulf of Mexico and the Atlantic Ocean, resulting in an environment mostly composed of marshes, swamps, lakes, rivers, and springs. There are 1,711 rivers, streams, and creeks in the state, with notable rivers including St. John’s River, St. Mary’s River, and Suwannee River. There are 111 lakes in the state; Central Florida has the highest concentration of lakes, including Lake Okeechobee, the largest freshwater lake in Florida. The Miami Canal connects Lake Okeechobee to Biscayne Bay, crossing through Miami-Dade County.

Miami-Dade County is the third largest county in the state, with an area of 2,431 square miles; 1,946 square miles of land and 485 square miles of water. The Everglades National Park encompasses one-third of the entire county. Most of the land is close to sea level with an average elevation of 6 feet above sea level. The eastern side of Miami-Dade County is composed mainly of Oolite Limestone while the western side is composed mainly of Bryozoa.

Most of the county’s water mass is located in the Biscayne Bay area and the Atlantic Ocean. Biscayne Bay extends the length of the County, approximately 40 miles long and ranges from 2-10 miles wide. Biscayne Bay is located within Biscayne National Park or the Biscayne Bay Aquatic Preserve. The coastal waters of the county in the

Atlantic Ocean are part of the Kristen Jacobs Coral Aquatic Preserve to the north and Biscayne National Park and the Florida Keys National Marine Sanctuary to the south.

Global stressors, significant population growth, and development in Southeast Florida contribute to impacts on natural resources. Efforts are in place to preserve aquatic life, restore reefs, remove air and water pollutants, protect endangered lands, initiate restoration projects, and ultimately reduce the human impact on the environment.

The County protects the environment through a number of ordinances, including Chapter 24, the Miami-Dade County Environmental Protection Ordinance, through which "the Board [found] and [determined] that the reasonable control and regulation of activities which are causing or may cause pollution or contamination of air, water, soil and property is required for the protection and preservation of the public health, safety and welfare" (Part 3, Chapter 24, Article I, Division 1, Section 24-2 of County Code of Ordinances). Other notable chapters that concern environmental stewardship include:

- Chapter 7: Boats, Docks, and Waterways
- Chapter 11B: Dumps and Landfill Sites
- Chapter 11C: Development within Flood Hazard Districts
- Chapter 15: Solid Waste Management
- Chapter 24: Environmental Protection
- Chapter 24A: Environmentally Endangered Lands Program
- Chapter 32: Water and Sewer Regulations
- Chapter 33: Zoning
- Chapter 33B: Areas of Critical Environmental Concern
- Chapter 33D: Biscayne Bay Management
- Chapter 33F: Key Biscayne Beach Preservation

D. Population & Demographics

Miami-Dade County has experienced steady and rapid population growth, particularly in the 1960s and 1970s. Population doubled between 1960 and 1990. Projected growth through 2025 is expected to follow a similar trend, albeit at a somewhat slower rate. The principal driver of population growth has been and will continue to be immigration. Net immigration is projected to reach over 240,000 persons between 2020 and 2025. Clearly the effects of immigration over the past half century have dramatically shaped the ethnic composition of Miami-Dade County. It is expected that there will be a more moderate augmentation of Hispanics as the dominant ethnic group.

The most current estimated countywide population of Miami-Dade County is 2,761,581 people (2018 Population Estimates). The most populated city in Miami-Dade County is Miami, with an estimated 417,650 residents (2013 Population Estimates). An estimated 43.76% of the countywide population lives in the unincorporated portion of the County. Between 2010 and 2018, Miami-Dade County

as a whole had a growth rate of 10.5%. Based on the 2018 Population Estimates, the most rapidly growing municipality in Miami-Dade County by average annual change is the City of Sweetwater, which has increased its population by an average of 7.4% each year between 2010 and 2018. The largest growth by sheer numbers was the City of Miami, increasing by 71,457 between 2010 and 2018. Additional information about Miami-Dade County's population and demographics is available in the Social Vulnerabilities section of the THIRA.

E. Culture

Florida has a rich cultural history dating back 10,000 years through archeological discoveries of Native American nomads that lived off the land and local game. The Tequesta people inhabited the region unaffected by outside influence until the arrival of Spanish explorer Juan Ponce de Leon in 1513. After the first attempt to build a mission in 1567, the Spanish eventually gained and continued to control Florida for 250 years. The United States purchased Florida for 5 million dollars in 1821. At the time of purchase, the main industry was “wrecking,” and residents survived by retrieving goods from ships that crashed on the nearby coral reefs.

Florida’s population and industry began to boom with the arrival of the railroad in 1896 by Henry Flagler and again with the development of subdivisions and tourist resorts in the 1920s. During World War II, nearly half a million men (one-fourth of all Army Air Force officers and one-fifth of the military’s enlisted) were trained at Miami Beach by the Army Air Forces Technical Training Command. After the war, many troops returned with their families to take-up a permanent residence, resulting in another population boom. Furthermore, Florida has become home to thousands of refugees with a significant influx following the Cuban Revolution during the 1960s and from Haiti in the 1990s.

Since the first Spanish inhabitants, Miami-Dade County has developed into a multi-cultural destination. About 1,471,922 of Miami-Dade County’s residents were born outside of the United States, accounting for 53.3% of the population. Miami-Dade County has nearly tripled the state average and just shy of four times the national average of Hispanic residents with 69.1% of the population identifying as Hispanic (of any race).

F. Political Governance

Miami-Dade County was named after a soldier, Major Francis Dade, killed in the Second Seminole War. The county was formally created in 1836 under the Territorial Act as Dade County. In 1956, a constitutional amendment was approved by the people of Florida to enact a home rule charter. Up until then the county was governed and ruled by the state. Since 1957 the county has operated under a two-tier federation metropolitan system, which separates the local and county government.

The local governments may be responsible for zoning and code enforcement, police and fire protection, and other city services required within each jurisdiction. The

Unincorporated Municipal Services Area (UMSA) covers the residents of all the unincorporated areas within the County.

The structure of the county government has an elected official, Executive Mayor, and the Board of County Commissioners with 13 elected members, each serving a four-year term. The Mayor is not a part of the Board of County Commissioners but has the veto power over the board. The Mayor directly oversees the majority of the operations of the County. The Board of County Commissioners is the legislative branch that oversees the legislation, creates departments, and business operations. Miami-Dade County is the only county in Florida where the Sheriff is appointed by the Mayor and is not elected by the residents.

Miami-Dade County Departments:

- Animal Services
- Audit and Management Services
- Aviation (Miami International Airport)
- Communications and Customer Experience
- Community Action and Human Services
- Corrections and Rehabilitation
- Cultural Affairs
- Elections
- Finance
- Fire Rescue
- Human Resources
- Information Technology
- Internal Services
- Juvenile Services
- Libraries
- Management and Budget
- Medical Examiner
- Parks, Recreation and Open Spaces
- Police
- Public Housing and Community Development
- Regulatory and Economic Resources
- Seaport (Port of Miami)
- Solid Waste Management
- Transportation & Public Works
- Water and Sewer

G. Built Environment

The term built environment refers to the human-made surroundings that provide the setting for human activity, ranging in scale from personal shelter and buildings to neighborhoods and cities that can often include their supporting critical infrastructure

(bridges, water treatment, highways, etc.) and key resource (schools, museums, etc.) assets. The built environment is a material, spatial and cultural product of human labor that combines physical elements and energy in forms necessary for living, working and playing. In urban planning, the phrase connotes the idea that a large percentage of the human environment is man-made, and these artificial surroundings are so extensive and cohesive that they function as organisms in the consumption of resources, disposal of wastes, and facilitation of productive enterprise within its bounds.

The built environment can be organized into three broad categories (critical infrastructure, key resources, and housing stock), which are detailed more thoroughly in the Vulnerability Assessment.

Critical Infrastructure

- Airport
- Chemical Sector
- Communications
- Energy Sector
- Freight
- Information Technology
- Monuments and Icons
- Pipelines
- Solid Waste Facilities
- Transit
- Transportation
- Water Control Structures
- Water/Wastewater Treatment
- Waterways & Ports

Key Resources

- Banking & Finance
- Commercial Sector
- Critical Manufacturing Sector
- Defense Industrial Base
- Emergency Services
- Food and Agriculture Sector
- Healthcare
- Schools
- Universities
- Other Key Resources

Building Stock

1. Commercial & Industrial
2. Governmental
3. Housing Stock

H. Economy

According to the Miami-Dade Beacon Council, employment in target industries continue to trend up. Between 2012 and 2017 the aviation industry In Miami-Dade County added 4,034 jobs, for an increase of 19%. For the same period, the banking & finance industry saw an increase of 3,323 jobs (9%), for hospitality & tourism an increase of 26,209 jobs (21%), for life sciences & healthcare, an increase of 13,403 jobs (11%), for the technology industry, an increase of 2,642 jobs (32%), and for trade & logistics, an increase of 7,376 jobs (22%). Considering the current job growth trends in Miami-Dade County, the total number of payroll jobs is projected to increase from 1,151,314 jobs in 2017 to 1,205,646 in 2022, a 5% overall increase for this period.[5]

The two significant external generators of economic activity in Miami-Dade County are international trade and tourism. While there is no rigorous way to determine the weight of international trade and tourism in Miami-Dade County's economy, without doubt, both of these external sectors are vital components for a healthy and growing local economy.

Tourism in the Greater Miami area continues to be an important component of the overall Miami-Dade County economy. Since 2011, overnight visitors to Miami-Dade have increased by 20%, and hotel room nights sold have gone up 22%. In 2019, Greater Miami welcomed 24.3 million visitors, for an increase of almost 5% over 2018, additionally, a record of 15.9 million hotel room nights was set. Travel and tourism fueled a record breaking 146,700 in 2019. Miami-Dade County graciously hosted their eleventh Super Bowl on February 2, 2020, bringing in 30,000 additional tourist per day during Super Bowl Weekend.[6]

In 2019, Greater Miami welcomed 24.3 million visitors, for an increase of 4.6 percent over 2018. The total economic impact from these visitors in 2019 was over $17.9 billion with the vast majority, $16.3 billion, coming from overnight guests. Greater Miami overnight visitors were up +2.1%, or 340,000 higher from the previous year. In addition, leisure and hospitality employment in Greater Miami rose to 146,800 jobs, a 2.3% increase from the previous year.[7]

I. Future Development & Commercial Trends

Miami-Dade County faces many of the same growth issues that challenge communities around the country. With highly urbanized areas, suburban strip

[5] https://www.beaconcouncil.com/data/economic-overview/business-growth/#rankings
[6] State of the County 2020
[7] Greater Miami Convention & Visitors Bureau, 2019 Visitor Industry Overview

development, and farmland, the county contains many resources and assets, but must also deal with a variety of development issues and pressures as it balances continued growth with utilizing and maintaining existing infrastructure and investments. According to a recent Urban Development report for the county, Miami-Dade County wants to keep its agricultural identity, protect its unique natural environment, and encourage development to locate in areas with existing infrastructure, transit and other amenities. For example, one goal is to keep development from spilling toward highly sensitive lands, including the Everglades National Park.

According to a 2020 Demographic Overview & Population Trends report issued by the Florida Legislature's Office of Economic and Demographic research, by 2030 all of Florida's population growth will be from net migration, boosting Miami-Dade County's population to an estimated 3.2 million people. Where these people will live is a critical consideration that drives decisions about growth management, provision of affordable housing, and transportation investments. Furthermore, these decisions will have a profound impact on how the County works to address issues related to disaster management and mitigation.

Notable projects include the following:

Transit Development Projects:
The seven major goals of Miami-Dade County's Transit Development Plan MDT10Ahead are to improve convenience, reliability and customer service of transit services; improve operational safety and security; improve coordination and outreach; enhance the integration of transit services to support the economy and preserve the environment management/operation; maximize use of all funding sources; maximize and expand transit services; and, meet all requirements of the Americans with Disabilities Act (ADA).

In October of 2019, County Commissioners approved $76 million for construction of a rail station and park-and-ride lot on the Northeast Corridor in a public-private partnership with Virgin Trains U.S.A., which will link commuters traveling between Aventura and Downtown Miami. Virgin Trains U.S.A. will also add a stop at Port of Miami. Current plans are underway for a Tri-Rail Station in Midtown as well.

The Golden Glades Multimodel Transportation Facility (GGMTF) project is located in northern Miami-Dade County on two FDOT-owned Park-and-Ride lots adjacent to the cities of Miami Gardens, North Miami Beach, North Miami and the Golden Glades Community. The GGMTF, a design-build project, will consolidate the existing bus transit services at the two Golden Glades Park-and-Ride lots into a single facility adjacent to the Tri-Rail Station. This project will transform the park-and-ride into a state-of-the-art transit terminal with a multi-bay bus facility upgraded walkways, platforms, bicycle/pedestrian amenities as well as other improvements related to transit operations, including internal roads, drainage, lighting systems, fencing, wayfinding, and traffic control signage. The GGMTF will feature a multi-story parking

garage, kiss-and-ride, and plenty of surface parking lots for all types of motorists, including scooters and motorcycles. Other amenities will include bicycle parking and lockers. The complex will also feature a transit hub, future governmental use development building, a break lounge for bus drivers, and future governmental use intercity bus terminal. Construction began in August 2018 and is anticipated to end in 2021.[8]



Source: Florida Department of Transportation

Miami-Dade County's Department of Transportation and Public Works will continue to enhance existing security equipment with the addition of 4K technology to the Metrorail and Metromover CCTV systems. The second phase of the CCTV project is slated to be completed by July 2021. Metromover will also have a new fire detection and reporting system installed in all Metromover stations and at the Stephen P. Clark Metromover Control Center.

Water and Sewer Department Capital Improvement Program:
As the largest water and sewer utility in the southeastern United States, the Miami-Dade Water and Sewer Department (WASD) serves nearly 2.3 million residents and thousands of visitors. To continue to fulfill the department's vision of continuous delivery of high quality drinking water and wastewater services in compliance with all regulatory requirements, WASD has developed a Multi-Year Capital Improvement Program (CIP). During the next two decades, WASD will embark on a multi-billion dollar CIP to enhance and upgrade the water and sewer infrastructure utilizing state-of-the-art technology. This program will provide necessary upgrades to thousands of

[8] Miami-Dade Transit Development Plan, 2020 Annual Progress Report

miles of pipes, pump stations and water and wastewater treatment plants that provide high quality drinking water and wastewater services.[9]

Department of Transportation I-95 Construction

A project to enhance three major corridors, I-395, SR 836, I-95 is a partnership between the Florida Department of Transportation (FDOT) and the Miami-Dade Expressway Authority (MDX). This project focuses on reconstructing I-395, which will include the bridge over Biscayne Boulevard, and will increase capacity on SR 836, I-95, and I-395. Construction was originally expected to be completed in the fall of 2024.[10]

[9] Miami-Dade Water and Sewer Department, https://www.miamidade.gov/global/water/capital-improvement-program.page

[10] Florida Department of Transportation, http://www.fdotmiamidade.com/projects

Appendix K: Economic Summary

This summary provides an overview of the County's unemployment, employment, and wages earned.

Unemployment Rates
As of October 2024 the unemployment rate in the United States was 3.9%.[11] The unemployment rate in Miami-Dade County is below the national average and in October 2024 it was 2.2%. The unemployment rate increased since October 2023 when the rate was 1.7%.

Average Weekly Wages
In the first quarter of 2024 the average weekly wage for employees in Miami-Dade County was $1,601. This was slightly higher than the other large Southeast counties. The average weekly wage for Broward County is $1,441 and Palm Beach County is $1,558.[12] The Miami-Dade County median household income in 2019-2023 was $68,694 and 14.5% of the population lived in poverty.[13]

Economic Sectors
There are eight sectors of the economy in Miami-Dade County that employs more than 100,000 people in October of 2024. The sector that employs the greatest number of people was trade, transportation and utilities sector that employs 662,000 employees. The second largest sectors are the professional and business services that employs 524,700 people and the education and health services that employs 469,000 people. The third largest employers are the leisure and hospitality sector which employs 341,900 people and the government sector who employs 326,100 people. The other major employment sectors is the construction sector (166,600 people), financial services (216,400 people) and other services (121,400 people).[14]

Largest Employers

The top employers in Miami-Dade County are a combination of the private and the public sector. The top private sector employer is the University of Miami which employs 22,566 employees.[15] The other top private sector employers are:

- Publix Supermarkets with 14,146 employees
- American Airlines with 11,297 employees
- Amazon with 7,383 employees

[11] U.S. Bureau of Labor Statistics, Miami Economy Summary
[12] U.S. Bureau of Labor Statistics, Miami Economy Summary
[13] U.S. Census Bureau
[14] U.S. Bureau of Labor Statistics, Miami Economy Summary
[15] Florida Commerce website: https://floridajobs.org/wser-home/employer-database

The top public-sector employer in the county is Miami-Dade County Public Schools which employees 35,497 employees.[16] The other top employees include:

- Miami-Dade County government employs 29,495 employees
- The Jackson Health System employs 14,249 employees
- Florida International University employs 6,597 employees
- The Federal government employs tens of thousands in the area but a breakdown by county was not readily available

[16] Florida Commerce website: https://floridajobs.org/wser-home/employer-database

Figure 1: Commercial and Industrial Facilities by Municipality

	COMMERCIAL		INDUSTRIAL	
JURISDICTION	Count	BLDG VALUE	Count	BLDG VALUE
AVENTURA	999	$774,780,273	34	$240,403,044
BAL HARBOUR	42	$7,626,571	2	$1,086,300
BAY HARBOR ISLANDS	141	$23,945,875	5	$33,612,179
BISCAYNE PARK			7	$1,618,985
CORAL GABLES	1,949	$1,621,258,336	261	$844,062,274
CUTLER BAY	1,869	$186,447,795	121	$175,502,961
DORAL	8,167	$1,688,609,117	73	$571,746,177
EL PORTAL	12	$5,571,909	3	$6,927,989
FLORIDA CITY	1,334	$162,311,132	135	$49,103,131
GOLDEN BEACH			1	$87,749
HIALEAH	7,281	$1,089,459,679	549	$927,020,889
HIALEAH GARDENS	464	$93,067,256	35	$220,350,313
HOMESTEAD	5,943	$511,236,003	287	$382,288,324
INDIAN CREEK VILLAGE			2	$588,360
KEY BISCAYNE	158	$39,115,237	25	$48,585,472
MEDLEY	620	$65,318,767	13	$15,107,363
MIAMI	9,330	$7,590,413,857	1,854	$3,775,835,294
MIAMI BEACH	2,375	$2,557,259,180	236	$1,050,667,690
MIAMI GARDENS	3,769	$799,252,840	305	$444,909,737
MIAMI LAKES	2,228	$474,297,309	41	$149,626,941
MIAMI SHORES	105	$51,739,852	82	$124,907,074
MIAMI SPRINGS	175	$195,295,887	74	$83,283,149
NORTH BAY VILLAGE	59	$8,529,813	8	$3,295,376
NORTH MIAMI	1,063	$443,002,733	260	$291,717,360
NORTH MIAMI BEACH	563	$310,726,734	111	$111,655,900
OPA-LOCKA	829	$118,921,568	131	$48,165,670
PALMETTO BAY	427	$245,002,214	112	$125,868,112
PINECREST	256	$106,129,769	51	$85,294,980
SOUTH MIAMI	664	$276,456,933	87	$129,211,107
SUNNY ISLES BEACH	378	$106,582,010	23	$49,151,540
SURFSIDE	58	$51,685,711	8	$21,704,682
SWEETWATER	912	$371,421,579	18	$40,494,405
UNINCORPORATED MIAMI-DADE	49,929	$5,803,280,222	3467	$5,563,741,53
VIRGINIA GARDENS	24	$37,152,593	9	$5,152,922
WEST MIAMI	94	$31,810,210	15	$12,048,327
Totals	102,217	$25,847,708,964	8,445	$15,634,823,308

Figure 2: Residential and Other Structures by Municipality

	RESIDENTIAL		OTHER	
JURISDICTION	**COUNT**	**BLDG VALUE**	**Count**	**BLDG VALUE**
AVENTURA	23,825	$628,092,606		
BAL HARBOUR	3,784	$286,889,274		
BAY HARBOR ISLANDS	2,754	$266,511,248		
BISCAYNE PARK	1,200	$216,895,493		
CORAL GABLES	18,183	$7,308,409,123	1	$967,701
CUTLER BAY	13,261	$2,800,795,174		
DORAL	17,914	$4,689,770,732		
EL PORTAL	860	$150,256,371		
FLORIDA CITY	2,464	$513,473,413	12	$15,347,172
GOLDEN BEACH	395	$584,871,556		
HIALEAH	57,112	$7,643,015,238	8	$4,733,064
HIALEAH GARDENS	5,815	$630,642,441	1	$661,474
HOMESTEAD	15,902	$2,784,379,144	7	$23,965,572
INDIAN CREEK VILLAGE	55	$189,724,537		
KEY BISCAYNE	7,105	$1,209,622,150		
MEDLEY	111	$11,131,114	2	$848,587
MIAMI	134,503	$6,245,740,558	46	$351,926,418
MIAMI BEACH	52,885	$6,245,740,558	4	$7,280,931
MIAMI GARDENS	29,748	$5,427,351,803	7	$11,220,045
MIAMI LAKES	7,865	$2,668,682,568		
MIAMI SHORES	3,956	$930,929,605		
MIAMI SPRINGS	4,605	$744,155,860		
NORTH BAY VILLAGE	3,564	$215,615,489		
NORTH MIAMI	15,794	$2,708,456,492	6	$14,997,446
NORTH MIAMI BEACH	13,957	$1,849,399,337		
OPA-LOCKA	3,233	$605,121,166	48	$99,865,645
PALMETTO BAY	8,159	$2,889,283,319		
PINECREST	6,571	$3,928,890,722		
SOUTH MIAMI	4,012	$1,153,233,731		
SUNNY ISLES BEACH	19,188	$550,316,520		
SURFSIDE	3,250	$297,990,370		
SWEETWATER	3,456	$690,350,989	14	$153,829,310
UNINCORPORATED MIAMI-DADE	326,783	$62,185,082,442	339	$386,124,476
VIRGINIA GARDENS	689	$108,251,579		
WEST MIAMI	1,709	$611,676,906		
Totals	814,667	$142,495,612,798		

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Miami-Dade County

2025

PART 5: FLOODING - NFIP & CRS

MIAMI-DADE
DEPARTMENT OF
EMERGENCY
MANAGEMENT

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INTRODUCTION

The National Flood Insurance Program (NFIP) was created to reduce the impact of flooding on public and private structures by:

- Providing affordable insurance to property owners, renters and businesses
- Encouraging communities to adopt and enforce floodplain management regulations

Table 1 shows the status of Miami-Dade County communities participating in NFIP as of January 21, 2025, per the FEMA Community Status Book Report. The current effective Flood Insurance Rate Maps (FIRM) for all communities in the County are dated September 11, 2009.

Table 1. Status of Miami-Dade County Communities Participating in NFIP[1]

Jurisdiction	Initial FIRM Identified	Entry Date	Additional Comments
Aventura	9/30/1972	10/22/1997	Adopted the Miami-Dade County (CID 120635) FIRM dated 3/2/1994 Panels 82 and 84.
Bal Harbour	9/29/1972	9/29/1972	
Bay Harbor Islands	9/29/1972	9/29/1972	
Biscayne Park	9/29/1972	9/29/1972	
Coral Gables	9/29/1972	9/29/1972	
Cutler Bay	3/2/1994	8/31/2006	
Doral	9/30/1972	5/12/2004	Use Miami-Dade County (CID 120635) Panels 75,160 and 170.
El Portal	9/29/1972	9/29/1972	
Florida City	9/29/1972	9/29/1972	
Golden Beach	9/29/1972	9/29/1972	
Hialeah	9/29/1972	9/29/1972	
Hialeah Gardens	9/29/1972	9/29/1972	
Homestead	9/29/1972	9/29/1972	
Indian Creek Village	9/29/1972	9/29/1972	
Key Biscayne	9/29/1972	9/29/1972	
Medley	9/29/1972	9/29/1972	
City of Miami	9/29/1972	9/29/1972	
Miami Beach	9/29/1972	9/29/1972	
Miami Gardens	9/30/1972	6/21/2004	Use Miami-Dade County (CID 120635) FIRM panels 80, 82, 83 & 90.
Miami Lakes	3/2/1994	7/17/2003	Use Miami-Dade County (CID 120635) FIRM panels 75, 80 & 90.
Miami Shores	9/29/1972	9/29/1972	
Miami Springs	9/29/1972	9/29/1972	
North Bay Village	9/29/1972	9/29/1972	
North Miami	9/29/1972	9/29/1972	
North Miami Beach	9/29/1972	9/29/1972	

[1] FEMA Community Status Book Report (January 2025): https://www.fema.gov/cis/FL.pdf

Jurisdiction	Initial FIRM Identified	Entry Date	Additional Comments
Opa-Locka	9/29/1972	9/29/1972	
Palmetto Bay	3/2/1994	2/2/2005	
Pinecrest	9/30/1972	10/13/1998	Adopted Miami Dade County (CID 120635) FIRM panels 260, 276 and 278. The initial FIRM date is 10/29/1972 for floodplain management purposes.
South Miami	9/29/1972	9/29/1972	
Sunny Isles Beach	3/02/1994	9/10/2003	Use Miami Dade County (CID 120635) FIRM panels 82 & 84. The initial FIRM date is 10/29/1972 for floodplain management purposes.
Surfside	9/29/1972	9/29/1972	
Sweetwater	7/17/1995	9/29/1972	
Virginia Gardens	7/17/1995	9/29/1972	
West Miami	7/17/1995	9/29/1972	
Unincorporated	9/30/1972	9/29/1972	

Miami-Dade County communities continue to participate in NFIP by adopting and enforcing floodplain management ordinances to reduce future flood damage. These floodplain management practices allow homeowners, renters, and business owners within the community to purchase the federally supported flood insurance.

To maintain compliance with NFIP, Miami-Dade County and its municipalities are responsible, but not limited to the following:

- In Miami-Dade County and its unincorporated community, the Water Management Division Chief of the Water Management Division under the Department of Regulatory and Economic Resources (RER) has been designated as the floodplain manager and assumes the responsibility of the commitments and requirements of participating in the NFIP
- In Miami-Dade County municipalities, typically, the building department assumes the responsibility of floodplain manager and assumes the responsibility of the commitments and requirements of participating in the NFIP, a full list of individuals identified at the municipal level is listed on Appendix G of this part
- Accept, review, and maintain records of the elevation for all new construction and substantial improvements in structure within the Special Flood Hazard Areas
- Require permits and review all new construction, including substantial improvements, for compliance with the minimum standards under NFIP and the local floodplain management codes
- Require that all development proposals greater than 50 lots or 5 acres, whichever is less, include Base Flood Elevation (BFE) data
- Ensure that all new construction and substantial improvements in Flood Zones V and VE are adequately elevated so that the bottom of the lowest horizontal structural member of the lowest floor is elevated to at or above the BFE
- Require that all manufactured homes located in the Special Flood Hazard Areas are installed using methods and practices that minimize flood damage; including proper elevation and anchoring to resist flotation, collapse or lateral movement

Substantial Damage Determinations and Enforcement in Miami-Dade County

This section outlines how Miami-Dade County and its municipalities enforce substantial damage determinations (SDDs) and the subsequent requirements for structures in Special Flood Hazard Areas (SFHAs), as governed by the National Flood Insurance Program (NFIP), Florida Building Code (FBC), and local ordinances.

Regulatory Framework

- Miami-Dade County Code, Chapter 11C (Flood Damage Prevention) governs SDDs in unincorporated areas, aligned with NFIP and Florida Building Code
- Municipalities may adopt their own ordinances, meeting or exceeding County/NFIP standards

Roles and responsibilities

- For Miami-Dade County, RER oversees SDDs in unincorporated areas via the Permitting and Inspection Center which conducts inspections, issues permits, and enforces compliance through notices, fines, or condemnation

- Each of the 34 municipalities has a building department or floodplain manager handling SDDs, these enforce local floodplain ordinances, often coordinating with the County for technical or environmental reviews

Substantial Damage Determination Process

A structure is substantially damaged if the cost of repairs to its pre-disaster condition equals or exceeds 50% of its pre-disaster market value (excluding land value). This triggers requirements to comply with current floodplain management and building code standards to reduce future flood risks.

1. **Inspection Triggers**
   - Post-disaster (e.g., hurricanes, floods), officials inspect damaged structures
   - The Director of RER may direct the Permitting and Inspection Center and other RER staff to conduct damage assessments
   - Post-disaster damage assessments may also be requested by the Miami-Dade County Department of Emergency Management (DEM) from the public at large and from municipal partners
   - Damage assessment information is collected using the County website, calls from the general public and from damage assessment software used by stakeholders
   - Collected damage assessment is shared with officials responsible with SDDs
   - Inspections are also triggered by owner permit applications, or complaints that are called in into the county's general support call center or specifically to RER

2. **Cost Assessment**
   1. Obtain a detailed itemized cost estimate from a licensed contractor or design professional.

2. All materials and labor, even if donated or provided by the owner are taken into account to make the SDD.
3. Exclude only costs allowed under NFIP (e.g., code-mandated health/safety upgrades not tied to the improvement).
4. For attached additions, the cost of addition is based on the replacement cost as shown on the County's Properties website Property Record Card, or the structure's replacement cost from an independent professional appraisal

3. **Market Value Assessment**
Acceptable methods to determine market value include:

- Depreciated building value from an independent professional appraisal (most preferred)
- Depreciated building value from the County's Properties website Property Record card
- Adjusted assessed value

4. **Calculation**

$$\frac{\text{Cost of Improvement or Cost of Repair to Pre-Damage Condition}}{\text{Market Value of Building}}$$

- If **≥ 50%**, the project is determined to be SI or SD.
- Document the determination in writing.

5. Local officials issue the SDD in writing, detailing compliance requirements
6. Owners can appeal within 20–30 days with new appraisals or cost estimates

Requirements for Substantially Damaged Structures

Permitting
- All development proposals in SFHAs must be reviewed for SI/SD determination if they involve additions, repairs, reconstruction, or improvements.
- Ensures compliance with flood-resistant standards
- Structures meeting SI/SD criteria must comply with NFIP and local floodplain regulations, including elevating to Base Flood Elevation (BFE) or higher as required.

Compliance Options
- Elevation: Elevate the lowest floor to or above the Base Flood Elevation (BFE) plus local freeboard.
- Floodproofing: Apply to non-residential structures (e.g., watertight walls, flood vents)
- Relocation: Move the structure outside the SFHA

- Demolition: Demolish and rebuild per current codes if repairs are not feasible

Enforcement Mechanisms

Permitting Oversight

- Unpermitted work triggers stop-work orders or fines
- Inspectors verify compliance during and after repairs

Code Enforcement

- County Neighborhood Regulations Division (unincorporated areas) or municipal code officers issue:
    - Notices of Violation (NOVs): Specify corrections and deadlines (10–30 days).
    - Fines: Up to $1,000 per violation or liens on the property
    - Hearings: Contested via Miami-Dade Code Enforcement Office or municipal officers; appeals within 20 days

Unsafe Structures

- Deemed unsafe, structures may face:
    - Unsafe Building Notices: Prohibit occupancy until repaired
    - Condemnation: Requires vacating and demolition/repair
    - Securing: County/municipality stabilizes structures, charging owners
- Handled by the Unsafe Structures Board or municipal equivalents; appeals to Circuit Court Appellate Division within 30 days

Community Rating System

A voluntary incentive program was created by NFIP, called the Community Rating System (CRS) for communities participating in the NFIP. The Program recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, homeowners benefit from a significant discount on their flood insurance premium because, rates are discounted to reflect the reduced flood risk resulting from the community's actions to meet CRS goals. The three (3) CRS goals are:

- Reduce and avoid flood damage to insurable property
- Strengthen and support the insurance aspects of NFIP
- Encourage a comprehensive approach to floodplain management

CRS recognizes measures for flood protection and flood loss reduction through four (4) main activity categories: Public Information, Mapping and Regulation, Flood Damage Reduction, and Flood Preparedness. To participate in the CRS Program, a community (County or Municipality) must complete and submit an application to the Federal Emergency Management Agency (FEMA). The community's floodplain management efforts are reviewed by FEMA and they are assigned the appropriate CRS classification based on credit points earned for various activities. Classifications range from 1 to 10 and they determine the premium discount for eligible flood insurance policies. Refer to Table 2 for details on the CRS premium discounts organized by class and flood zone.[2]

Table 2. CRS Premium Discounts by Class and Flood Zone

Class	Discount	Class	Discount	Class	Discount
1	45%	1	10%	1	10%
2	40%	2	10%	2	10%
3	35%	3	10%	3	10%
4	30%	4	10%	4	10%
5	25%	5	10%	5	10%
6	20%	6	10%	6	10%
7	15%	7	5%	7	5%
8	10%	8	5%	8	5%
9	5%	9	5%	9	5%
10	---	10	---	10	---
Flood Zones: A, AE, A1-A30, V, V1 – V30, AO and AH.		*Flood Zones: AR/A, AR/AE, AR/A1 – A30, AR/AH and AR/AO.*		*Flood Zones: B, C, X, D, AR and A99*	

As of December 2024, 469 communities in Florida participate in the NFIP and 265 of these communities participate in the CRS Program. Unincorporated Miami-Dade County has a total of 116,895 flood insurance policies-in-force, ranking number one (1) in the State. Five (5) Miami-Dade County municipalities (City of Miami, Miami Beach, Aventura, Sunny Isles Beach and Hialeah) are on the top 30 Florida communities, with a total of 157,821 flood insurance policies-in-force. They all participate in the CRS Program.[3] Unincorporated Miami-Dade County participates in the CRS Program since October 2003, and has currently achieved a Class 3 Community rating, which guarantees a 35 percent discount on all flood insurance premiums. Furthermore, there are 24 communities in Miami-Dade County that participate in the CRS

[2] April 2024 NFIP Flood Insurance Manual: https://www.fema.gov/flood-insurance/work-with-nfip/manuals/current

[3] Flood Insurance Data and Analytics: https://nfipservices.floodsmart.gov/reports-flood-insurance-data

Program with rating ranging from Class 3 (35% discount) to Class 9 (5% discount), as depicted in Table 3.

Table 3. Community Rating System Communities in Miami-Dade County

Community	Rating	Community	Rating
Unincorporated Miami-Dade	3	**Miami Beach**	5
Aventura	7	**Miami Gardens**	7
Bal Harbor	8	**Miami Lakes**	6
Bay Harbour	9	**Miami Shores**	6
Coral Gables	5	**North Bay Village**	8
Cutler Bay	3	**North Miami**	6
Doral	6	**North Miami Beach**	7
Hialeah	7	**Palmetto Bay**	5
Homestead	7	**Pinecrest**	7
Key Biscayne	8	**South Miami**	6
City of Miami	6	**Sunny Isles Beach**	8
Medley	9	**Surfside**	6

*As of December 17, 2024[4]

The Miami-Dade County Local Mitigation Strategy (LMS) supports the CRS communities and others who wish to become CRS communities and strives to help identify areas where uniform credit can be obtained, as per compliance with the CRS Coordinators Manual. The LMS Plan was expanded to include Part 6, in order to capture and compile information to support Miami-Dade County's CRS Communities, thoroughly address the current and future flood risks, and mitigation measures.

[4] FEMA Community Rating System: https://www.fema.gov/floodplain-management/community-rating-system

Scope

The scope of the Miami-Dade County Local Mitigation Strategy (LMS) Part 6: NFIP and CRS (LMS-Part 5) is to identify the County's CRS activities. A LMS CRS/Flood Sub-Committee will be responsible for supporting the development and review of this section of the LMS. Sub-committees are formed and disbanded as needed. LMS-Part 5 is meant to be supplementary to, and not replace, the responsibilities of the community's (County or Municipal) CRS Coordinator.

Planning Process

LMS-Part 1 states that the LMS is a compilation of initiatives that are identified and supported by the LMS Chair, LMS Co-Chair, LMS Steering Committee (LMSSC), LMS Working Group (LMSWG) and LMS Sub-Committees. Additionally, as illustrated in LMS-Part 4, Appendix B, a Whole Community Approach has been implemented into the LMS.

The LMSWG meets on a quarterly basis (March, June, September and November) and these meetings are open to the public. Meeting information is shared via email to the LMS Distribution List and it is advertised on the LMS webpage:
https://www.miamidade.gov/global/emergency/projects-that-protect.page.
The LMSSC and LMS sub-committees meet on an as needed basis.

The LMS Chair provides information on updates and changes to the LMS Program, training and outreach activities, information on new mitigation products, and information pertinent to the stakeholders through an email distribution list.

The LMS undergoes a five-year update cycle for submittal to the Florida Division of Emergency Management (FDEM) and then FEMA for review and approval. Upon FEMA approval, the Plan is locally adopted by the Miami-Dade Board of County Commissioners (BCC). Since 1957, Miami-Dade County has a metropolitan form of government comprised of an unincorporated area and 34 municipalities, each with their own government providing services. The BCC is the governing body of unincorporated Miami-Dade, and has broad, regional powers to establish policies, through ordinances and resolutions, for Miami-Dade County services. These actions automatically include the municipalities in the County. A Municipality can opt-out of an ordinance or resolution through their own resolution. However, when the BCC adopts the LMS, all municipalities must also adopt the LMS in their respective boards or councils for FEMA to consider them to have an approved and adopted hazard mitigation plan. Having a FEMA approved and adopted hazard mitigation plan is a requirement to be eligible to receive hazard mitigation assistance from FEMA.

Local communities that wish to utilize the LMS as their Floodplain Management Plan for credit under the CRS Program must execute a local adoption of the County's LMS Plan.

ASSESSING THE HAZARD - FLOODING

Flooding is an overflowing of water onto land that is normally dry. It can occur as a result of prolonged rainfall over several days, intense rainfall over short period of time, failure of a water control structure or storm surge. Floods are the most common and widespread weather-related natural hazard. In the United States, floods kill more people each year than tornadoes, hurricanes or lightning.[5]

Table 4. Flood Types[6]

Type	Description
River Flooding	Occurs when water levels rise over the top of the river banks due to excessive rainfall over the same area for extended periods of time.
Coastal Flooding	Caused by higher than average high tide and worsened by heavy rainfall and onshore winds (i.e. wind blowing landwards from the ocean).
Storm Surge	An abnormal rise in water level on coastal areas, over and above the regular astronomical tide, cause by forces generated from a severe storm's wind, waves and low atmospheric pressure.
Inland Flooding	Occurs when moderate precipitation accumulates over several days, intense precipitation falls over a short period of time, a river overflows because of an ice or debris jam, or a water control structure fails.
Flash Flooding	Caused by heavy or excessive rainfall in a short period of time, generally less than six (6) hours. Flash floods are generally characterized by raging torrents after heavy rainfall that rip through river beds, urban streets or mountain canyons sweeping everything before them. They can occur within minutes or a few hours of excessive rainfall. Additionally, flash floods can occur when a water control structure fails.

Miami-Dade County is highly vulnerable to flooding, as a result of heavy rainfall and storm surge, due to the County's unique geographical area. The County is surrounded by major bodies of water such as the Atlantic Ocean, Biscayne Park and the Everglades, and rivers, lakes, and canals. Additionally, Miami-Dade County has a relatively flat topography with a mean elevation of 11 feet and its underground water supply is just below the ground surface. As a result, during major rainfall events, rainwater has nowhere to drain and causes occasional flooding. Furthermore, studies are being conducted by the United States Army Corps of Engineers (USACE) to better understand the ongoing threat of sea level rise, its potential impacts and how Miami-Dade County communities are being impacted differently depending upon their geographic location and specific considerations.

For a more thorough flood hazard (flooding, storm surge and sea level rise) assessment, refer to the Hazard Identification & Vulnerability Assessment section on the LMS-Part 1. The aforementioned section was compiled based on the Miami-Dade County Threat and Hazard Identification and Risk Assessment (THIRA). The THIRA rates the County's hazard risks, determines community vulnerabilities and capabilities, and helps to better understand the potential adverse impacts of disasters and emergencies in the County. This document consists of three (3) volumes. Volume 3 is the County's hazard assessment and it contains hazard profiles for each to the hazards that have a potential risk in Miami-Dade County. Each hazard profile includes a description of the hazard, location of where the hazard is most likely to occur within the County, the extent, previous occurrences, the vulnerability and hazard assessment. The

[5] The National Severe Storms Laboratory, Severe Weather 101-Floods: https://www.nssl.noaa.gov/education/svrwx101/floods/
[6] *Ibid*.

THIRA is considered a public safety sensitive document therefore, access to the aforementioned sections will be provided to the Insurance Services Office, Inc. / CRS (ISO/CRS) Specialist by Miami-Dade DEM upon request.

Flooding Background and History in Miami-Dade County

Prior to urban development in Miami-Dade County, the land was frequently inundated for extended periods due to its flat topography, low land elevations, and the high groundwater table in the Biscayne Aquifer. The Biscayne Aquifer is the County's primary source of drinking water. To make land more suitable for urban development, various local governments and private entities initiated the construction of a canal system. A canal system was built to meet human needs by controlling the water levels and the movement of water from one place to another for water supply, flood control, drainage, navigation, and to provide water needed to sustain natural communities in lakes, rivers, wetlands and estuaries. The canal-based water management system in South Florida, developed over the past 100 years, is one of the largest and most complex civil projects in the world.[7]

The canal system that exists in Miami-Dade County today, utilizes gravity flow to move water to the east and ultimately to Biscayne Bay. However, the excavation required for the development of the canal system exposed the Biscayne Aquifer making it susceptible to saltwater intrusion. Saltwater intrusion refers to an influx of saltwater through various pathways into an aquifer. To mitigate this threat to the County water supply, salinity control structures were implemented in the primary and secondary canals throughout Miami-Dade County. For further information on saltwater intrusion in Miami-Dade County, refer to the Hazard Identification & Vulnerability Assessment section on the LMS-Part 1.

The initial canal system design did not take into account the significant urban development that has occurred in the western portion of the County. The western part of the County is lower in elevation and more flood prone. The system relies on gravity flow canal structures to drain the water into Biscayne Bay; however, this is not adequate to drain storm surge water out to Biscayne Bay.

Presently, Miami-Dade County canal system consists of approximately 616 miles of canals. The canal system is divided into 360 miles of primary canals, 260 miles of secondary canals, 350 miles of smaller ditches under private jurisdiction, and 75 miles of coastal waterways. In general, the secondary canal system connects into the primary system, which empties into Biscayne Bay. The primary canals, which include most of the salinity control structures, are maintained and operated by the South Florida Water Management District (SFWMD). Miami-Dade Department of Transportation and Public Works (DTPW) maintains and controls the secondary canals. The private ditches discharge into the secondary and primary canals and the coastal ditches discharge directly into Biscayne Bay. The ability to move water in the secondary system is dependent on the available capacity of the primary system, which, in turn, is dependent in part on the proper operation of the salinity control structures. Figure 1 illustrates Miami-Dade County's canal system and figure 2 illustrates the location of Miami-Dade County canals within the drainage basins.

The LMS continues to work with the SFWMD, DTPW and other County and Municipal stakeholders for canal mitigation measures. Miami-Dade County is significantly reliant on the ability of the canals to provide drainage. As illustrated in Figure 3, drainage basins cross different

[7] Canals in South Florida: A Technical Support Document – Prepared by SFWMD: https://www.researchgate.net/publication/305316875_Canals_in_South_Florida_A_Technical_Support_Document

jurisdictions, which demonstrates the importance of tracking drainage projects throughout Miami-Dade County to better collaborate on flood hazard mitigation with all jurisdictions.

Figure 1. Canals in Miami-Dade County

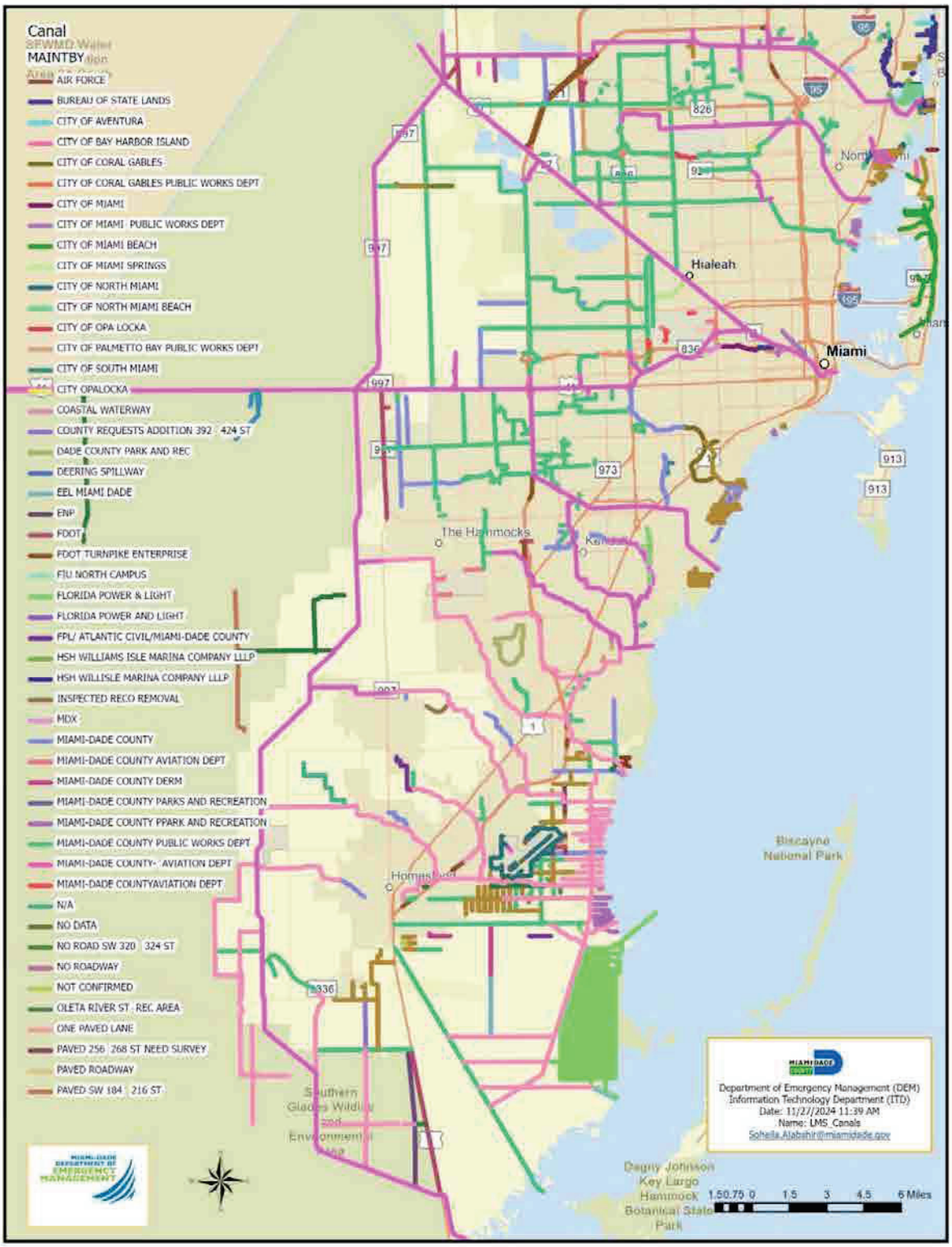


Figure 2. Canals and Canal Structures within Drainage Basins

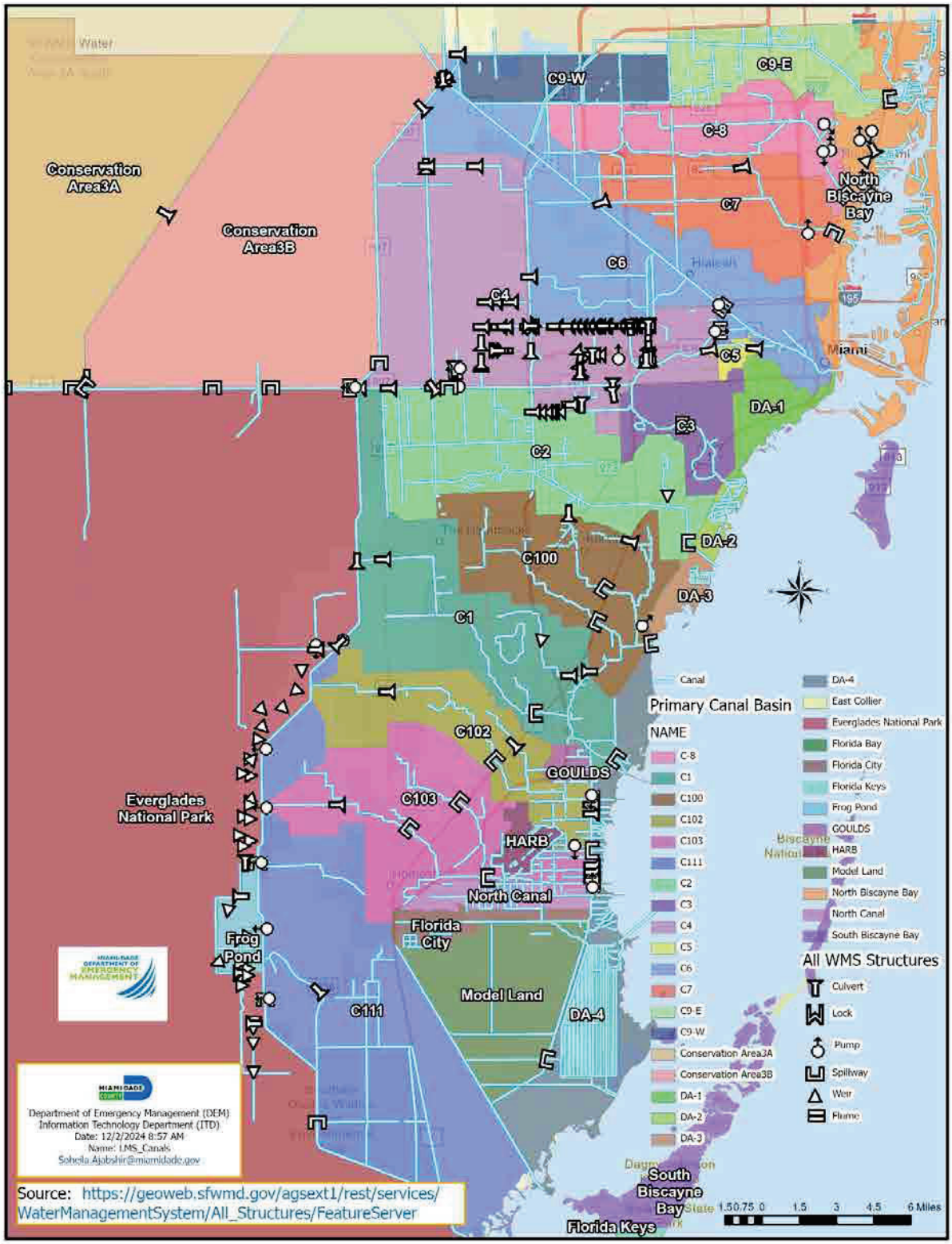
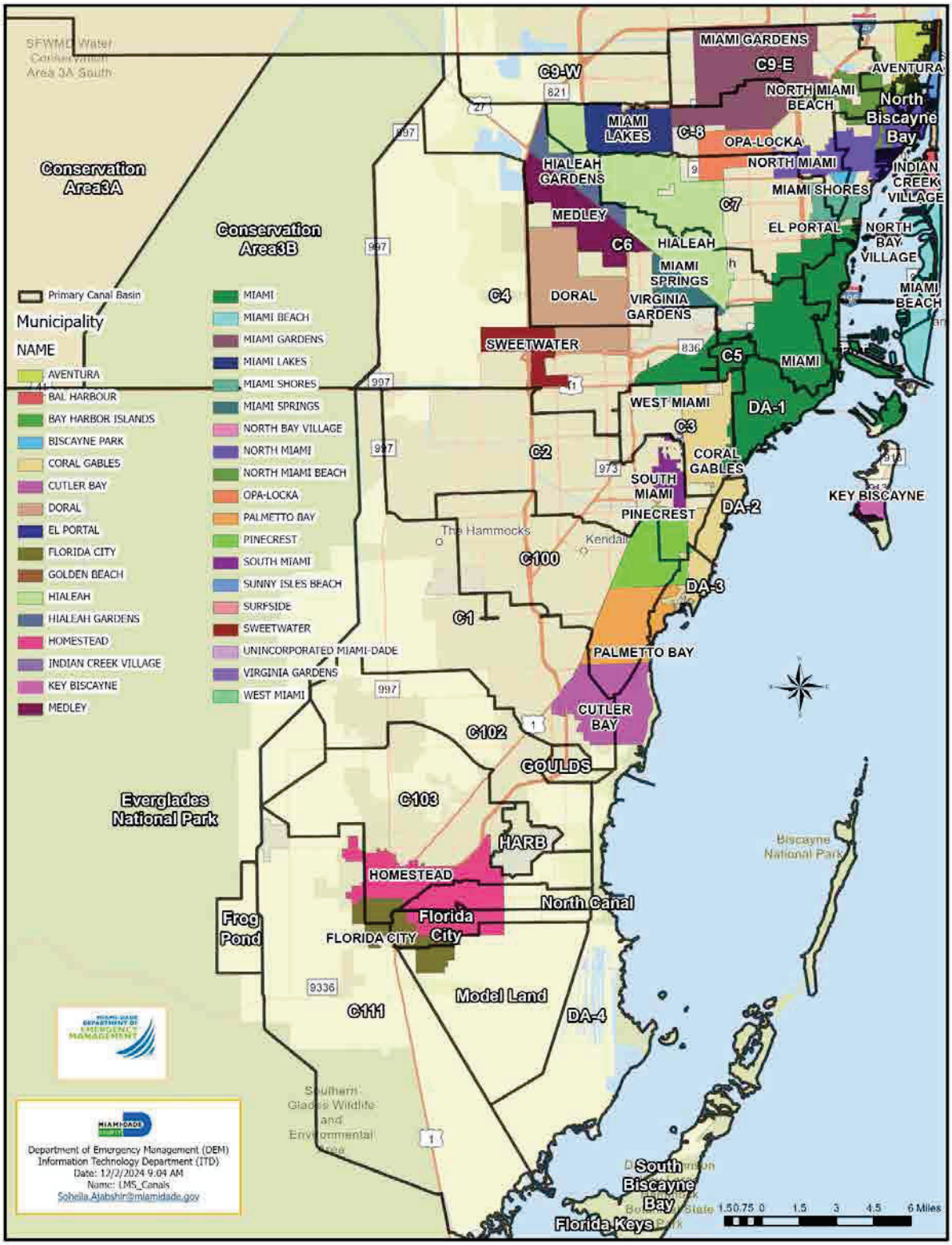


Figure 3. Municipal Boundaries in Relation to Drainage Basins



2024 Rainy Season[8]

South Florida's rainy season typically lasts an average of 155 days starting in mid-May and ending in mid-October. According to the National Weather Service, The El Niño pattern during the winter of 2023-2024 contributed to above normal precipitation, especially in February and March. However, as El Niño waned in the spring, the pattern transitioned rather quickly to much drier than normal in April and May when most areas received only 25 to 50 percent of the normal rainfall for those two months. This led to the development of moderate drought conditions in SW Florida and Palm Beach County in April, spreading south to include most of the southern Florida peninsula by the beginning of June.

Table 5, compiled by the National Weather Service (NWS) - Miami/South Florida Forecast Office, includes six (6) Miami-Dade County sites.

Table 5. Recorded rainfall from NWS sites in Miami-Dade County 2024

Location	Rainfall (inches)	Departure from Normal (inches)
Hialeah	69.54	-3.39
Homestead General Airport	60.38	+2.99
Miami International Airport	69.56	+2.15
Miami/Tamiami Executive Airport	52.05	-4.67
NWS Miami – University Park	65.82	-3.92
Opa-Locka Airport	60.35	-2.30

The late-spring dryness ended quite abruptly with the widespread rain/flood event of June 11-13. Several days of copious rainfall led to major flash flooding across parts of South Florida, mainly in the northern Miami-Dade and southern Broward County metro areas where 2-day rainfall totals of 15 to 20 inches were observed. Rainfall totals of 10-20 inches were common across most of Collier County (highest values over the eastern sections of the county), with generally 5-8 inches elsewhere across the region.

Precipitation stayed slightly above normal for the remainder of the summer and rainy season, highlighted by rainfall associated with Hurricanes Debby and Helene which were more notable across SW Florida. After the passage of Hurricane Milton in early October, the year concluded with below normal rainfall.

Overall, 2024 ended up with above normal rainfall over most of SW Florida. Most of metro SE Florida ended up with above normal rainfall, except for an area of below normal rainfall from the eastern Everglades into portions of metro Miami-Dade and northern Palm Beach counties.

[8] South Florida 2024 Weather Summary by the NWS – Miami/South Florida Forecast Office

Significant Flood Events

Hurricane Irene (October 1999) – Hurricane Irene was a typical October tropical cyclone that moved over the Florida Keys and southeast Florida. Tropical Depression 13 formed on October 13, 1999, in the northwestern Caribbean Sea and reached tropical storm status on the same day. The storm continued a general north-northeast track over Cuba and towards the Florida Keys. On October 15th, it reached hurricane strength over the Florida Straits and made landfall in Key West, Florida as a Category 1 hurricane. Hurricane Irene made its fourth landfall near Cape Sable, Florida and then moved across southeast Florida bringing tropical storm conditions and torrential rainfall. The hurricane produced 10 to 20 inches of rainfall throughout the region. On October 16th, the storm moved offshore near northern Palm Beach County.[9]

Although Hurricane Irene did not make a direct landfall in Miami-Dade County, the heavy rainfall severely impacted the County. In some areas, flooding lasted for about a week displacing hundreds of people and isolating thousands. Total losses were estimated near $600 million in southeast Florida. As a result of Hurricane Irene, the BCC created a Flood Management Task Force. The Task Force was charged with analyzing the current flood management system and its performance during Hurricane Irene as well as recommending solutions to protect residents from future flood impacts. After eight (8) months of meetings with affected residents, businesses, municipalities, and federal, state and local agencies, the Task Force issued a Final Report with 18 recommendations that could reduce future flood impacts in Miami-Dade County.[10]

Tropical Storm Leslie (October 2000) – Tropical Storm Leslie was a short-lived tropical storm that developed from Subtropical Depression One, off the east coast of Florida. Although, neither Tropical Storm Leslie nor Subtropical Depression One was responsible for the flood damage that occurred during this event. This event was later referred to as the “No Name” storm.

A tropical wave entered the eastern Caribbean Sea on September 27, 2000 and it remained disorganized as it moved north-northwest. On October 2nd, just south of western Cuba, the tropical disturbance was slightly better organized, and a mid-level circulation was visible in satellite imagery. The system began to move northward across western Cuba and the Florida Straits, and on October 3rd it entered the southeast Gulf of Mexico. As the disturbance moved north toward the west coast of Florida, it interacted with a stalled frontal boundary across southern Florida. The disturbance’s interaction with the stalled frontal boundary resulted in a band of very heavy rainfall to become stationary across southeast Florida on October 3rd. On October 4th, the disturbance began to move northeastward over central Florida and moved offshore near Daytona Beach, Florida. At this time, the system became Subtropical Depression One and the storm was upgraded to Tropical Storm Leslie on October 5th.

This system was closely monitored by DTPW, SFWMD and Municipal Public Works, and the appropriate protective actions were taken to lower the canal water levels. Initially, 4 to 8 inches of rainfall was forecast for this system, but rainfall amounts exceeded the forecasts. Ultimately, the system produced 14 to 18 inches of rainfall over a linear area across the County. Rain gauges in South Miami recorded 17.50 inches, 15.79 inches in Sweetwater (NWS Forecast Office), and 15.30 inches at the Miami International Airport.[11] Many of the same areas that were impacted by

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[9] National Hurricane Center Tropical Cyclone Report for Hurricane Irene, October 13 – 19, 1999: http://www.nhc.noaa.gov/data/tcr/AL131999_Irene.pdf

[10] Miami-Dade County Flood Management Task Force – Report on Flood of October 3, 2000: https://www.miamidade.gov/environment/library/reports/flood-management.pdf

[11] National Hurricane Center Tropical Cyclone Report for Tropical Storm Leslie (Subtropical Depression One), October 4 – 7, 2000: http://www.nhc.noaa.gov/data/tcr/AL162000_Leslie.pdf

Hurricane Irene the prior year were affected by this system. As a result, the BCC reconvened the Miami-Dade County Flood Management Task Force to evaluate for the installation of supplemental pumps on some key coastal canal structures throughout Miami-Dade County.[12]

"After Hurricane Irene, the Miami-Dade Office of Emergency Management put together a Project Impact and Local Mitigation Strategy effort to coordinate work with the Federal Office of Emergency Management in order to obtain as much federal financial support as possible. The October 2000 flood, coming on the heels of the damage caused by Hurricane Irene, served to energize the participation by all levels of government in the mitigation process. The concerted effort by all participants, and the leadership shown by County staff, have resulted in the likely commitment of tens of millions of dollars for federal money to correct some of the County's flood control deficiencies."

– Miami-Dade County Flood Management Task Force, Report on Flood of October 3, 2000

Hurricane Katrina (August 2005) – The complex development of Hurricane Katrina involved the interaction of a tropical wave, the tropospheric remnants of Tropical Depression Ten and an upper tropospheric trough. On August 19, 2005, a tropical wave that emerged from Africa several days prior merged with the remnants of Tropical Depression Ten producing a large area of showers and thunderstorms north of Puerto Rico. This system was moving northwestward, passing north of Hispaniola and then consolidating just east of Turks and Caicos on August 22nd. Wind shear in the area decreased enough to allow the system to develop into Tropical Depression Twelve in the afternoon of August 23rd over the southeastern Bahamas. The tropical system continued to become better organized and it became Tropical Storm Katrina in the morning of August 24th. Initially, the storm was moving northwestward as it continued to strengthen. However, on August 25th, its interaction with a weakness in the lower tropospheric subtropical ridge over the northern Gulf of Mexico and southern United States, Tropical Storm Katrina began to move westward towards southern Florida. The evening of August 25th, less than two (2) hours before its center made landfall in southeastern coast of Florida, the system strengthened into a Category 1 hurricane. Hurricane Katrina made its first landfall in the United States as a Category 1 hurricane with maximum sustained winds of 81 mph near the border of Miami-Dade County and Broward County late evening on August 25th.

As Hurricane Katrina continued to move westward across southern Florida, the strongest winds and heaviest rainfall were located south and east of the eye, over Miami-Dade County. The storm remained over land for about six (6) hours and weakened into a tropical storm over mainland Monroe County. Once the storm reemerged into the Gulf of Mexico, north of Cape Sable, FL, it quickly regained its strength. Hurricane Katrina made its final landfall near the mouth of the Pearl River at the Louisiana/Mississippi border as Category 3 hurricane on August 29th. This is the costliest [13, 14]and one of the deadliest tropical cyclones on record.

Hurricane Katrina produced substantial rainfall over portions of southern Miami-Dade County. Rain gauges at the Homestead Air Reserve Base recorded 14.04 inches, 12.25 inches in Florida City, and 11.13 inches Cutler Ridge. Rainfall amounts over northern Miami-Dade County were between 2 to 4 inches. Storm Surge was not an issue for Miami-Dade County during this storm. However, Hurricane Katrina served as a grim reminder that storm surge poses the greatest potential cause for loss of life in a single hurricane in the United States.

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[12] Miami-Dade County Flood Management Task Force – Report on Flood of October 3, 2000: https://www.miamidade.gov/environment/library/reports/flood-management.pdf

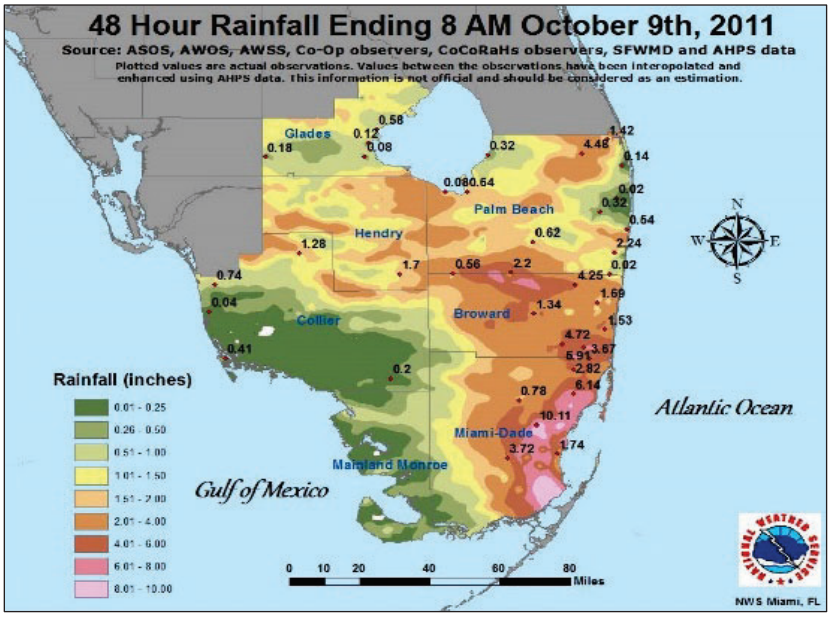
[13] National Hurricane Center's Costliest U.S. Tropical Cyclones Tables: https://www.nhc.noaa.gov/news/UpdatedCostliest.pdf

[14] 2017 Hurricane Harvey tied with Hurricane Katrina as the costliest tropical cyclone on record.

October 2011 – There were two (2) significant flood events in October 2011. During this month, Miami Beach recorded a total of 21.34 inches of rainfall breaking a 1952 record of 18.02 inches. The Miami International Airport recorded a total of 15.52 inches (9.19 inches above normal) making it the 11th wettest October on record.

The first flood event occurred between Friday, October 7th through Sunday, October 9th. The highest rainfall amounts were recorded over the Miami metropolitan area, with the highest occurring south of Kendall Drive. Figure 4 illustrates estimated rainfall amounts covering the period from Friday, October 7th through Sunday, October 9th. Areas in pink indicate rainfall totals between 8 and 10 inches. Rain gauges at the West Kendall/Tamiami Airport recorded 10.11 inches, 8.90 inches in Princeton and 7.40 inches at the Homestead Air Reserve Base.[15]

Figure 4. 48-Hour Rainfall Accumulation Map (October 7 – 9, 2011)



The second flood event occurred between Friday, October 28th and Monday, October 31st. A combination of high levels of atmospheric moisture in the Caribbean and the Gulf of Mexico, and a stalled frontal boundary produced heavy rainfall between October 28 and 31, 2011 (Friday – Monday). This resulted in significant to severe flooding throughout parts of South Florida. Late in the afternoon on October 29th, the front stalled over South Florida and bands of heavy rainfall developed in northern Miami-Dade County, from Miami Beach and Doral north to the Pompano Beach area (Broward County). These areas saw 3 to 7 inches of rainfall in only a few hours resulting in significant street flooding. The front remained nearly stationary over South Florida through October 30th, which resulted in the most significant rain event of the weekend.

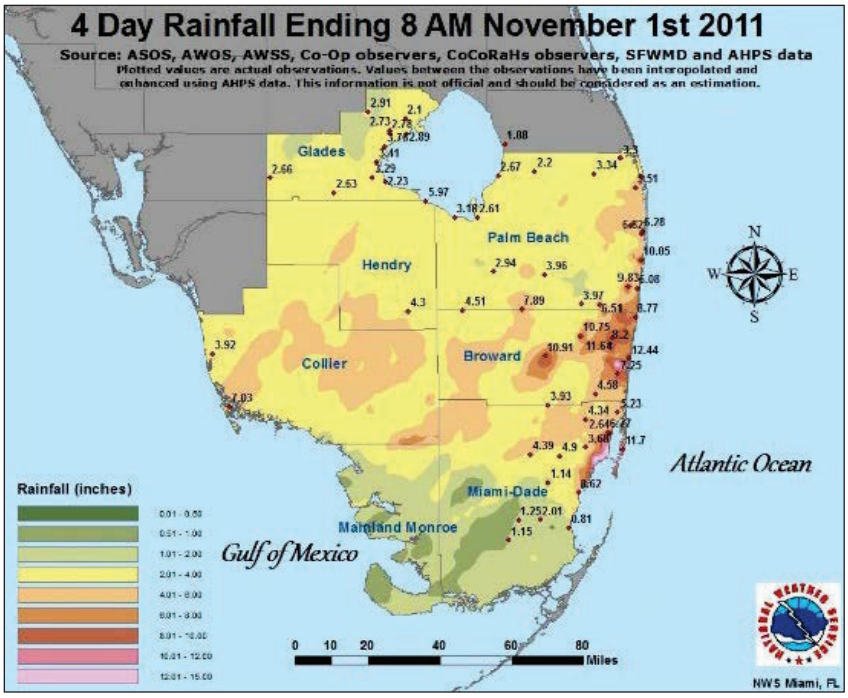
Clusters of heavy rainfall and thunderstorms developed over Biscayne Bay during late afternoon and evening. It later drifted north over Key Biscayne, Cutler Bay and Palmetto Bay during the evening. At midnight on October 31st, the area of heaviest rainfall and thunderstorms was over Pinecrest, Coral Gables and Coconut Grove. In only a few hours, areas from Cutler Bay to

[15] NWS – Miami/South Florida Forecast Office, Public Information Statement: https://www.weather.gov/media/mfl/news/RAIN_EVENT111009.pdf

Coconut Grove received 6 to 10 inches of rainfall resulting in severe street flooding and water intrusion in dozens of homes. Per SFWMD, isolated areas in Coconut Grove may have received over 12 inches of rainfall during this time. Rainfall continued throughout the evening.[16]

Figure 5 illustrates an estimate of rainfall amounts covering the period from Friday, October 28th through Tuesday, November 1st. Areas in pink indicate rainfall totals over 12 inches. The highest rainfall total recorded in Miami-Dade County was in Miami Beach with 11.70 inches.

Figure 5. 4-Day Rainfall Accumulation Map (October 28 – November 1, 2011)

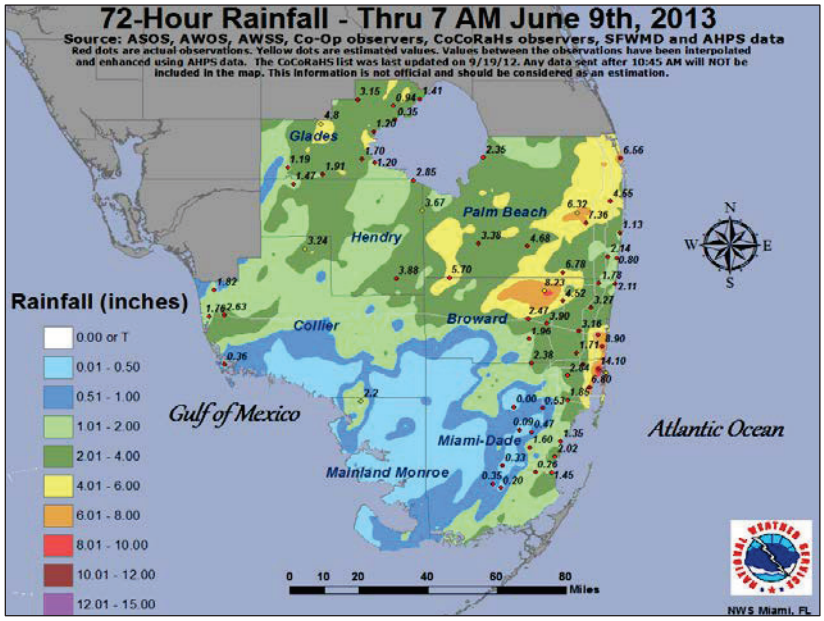


Tropical Storm Andrea (June 2013) – A trough developed north of a persistent cyclonic gyre located over the southeastern Mexico and northern Central America on June 2, 2013. On June 3rd, a broad area of low pressure formed over the southern Gulf of Mexico in response to a tropical wave entering the northwestern Caribbean Sea. Moderate vertical wind shear and dry air in the area hindered the development of the system as is moved northward. Atmospheric conditions became slightly conductive and Tropical Storm Andrea formed in the evening of June 5th several miles southwest of St. Petersburg, Florida. The storm initially began moving northward, but on June 6th it turned northeastward and made landfall along the northwestern Florida Peninsula. Tropical Storm Andrea continued to move across northeastern Florida and southeastern Georgia, and it became extratropical over northeastern South Carolina on June 7th.

[16] NWS Weather Forecast Office, Summary of Heavy Rainfall/Flood Event of October 28-31: https://nwas.org/ej/2012-EJ11/October2011HeavyRain.pdf

Although Tropical Storm Andrea did not make landfall in South Florida, convective rain bands well southeast of the center of the storm produced very heavy rainfall over southeastern Broward County and northeastern Miami-Dade County between June 6th and 7th. A 24-hour total of 13.94 inches was recorded at the SFWMD station in North Miami Beach, 11.71 inches at the FIU Biscayne Campus and 9.89 inches in North Miami/Keystone Point. This excessive rainfall resulted in widespread flash flooding that caused water to enter homes and roads to become impassible.[17, 18] Figure 6 illustrates an estimate of rainfall amounts covering the period from June 6th through June 9th.

Figure 6. 72-Hour Rainfall Accumulation Map (June 7 – 9, 2013)



October 2013 – An area of low pressure near the Yucatan Peninsula directed tropical moisture into South Florida that produced heavy rainfall in the Kendall area, near the Falls Shopping Mall, during the late afternoon and early evening of October 2, 2013. The slow-moving showers and thunderstorms produced rainfall amounts of 7 to 10 inches in just a few hours which resulted in an isolated area of flash flooding. Roads were impassible and The Falls Shopping Mall parking lot was completely under water. Additionally, water entered buildings and vehicles in the area.[19]

February 2015 – A stationary front over South Florida resulted in a strong thunderstorm that produced over 4 inches of rainfall over northeast Miami-Dade County.[20] As a result, significant flooding occurred in the Omni, Edgewater and Midtown areas, mainly along Biscayne Boulevard and North Miami Avenue, in the City of Miami. Multiple cars stalled and flooding was about one

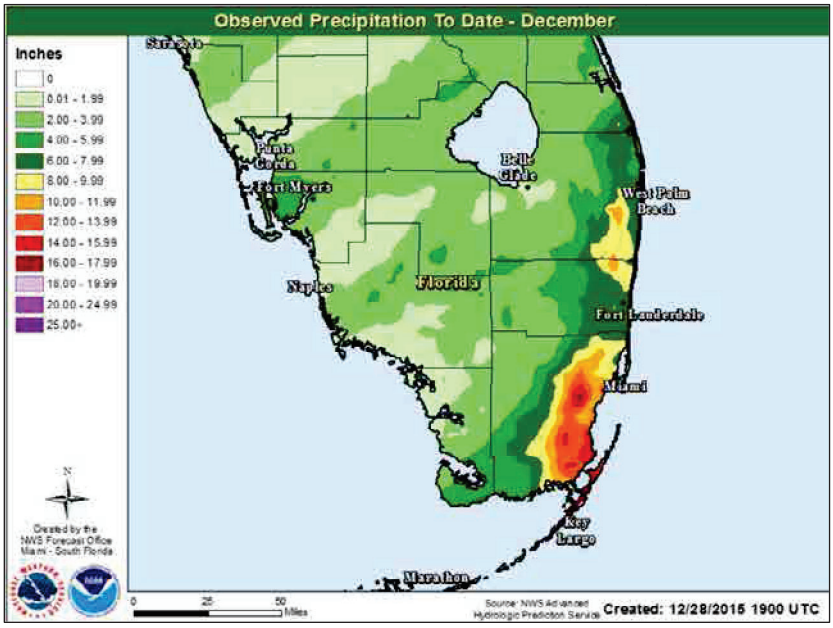
[17] National Hurricane Center Tropical Cyclone Report for Tropical Storm Andrea: https://www.nhc.noaa.gov/data/tcr/AL012013_Andrea.pdf
[18] NWS – Miami/South Florida Forecast Office, Tropical Storm Andrea (June 5 – 7, 2013): https://www.weather.gov/mfl/andrea
[19] NOAA's National Centers for Environmental Information Storm Events Database (Event Type: Flash Flood): https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=478777
[20] NWS – Miami/South Florida Forecast Office, South Florida Winter 2014-2015 Recap: https://www.weather.gov/media/mfl/news/Feb2015WinterSummary.pdf

(1) foot deep. Additionally, multiple businesses in the Miami Midtown Shops closed, because ground floors flooded.[21]

December 2015 – A cold front moved into South Florida on December 3, 2015. On December 4th and 5th, the front stalled over the upper Florida Keys and produce heavy rainfall throughout Miami-Dade County. However, southern Miami-Dade County was the hardest hit area and rainfall amounts recorded between December 5th and 6th were similar to totals observed during previous tropical systems. The Miami Executive Airport recorded 8.92 inches of rainfall and over 10 inches were recorded in West Kendall. The Homestead/Redland area recorded 6 to 8 inches of rainfall resulting in the severe flooding of agricultural fields. Farmers reported significant damage to fall and winter crops, ranging from rotting crops due continuous rainfall to total loss from completely flooded fields. Agricultural damage estimates were about 1 Million dollars with a 70% to 80% loss in crops. Other impacts included numerous road closures, stalled vehicles and Zoo Miami closed for several days due to flooding in the facility.[22]

Typically, December is the driest months in South Florida, but December 2015 had an unusual wet pattern. The Miami Executive Airport in West Kendall recorded 18.43 inches of rainfall, the wettest December on record since 1998; the Redland recorded 14.92 inches; the wettest December on record since 1942 and the Miami International Airport recording its second wettest December on record with 9.75 inches. Figure 7 illustrates observed rainfall amounts for the month of December.[23]

Figure 7. Observed Precipitation for December 2015



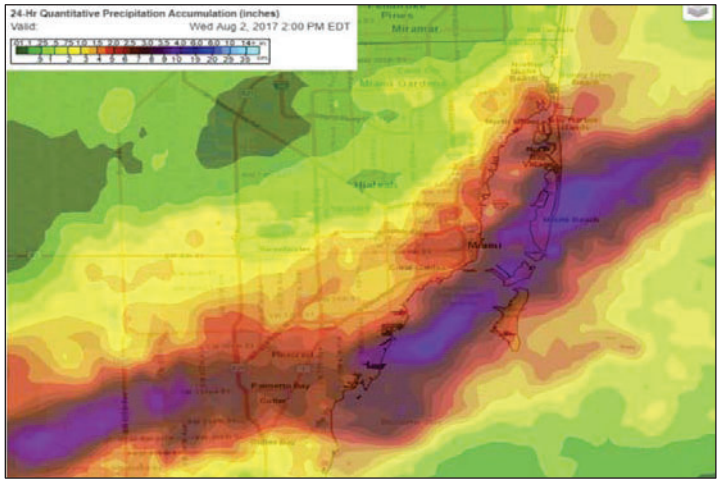
[21] NOAA's National Centers for Environmental Information Storm Events Database (Event Type: Flash Flood): https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=565140
[22] NOAA's National Centers for Environmental Information Storm Events Database (Event Type: Flood): https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=605707
[23] NWS – Miami/South Florida Forecast Office, 2015 South Florida Weather Year in Review: https://www.weather.gov/media/mfl/news/2015WeatherSummary.pdf

August 2017 – A surface low with enough organized deep convection formed within the post-frontal trough and a Tropical Depression developed on July 30, 2017. The system was centered west-northwest of St. Petersburg, Florida. The next day, on July 31st, the system strengthened into Tropical Storm Emily and made landfall near Longboat Key, Florida. Tropical Storm Emily moved over Central Florida and weakened into a Tropical Depression in the early hours of August 1st and moved offshore into the Atlantic Ocean. By August 2nd, the storm became post tropical and dissipated over the Atlantic Ocean.[24]

Tropical Storm Emily was a short-lived tropical storm and no direct impacts were reported in Miami-Dade County. However, the system left an elongated trough across South Florida on August 1st. A combination of the frontal boundary and daytime heating, a band of thunderstorms developed off the coast and moved west. At around 2 pm, the band of thunderstorms became nearly stationary over Miami Beach, Key Biscayne and Downtown Miami. A Flash Flood Warning was issued at 3:47pm until 9:45pm. Later in the afternoon, the same band of thunderstorms redeveloped over The Redlands, Kendall, Palmetto Bay, and Pinecrest area. Rainfall amounts in these areas ranged between 4 and 6 inches with isolated amounts between 7 and 8 inches. The rainfall rates of 2 to 4 inches an hour lasted 2 to 3 hours, around the same time as high tide which exacerbated the flooding.

Significant flooding was reported in Miami Beach and the Brickell area in the City of Miami. Vehicles were stalled in streets with up to 2 feet of water and several streets were closed due to deep standing water. In Miami Beach, 1 to 2 feet of water was reported throughout several streets in South Beach, including Purdy Avenue, West Avenue, Alton Road, Pennsylvania Avenue, Meridian Avenue, Collins Avenue, Washington Avenue and Indian Creek Drive. Water entered businesses, homes, apartment lobbies and parking garages. In Mary Brickell Village, more than 10 businesses and buildings had 1 to 4 inches of water inside their structures. Figure 8 illustrates the 24-hour rain total graphic from NWS Weather and Hazards Data Viewer for this event.[25,26]

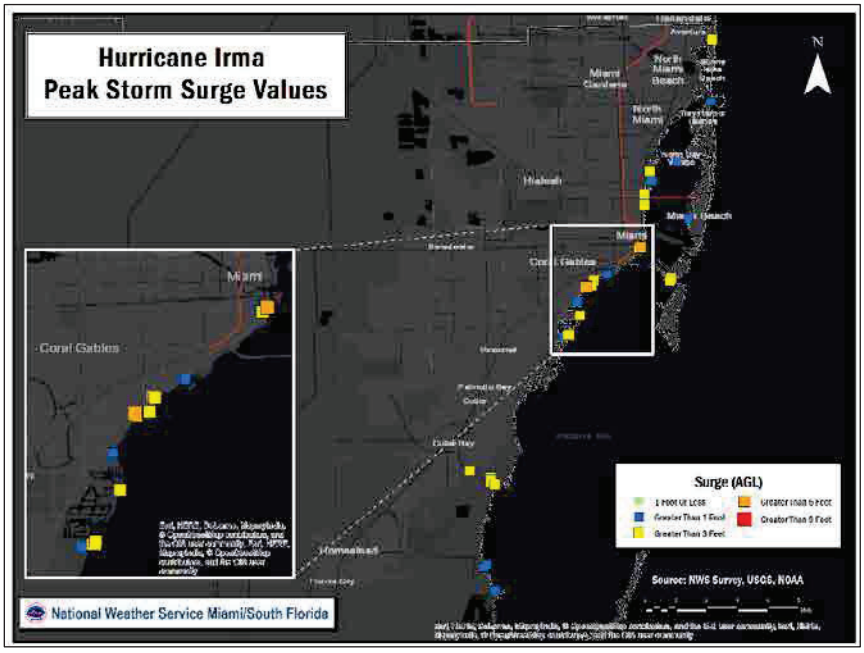
Figure 8. Rainfall Map from NWS Weather and Hazards Data Viewer



[24] NWS – Miami/South Florida Forecast Office, Tropical Storm Emily (July 13 – August 1, 2017): https://www.nhc.noaa.gov/data/tcr/AL062017_Emily.pdf
[25] NWS – Miami/South Florida Forecast Office, Preliminary Report on August 1, 2017 Miami and Miami Beach Flood Event: https://www.weather.gov/media/mfl/news/Flood_2017Aug1.pdf
[26] NOAA's National Centers for Environmental Information Storm Events Database (Event Type: Flash Flood): https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=718505

Hurricane Irma (September 2017) – Hurricane Irma made two landfalls in South Florida on September 10th. At 9:10 am, Category 4 Hurricane Irma made landfall in Cudjoe Key and at 3:35 pm in Marco Island as a Category 3. The center of Hurricane Irma moved into Central Florida and continued a northward trajectory over Florida. Rainfall amounts in Miami-Dade County were mainly between 6 and 10 inches. Storm surge of approximately 3 to 5 feet travelled 1 to 2 blocks inland along the Biscayne Bay shoreline from Homestead to Downtown Miami/Brickell. Isolated spots in Coconut Grove and Brickell surveyed storm surge inundation greater than six (6) feet. Storm surge inundation north of Downtown Miami had values of 2 to 3 feet and areas along the Atlantic oceanfront (Key Biscayne and Miami Beach) had inundation of 2 to 3 feet and confined to the immediate beachfront. Figure 9 illustrates peak storm surge values in Miami-Dade County.

Figure 9. Hurricane Irma Peak Storm Surge Values

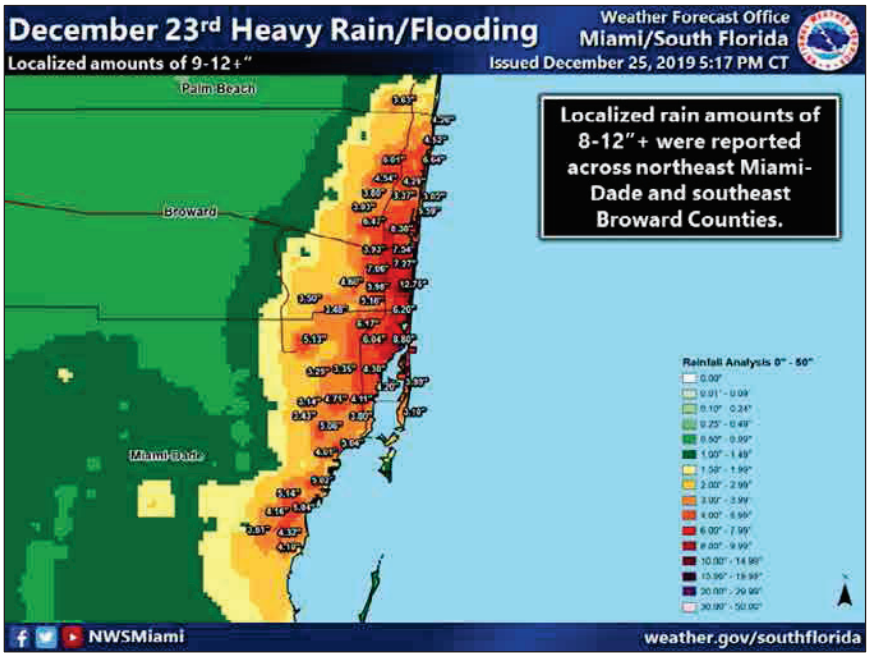


December 2019 - A strong cold front moved across the region behind a low pressure system that developed over the Gulf of Mexico. Ahead of the cold front, a strong line of storms crossed through South Florida and produced heavy rainfall and flooding across the east coast metro areas of northeast Miami-Dade County during the early morning hours of December 23, 2019. The highest rainfall amount was over 8 inches. Significant flooding was recorded from Aventura south and to the North Miami area. Multiple reports received of significant street and parking lot flooding, with reports of flooded parking garages and stalled vehicles, particularly in Aventura as well as along Biscayne Boulevard and NE 123rd Street. Flooding continued impacting several roads across the area into Monday afternoon and evening. Figure 10 illustrates observed rainfall amounts for December 23rd.[27, 28]

[27] NWS – Miami/South Florida Forecast Office, December 2019 South Florida Flooding: https://www.weather.gov/mfl/dec2019flooding

[28] NOAA's National Centers for Environmental Information Storm Events Database (Event Type: Flood): https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=869837

Figure 10. December 23rd Rainfall Accumulation Map



Local flood events are documented by NWS Miami/South Florida Forecast Office at https://www.weather.gov/mfl/events_index and by NOAA's National Centers for Environmental Information Storm Events Database at https://www.ncdc.noaa.gov/stormevents/.

September 13, 2020 – A low pressure system, turned tropical disturbance, moving across the western Atlantic and over the Bahamas abruptly formed into Tropical Depression Nineteen on September 11th. Tropical Depression Nineteen gradually continued westward and the center passed about 10 to 20 miles SSE of Miami, Florida during the morning of September 12th. As Tropical Depression Nineteen moved westward over the South Florida peninsula, it continued to strengthen into a Tropical Storm known as Tropical Storm Sally. Rainfall flooding impacts were moderate to significant across South Florida with around 3 to almost 8 inches across portions of Miami-Dade County. Several broadcast media reports of significant street flooding from Coconut Grove to Brickell and Downtown Miami, and possibly extending into Little Havana. U.S. Highway 1 in Coconut Grove and Brickell was covered in water up to knee-high in places, leading to a number of stalled vehicles.

Flood Impacts

Flood impacts in a structure can range from wet carpets or floors, to damaged interiors leading to destruction of property. In addition, floods can potentially cause damage to infrastructure, such as washing out roads and bridges, or standing water can inhibit the movement of vehicular traffic. The agricultural community can significantly be impacted by floods when crop fields are flooded for an extended period of time or are being washed away.

Flood Regulations in Miami-Dade County

Pre-Flood Insurance Rate Map structures are those built before the effective date of the first FIRM for the community or prior to January 1, 1975 (whichever is later). This means structures built before detailed flood hazard data and flood elevations were provided to the community and usually before the community enacted a comprehensive floodplain management program and regulations.[29] Pre-FIRM buildings can be insured using "subsidized" rates to help residents afford flood insurance even though the structure was built without considering flood protection.[30]

Post-FIRM structures are new construction built after the effective date of the first FIRM for the community. Insurance rates for Post-FIRM buildings depend on the elevation of the lowest floor in relation to the BFE.

The CRS Sub-Committee identified major milestones for flood regulation in Miami-Dade County as depicted in Table 6.

Table 6. Percent Housing Stock by Major Flood Regulation Dates for Miami-Dade County (December 2024)

Color	Year	Description	% of housing stock
	Pre-1957	No special elevation requirements in effect.	23.62%
	1957-1973	General Countywide requirement of the highest of the County Flood Criteria maps (10-year event) (CFC), Back Of Sidewalk (BOS), or highest adjacent Crown Of Road (COR) + 8 inches for residential or 4 inches for commercial construction	22.42%
	1973-1992	First FIRM maps developed identifying flood areas. CFC still enforced.	24.82%
	1993-2008	Incorporated areas begin enforcing flood codes.	20.90%
	2009-2011	Updated FEMA Flood Maps	1.00%
	2012 - present	New Florida Building Code requiring free board for properties within Special Flood Hazard areas, following ASCE24 Table, to be elevated depending on the building category	7.23%

Figure 11 illustrates an overview of the residential construction in relation to the major milestones listed on Table 6. The data was for figure 11 was gathered from the Miami-Dade County Property Appraiser database, by looking at the year of construction. This information is meant to provide an overview on the structures' year of construction, but it does not provide information on the elevation. However, it provides an overview of the standard in place when the structure was built. Individual jurisdictional maps can be made available to all municipalities.

[29] Pre-FIRM Definition/Description (FEMA): https://www.fema.gov/about/glossary/pre-firm-building
[30] Miami-Dade County Regulatory and Economic Resources, Flood Insurance: https://www.miamidade.gov/environment/flood-insurance.asp

Table 7 illustrates the number of structures by the flood regulation milestones for each Municipality.

An Elevation Certificate is used to provide elevation information necessary to: [31]

- Ensure compliance with the community's floodplain management ordinances
- Determine the proper insurance premium rate
- Support a request for a Letter of Map Amendment (LOMA) to remove a building from the Special Flood Hazard Area

If a structure is located within a FEMA Flood Zone, an Elevation Certificate is needed. It is imperative that every homeowner has an Elevation Certificate because, in case of a disaster, it would demonstrate to County authorities that the structure is at or above the required elevation. Elevation Certificates are required for all new construction, substantial improvements to a structure, and for substantially damaged structures. Miami-Dade County has been collecting Elevation Certificates from developers since 1995 as a requirement for their building permit. However, a comprehensive database of Elevation Certificates for all structures in Miami-Dade County is not available, but the Miami-Dade County Regulatory and Economic Resources Department (RER) continues to gather this data.[32]

[31] NFIP Elevation Certificate and Instructions (FEMA): https://www.fema.gov/media-library/assets/documents/160
[32] Miami-Dade RER, Flood Protection – Elevation Certificates: https://www.miamidade.gov/environment/flood-elevation.asp

Figure 11. Miami-Dade County Residential Construction by Flood Regulation Milestones

Pre-1957

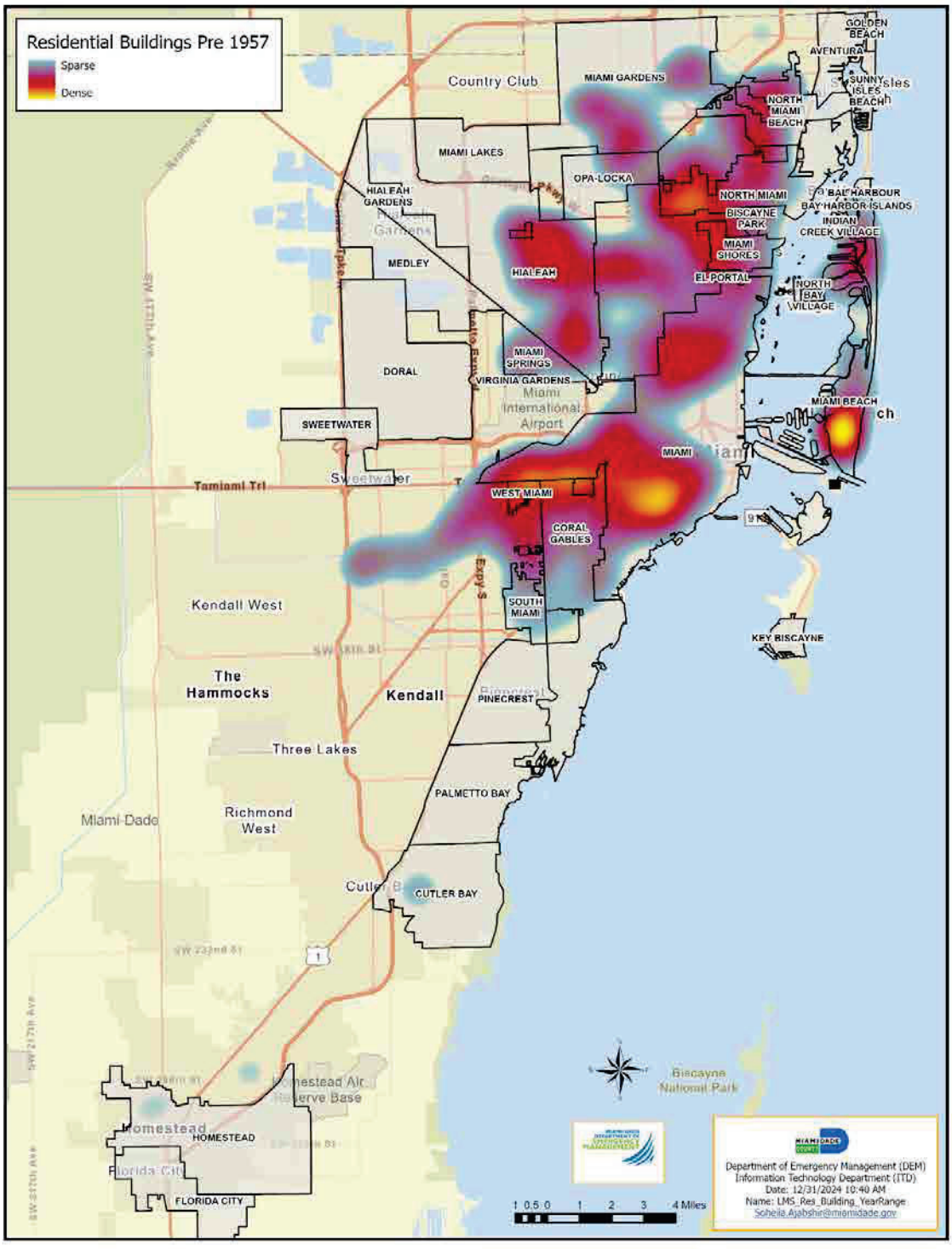


Figure 11. Miami-Dade County Residential Construction by Flood Regulation Milestones

1958-1973

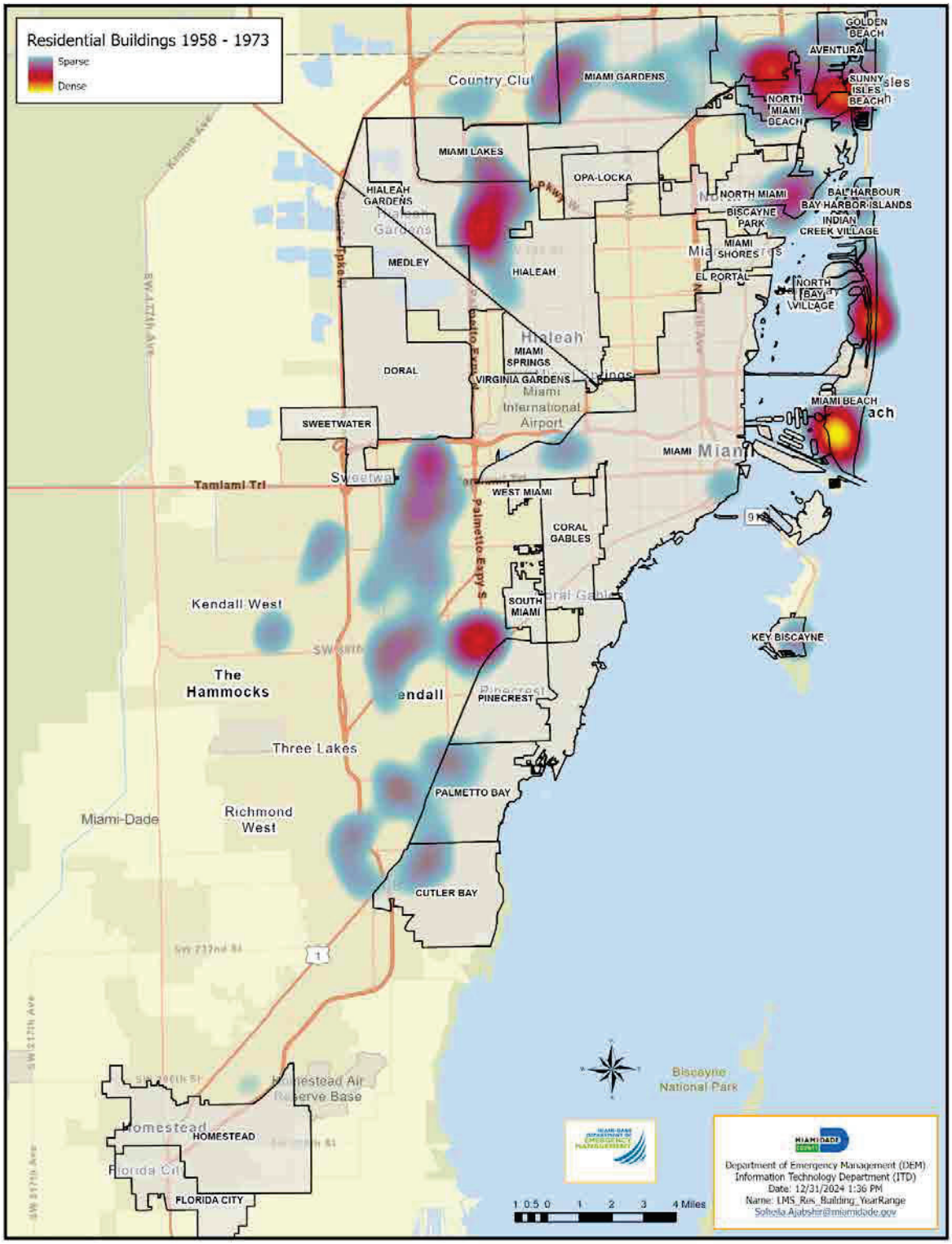


Figure 11. Miami-Dade County Residential Construction by Flood Regulation Milestones

1974-1992

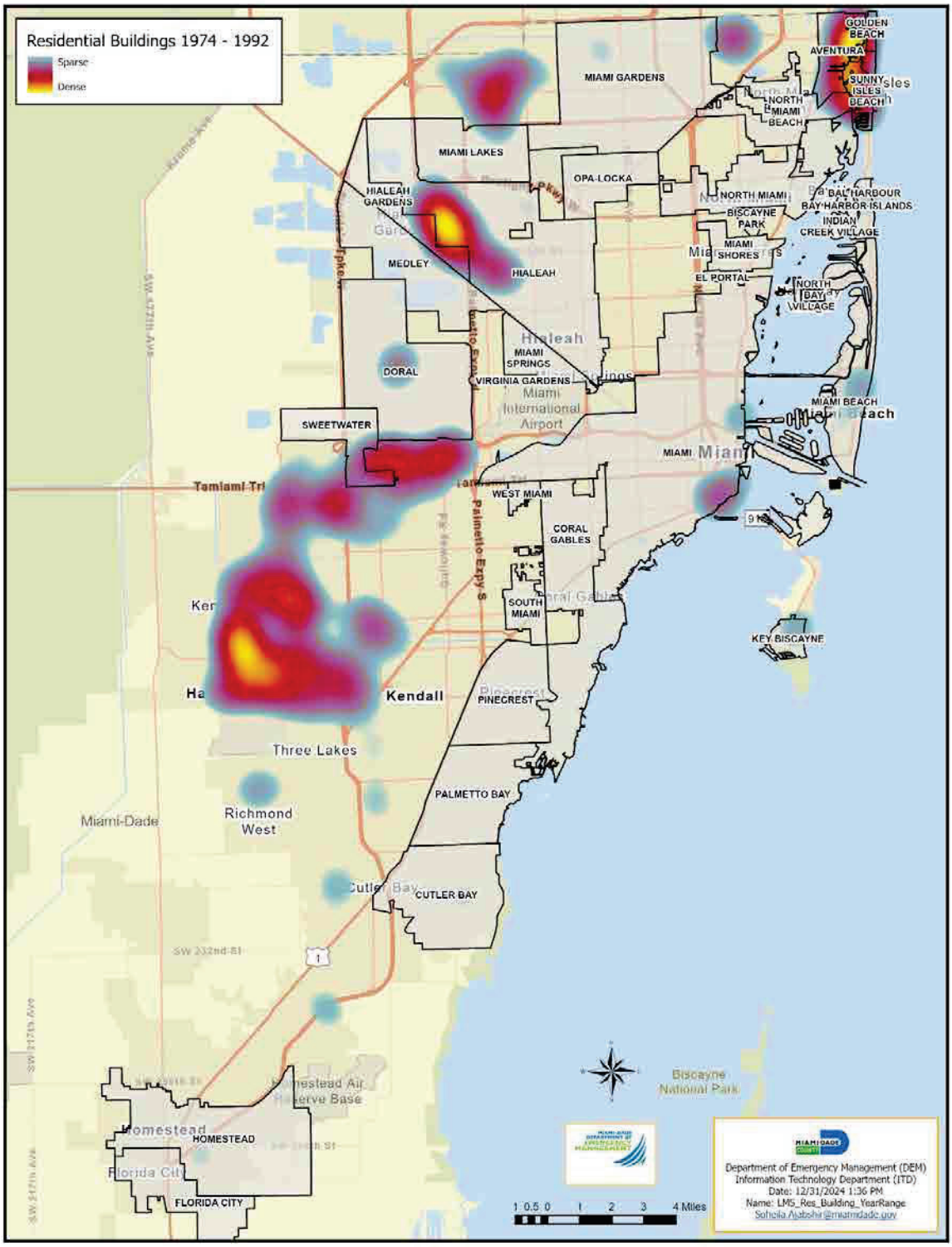


Figure 11. Miami-Dade County Residential Construction by Flood Regulation Milestones

1993-2008

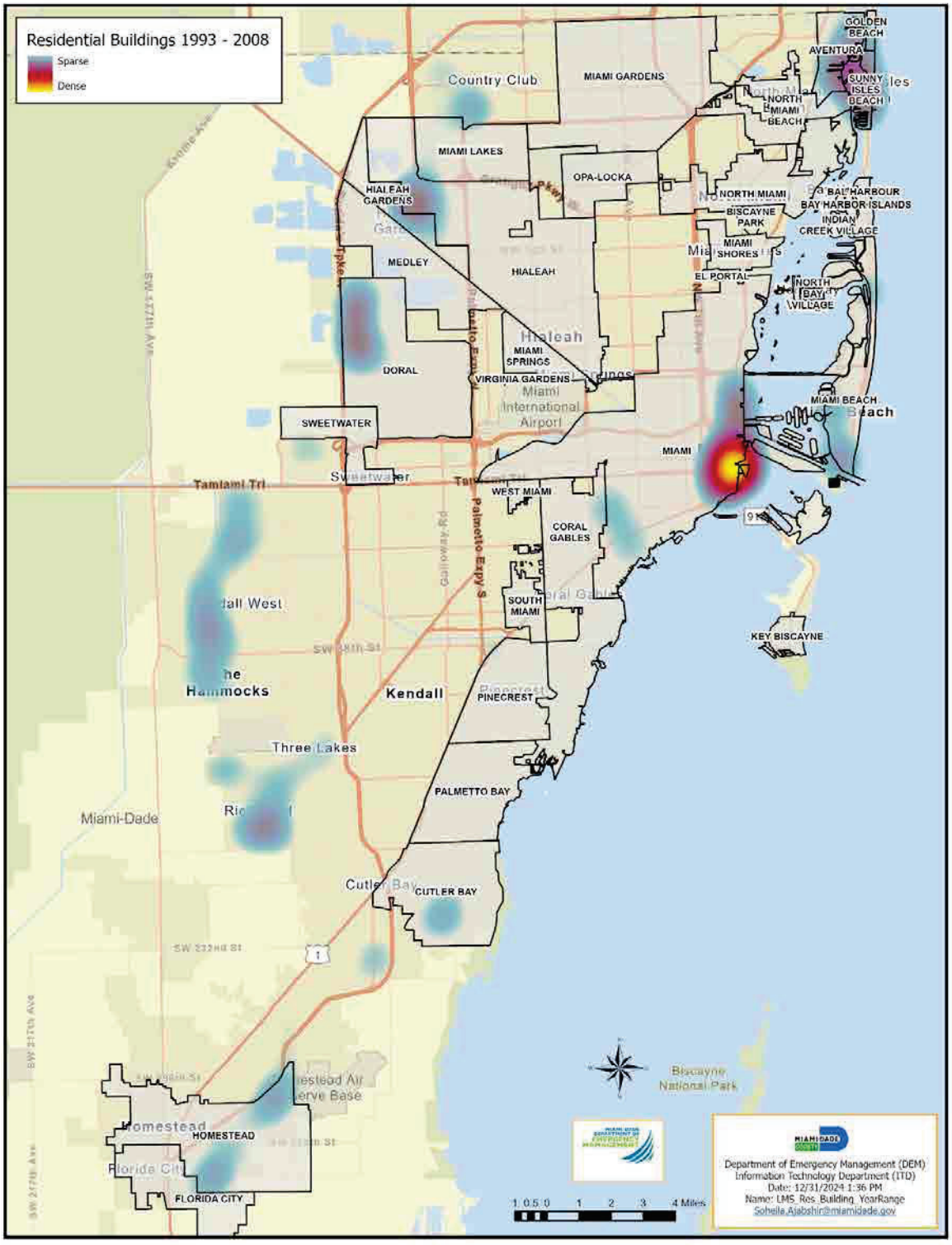


Figure 11. Miami-Dade County Residential Construction by Flood Regulation Milestones

2009-2011

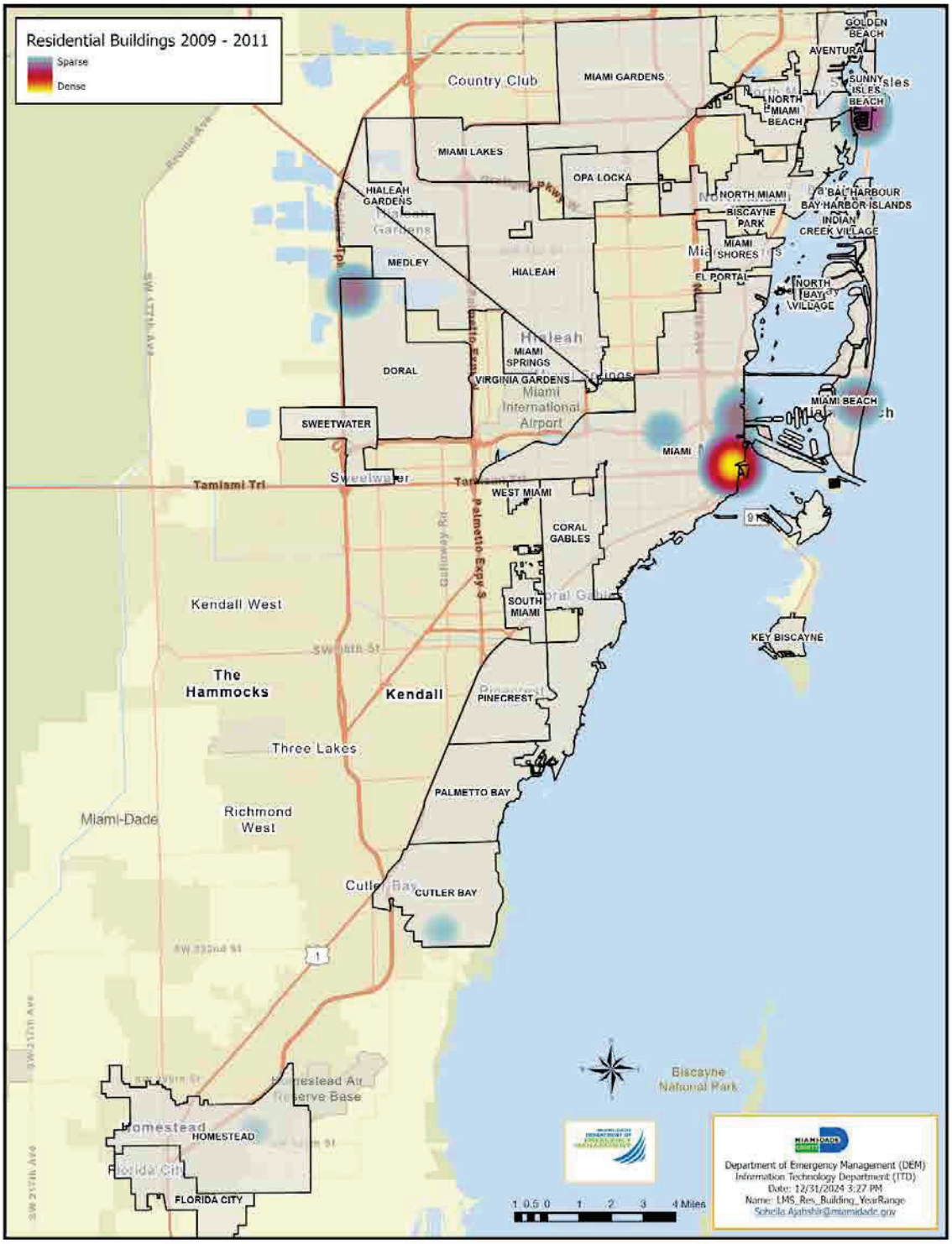


Figure 11. Miami-Dade County Residential Construction by Flood Regulation Milestones

2012-2024

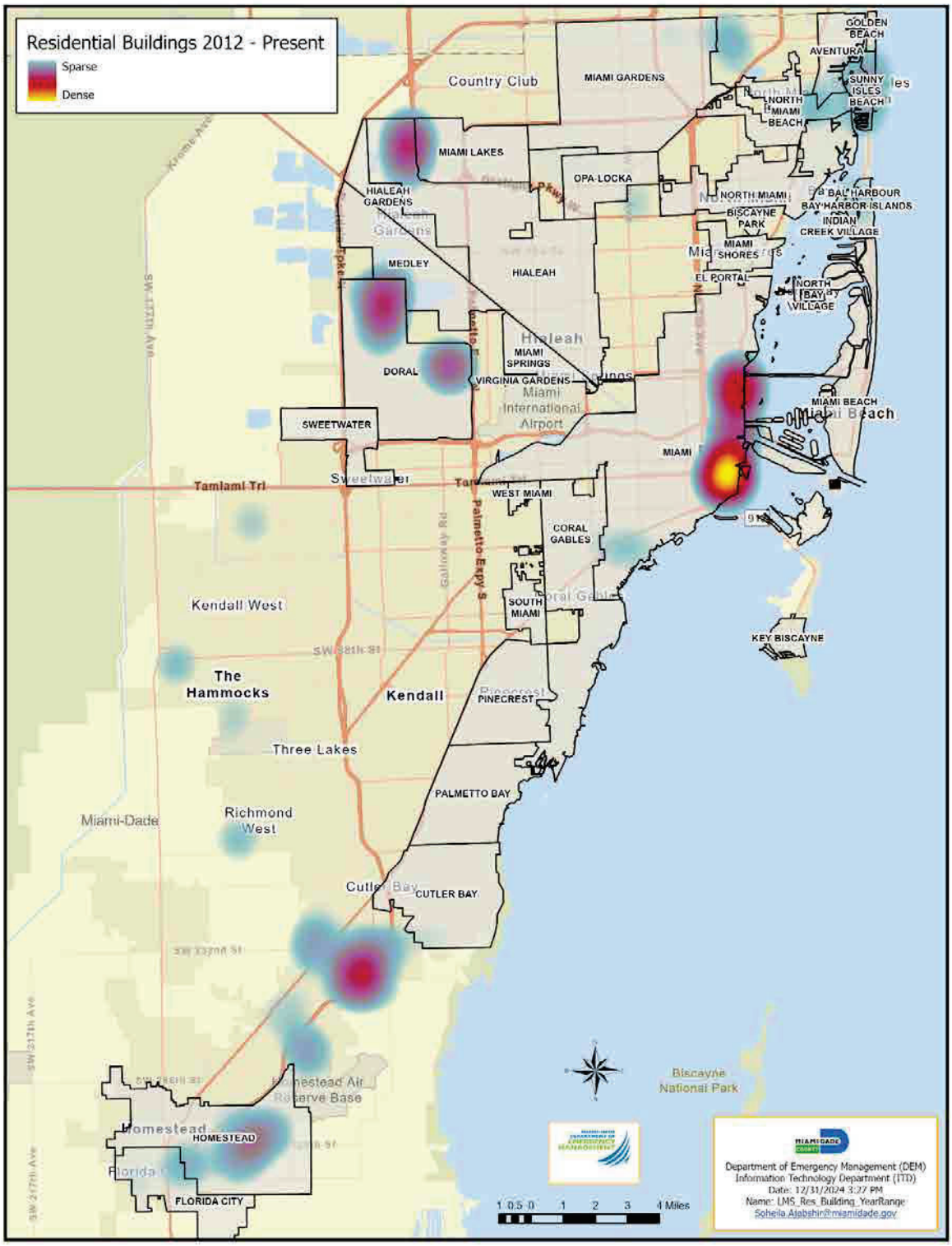


Table 7. Residential Structures by Flood Regulation Dates for Each Jurisdiction

Jurisdiction	Pre 1957	1957 – 1973	1974 – 1992	1993 – 2008	2009 – 2011	2012 – Present
Aventura	19	4,401	11,244	8,107	63	554
Bal Harbour	321	800	1123	661	210	272
Bay Harbor	546	1,307	165	139	5	532
Biscayne Park	912	92	37	2	3	11
Coral Gables	7,094	3,963	2,095	3,047	252	863
Cutler Bay	1284	4,600	3,360	4,783	280	560
Doral	13	844	4,174	11,174	750	6,842
El Portal	667	52	3	14	1	8
Florida City	280	569	301	1,003	30	1,348
Golden Beach	90	24	76	90	11	88
Hialeah Gardens	2	278	2,244	3,266	7	103
Hialeah	14,451	15,048	18,009	5,581	55	3,386
Homestead	1242	1,061	3,012	11,461	310	3,897
Indian Creek Village	3	4	8	31	4	5
Key Biscayne	530	2,326	2,221	1,592	43	371
Medley	17	28	27	22	1	4
Miami Beach	12,721	18,122	6,106	11,061	840	2,125
Miami Gardens	8,881	14,481	4,549	2,408	178	885
Miami Lakes	2	2,845	2,802	3,350	10	553
Miami Shores	2,921	533	179	80	3	31
Miami Springs	2,702	837	256	82	28	51
Miami	38,489	16,256	15,229	33,030	2927	14,733
North Bay Village	680	1,204	557	950	158	21
North Miami Beach	5,831	5,078	1,242	277	13	1,044
North Miami	7,687	5,381	1,166	601	14	152
Opa-Locka	1,864	599	162	275	9	163
Palmetto Bay	306	4,623	2,215	1,001	13	94
Pinecrest	1,177	2,947	863	915	52	500
South Miami	1,683	749	628	527	26	154
Sunny Isles Beach	245	4,889	4,495	6,502	850	2,142
Surfside	979	613	499	848	3	266
Sweetwater	50	954	2,134	383	7	23
Virginia Gardens	432	136	49	9	0	1
West Miami	1,354	97	24	95	2	29
Unincorporated	43,903	82,335	128,070	71,322	1,678	22,045
TOTAL	**159,378**	**198,076**	**219,324**	**184,689**	**8,836**	**63,856**

Figure 12 illustrates the FEMA Flood Zones, also known as the FIRMs, which went into effect in 2009. These maps can be accessed via an interactive web tool at gisweb.miamidade.gov/floodzone. FEMA is conducting an update to the Miami-Dade County FEMA Flood Zones. Preliminary maps were published in February of 2021. As of December 2024, these maps are not yet effective. The preliminary maps may also be accessed via the interactive web tool previously referenced.

Figure 13 illustrates the number of buildings that are within the Miami-Dade County FEMA Flood Zones AE and AH with clustered building counts with positions relative to their flood zone. These are based on 2024 data from the Miami-Dade County Property Appraiser.

Figure 14 illustrates the number of buildings that are within the Miami-Dade County FEMA Flood Zones VE with clustered building counts with positions relative to their flood zone. These are based on 2024 data from the Miami-Dade County Property Appraiser.

Figure 15 illustrates the number of buildings that are within all the Miami-Dade County FEMA Flood Zones with clustered building counts with positions relative to their flood zone. These are based on 2024 data from the Miami-Dade County Property Appraiser.

Table 8 provides a breakdown of the number of buildings within the FEMA Flood Zones, by jurisdiction.

Figure 12. Miami-Dade County FEMA Flood Zones (2009)

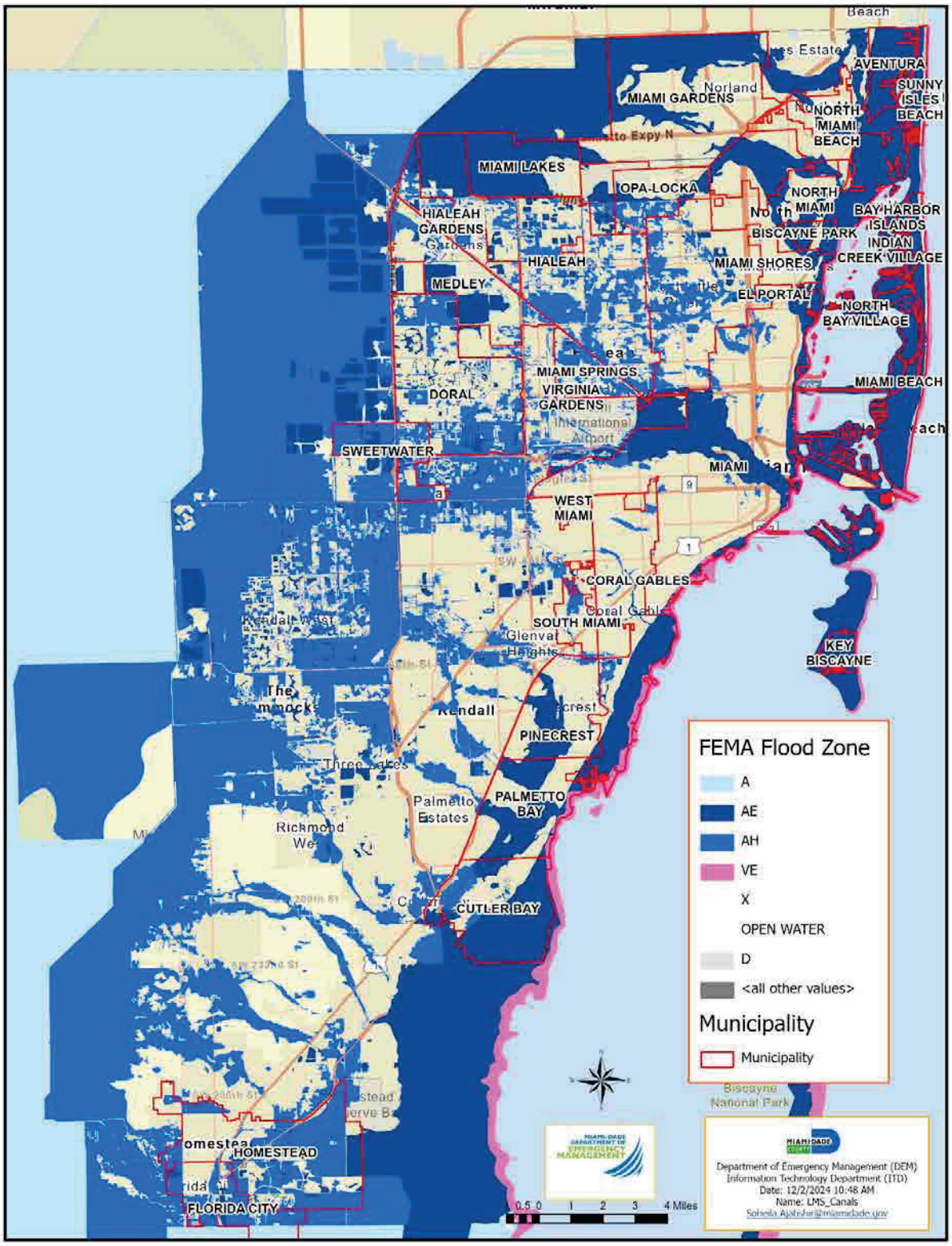


Figure 13. Buildings by FEMA Flood Zones – AE and AH

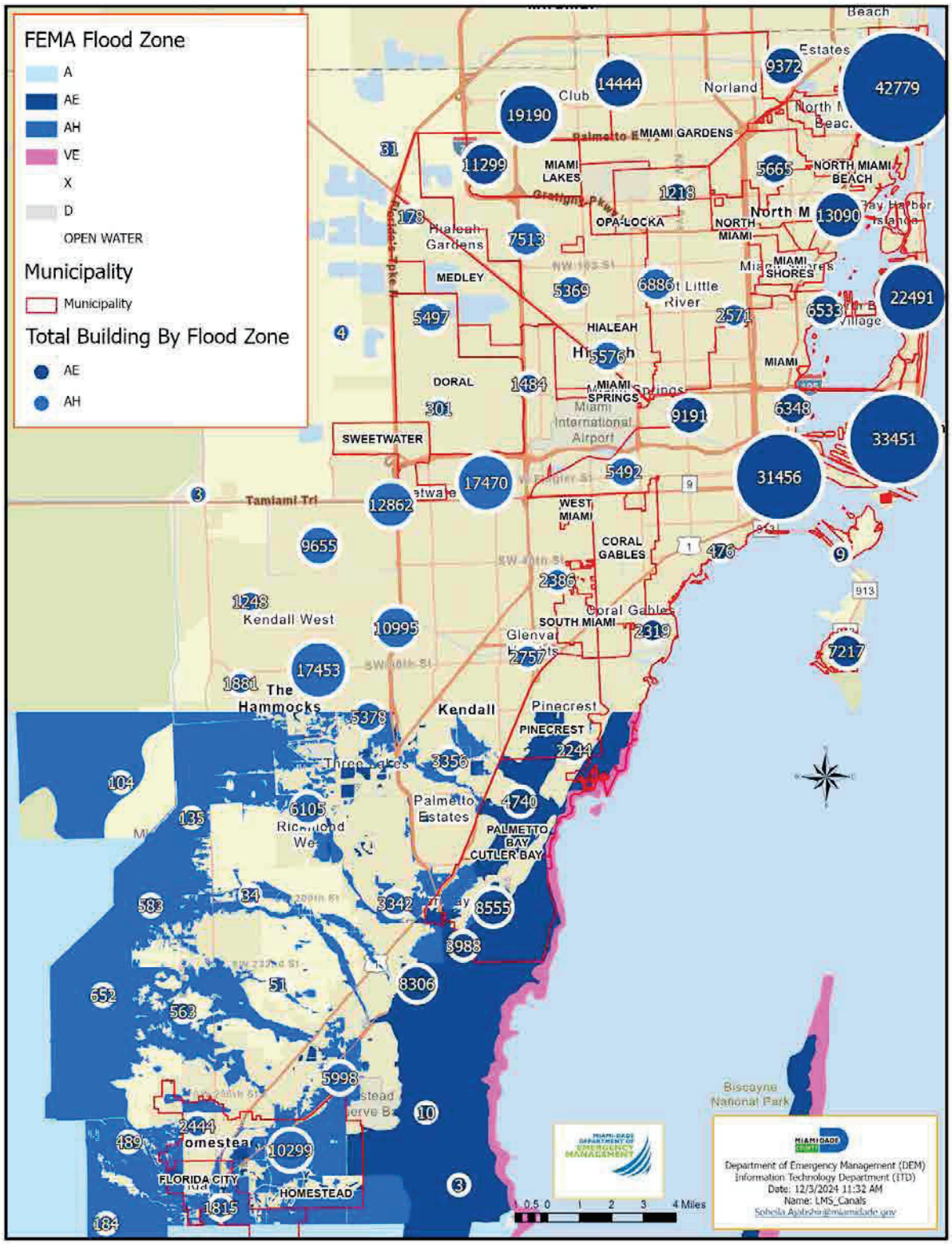


Figure 14. Buildings by FEMA Flood Zones – VE

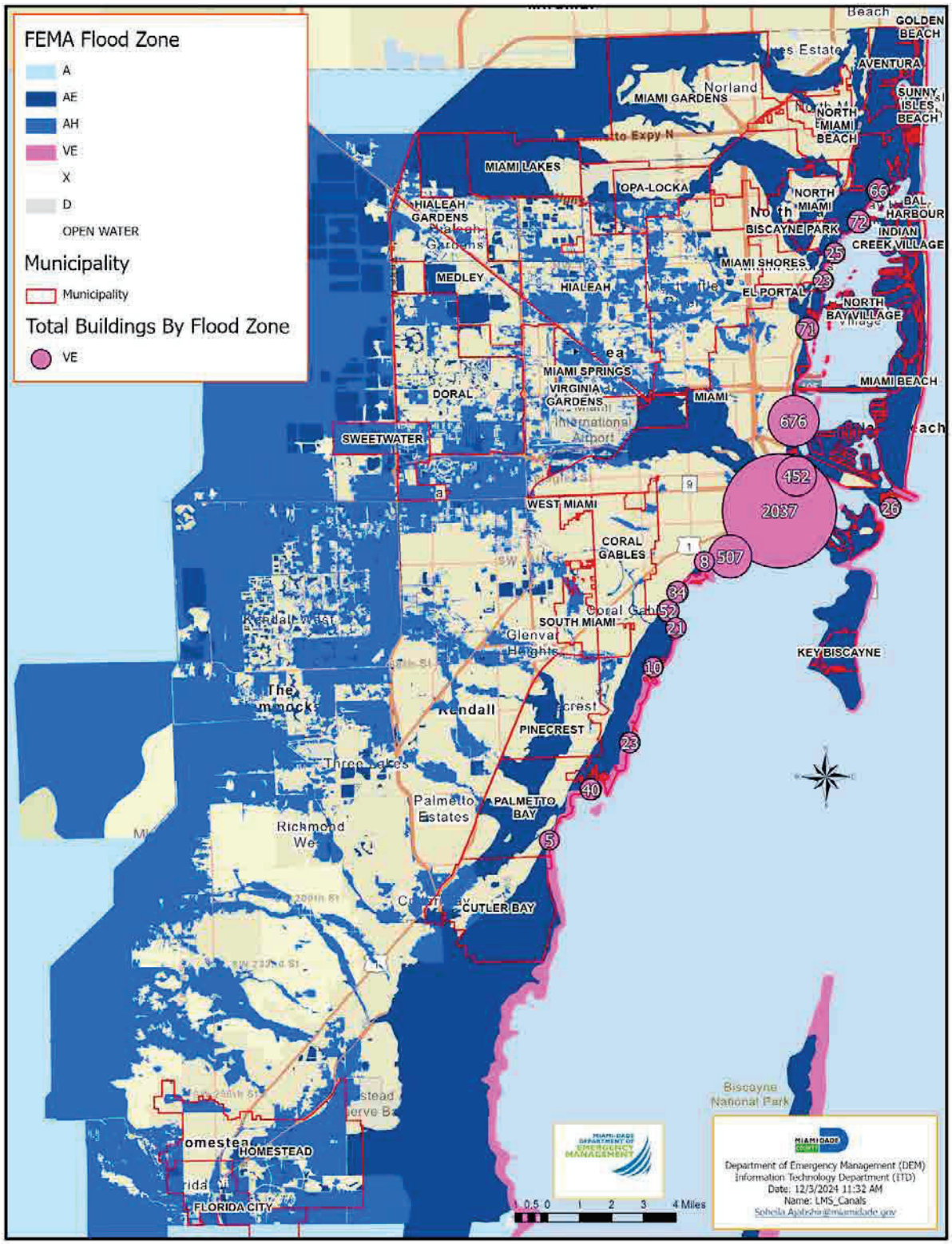


Figure 15. Buildings by FEMA Flood Zones

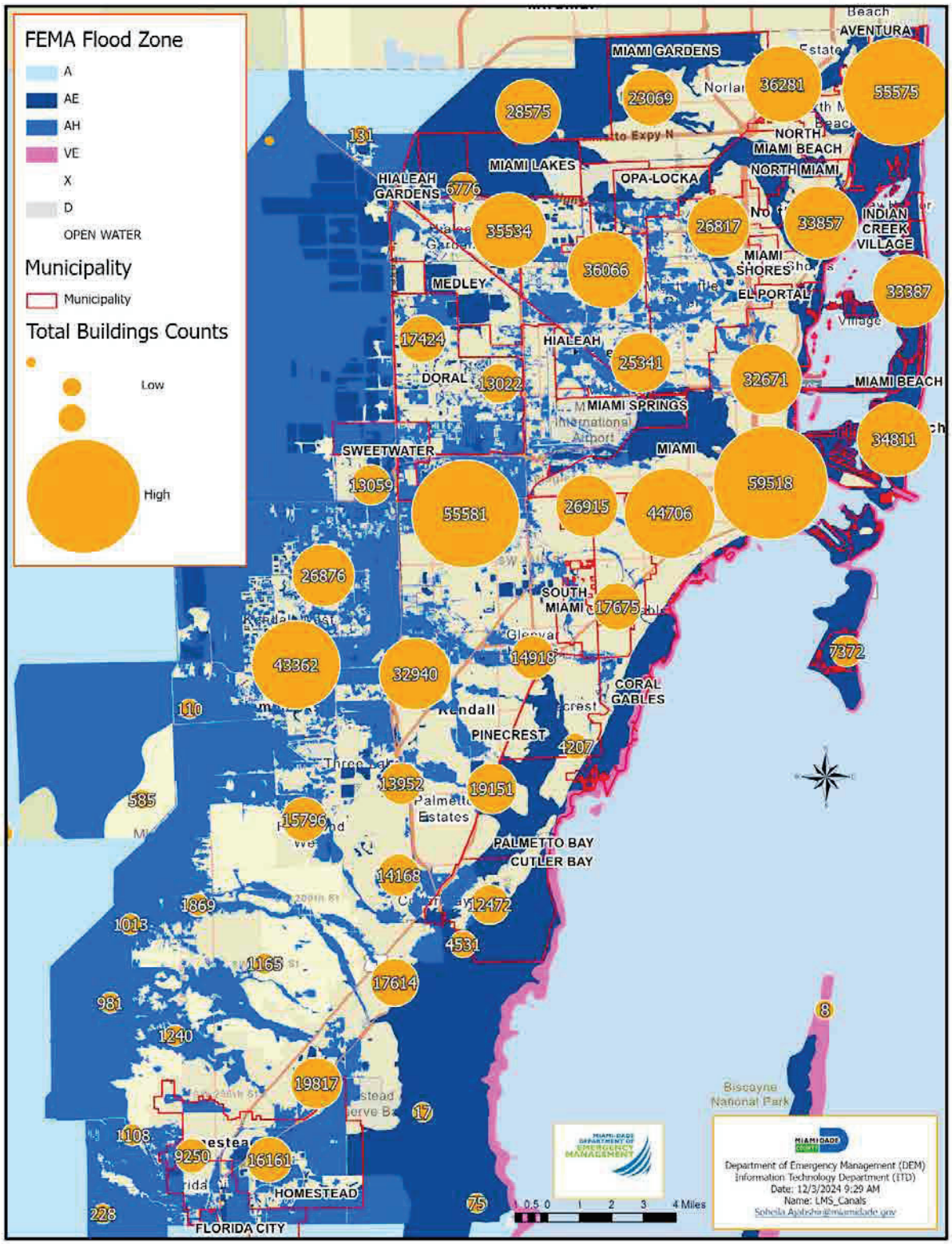


Table 8. Number of Buildings in FEMA Flood Zones for Each Jurisdiction (2024)

Jurisdiction	A	AE	AH	D	VE	X
Aventura		24,861				172
Bal Harbour		642				3,192
Bay Harbor		2,906				
Biscayne Park		1,116				93
Coral Gables		2,977	1,414		65	16,097
Cutler Bay		8,902	2,009			4,343
Doral		166	7,311			19,729
El Portal		10	111			755
Florida City	2	21	1,899			2,072
Golden Beach		269				136
Hialeah		4,478	21,569			40,678
Hialeah Gardens		139	429			5,895
Homestead		770	12,137			9,556
Indian Creek Village		51				20
Key Biscayne		7,298				
Medley		9	456			1,159
City of Miami		51,416	7,084		3,864	84,868
Miami Beach		51,701				3,939
Miami Gardens		14,024				20,227
Miami Lakes		8,934				1,341
Miami Shores		843			24	3,277
Miami Springs		48	2,338			2,486
North Bay Village		3,659				
North Miami		8,579			139	8,580
North Miami Beach		6,458				8,285
Opa-Locka		951	569			3,104
Palmetto Bay		4,802			44	3,857
Pinecrest		2,260	67			4,618
South Miami		1	825			3,977
Sunny Isles Beach		11,971			1	7,719
Surfside		1,562				1,767
Sweetwater		11	3,410			1,103
Virginia Gardens			132			592
West Miami						1,823
Unincorporated	921	53,113	113,619	1	100	217,268
TOTAL	**923**	**233,368**	**164,534**	**1**	**4,172**	**438,347**

Storm Surge

Storm surge is the abnormal rise in ocean water during a tropical cyclone (tropical storm or hurricane), measured as the height of the water above the normal predicted astronomical tide. This is primarily caused by the storm's winds pushing water onshore. The amplitude of the storm surge at any given location depends on the orientation of the coastline with the storm's track, intensity, size, forward speed and the local bathymetry.[33] Coastal areas are more likely to experience high velocity storm surge which can cause erosion and structural damage. Meanwhile, areas inland are more likely to experience rising water as storm surge pushes inland, and into canals and rivers. Storm surge is the greatest threat to life and property from a tropical cyclone.

DEM utilizes the National Hurricane Center (NHC) Sea, Lake and Overland Surges from Hurricanes (SLOSH) model[34] to estimate storm surge heights in Miami-Dade County. In order to assist Miami-Dade County residents to understand their risk to storm surge, DEM developed the Miami-Dade County Storm Surge Planning Zones. The Miami-Dade County Storm Surge Planning Zones are areas that could potentially be affected by storm surge of 1.5 feet (18 inches) or higher during a hurricane. Miami-Dade County utilizes a risk-based approach based on the direction, size, forward speed, and arrival at high or low tide, which play a crucial role in pinpointing where the storm surge for each storm is likely to impact. To identify Storm Surge Planning Zones, DEM analyses data from SLOSH's Maximum of Maximums (MOM) models which provides the worst-case scenario of high-water value at a particular location for each storm category. SLOSH MOMs are used nationwide for hurricane evacuation planning and to develop the nation's evacuation zones.[35]

Storm Surge Planning Zones are not evacuation zones and should be utilized for planning purposes by residents, visitors and stakeholders to determine their potential risk of storm surge. There are five (5) Storm Surge Planning Zones:

Zone A – is at greatest risk for storm surge of Category 1 and higher storms
Zone B – is at greatest risk for storm surge of Category 2 and higher storms
Zone C – is at greatest risk for storm surge of Category 3 and higher storms
Zone D – is at greatest risk for storm surge of Category 4 and higher storms
Zone E – is at greatest risk for storm surge of Category 5 storms

Figure 16 illustrates Miami-Dade County's Storm Surge Planning Zones map. Table 9 demonstrates the projected population [36] and clearance times based on revised evacuation modeling done by the South Florida Regional Planning Council (SFRPC) in 2020. The revised data is based on additional evacuation center locations and revised Storm Surge Planning Zones provided to SFRPC by DEM. The time reflected here is based on the SLOSH MOM data models and it projects a maximum timeframe based upon compliance with evacuation orders.

[33] Ocean Facts, What is Storm Surge? (NOAA): https://oceanservice.noaa.gov/facts/stormsurge-stormtide.html
[34] NHC's SLOSH: https://vlab.noaa.gov/web/mdl/slosh
[35] NHC SLOSH Storm Surge MOM: https://www.nhc.noaa.gov/surge/momOverview.php
[36] 2020 Population – Evacuation Clearance Times were revised in 2020

Figure 16. Storm Surge Planning Zones Map

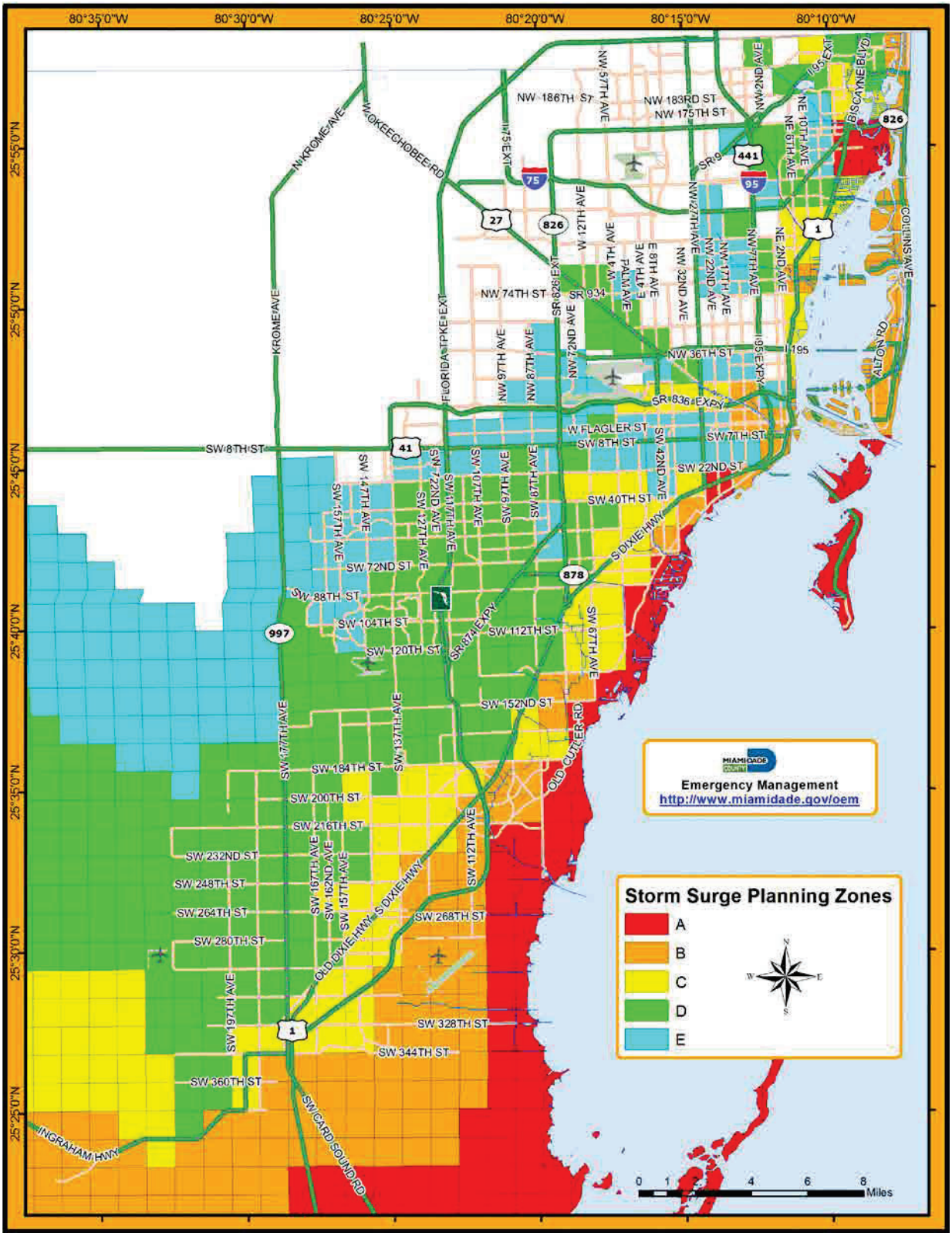


Table 9. South Florida Regional Evacuation Study – 2020 Base Scenario *

	Population				In County Clearance Times (hours)	Out of County Clearance Times (hours)
	Site-Built Homes (includes shadow evacuation)	Tourists	Mobile Homes	Cumulative (includes university population)		
A	559,639	1,138	37,902	599,050	23	23
B	933,746	65,786		1,037,909	32	32
C	1,302,514	76,160		1,417,932	37	37
D	1,955,245	93,387		2,088,073	66	66
E	2,297,842	102,955		2,440,577	77	77

**Clearance times from Base Scenario provided by SFRPC and FDEM on 2021.*

Figures 17 through 23 illustrate Miami-Dade County buildings by land use within the Storm Surge Planning Zones, their counts and relative locations. Tables 10 and 11 provide a breakdown of the building types and the total building area (square feet) for each building type within the Storm Surge Planning Zones in each jurisdiction.

Figure 17. Buildings by Land Use Within Storm Surge Planning Zones – Residential

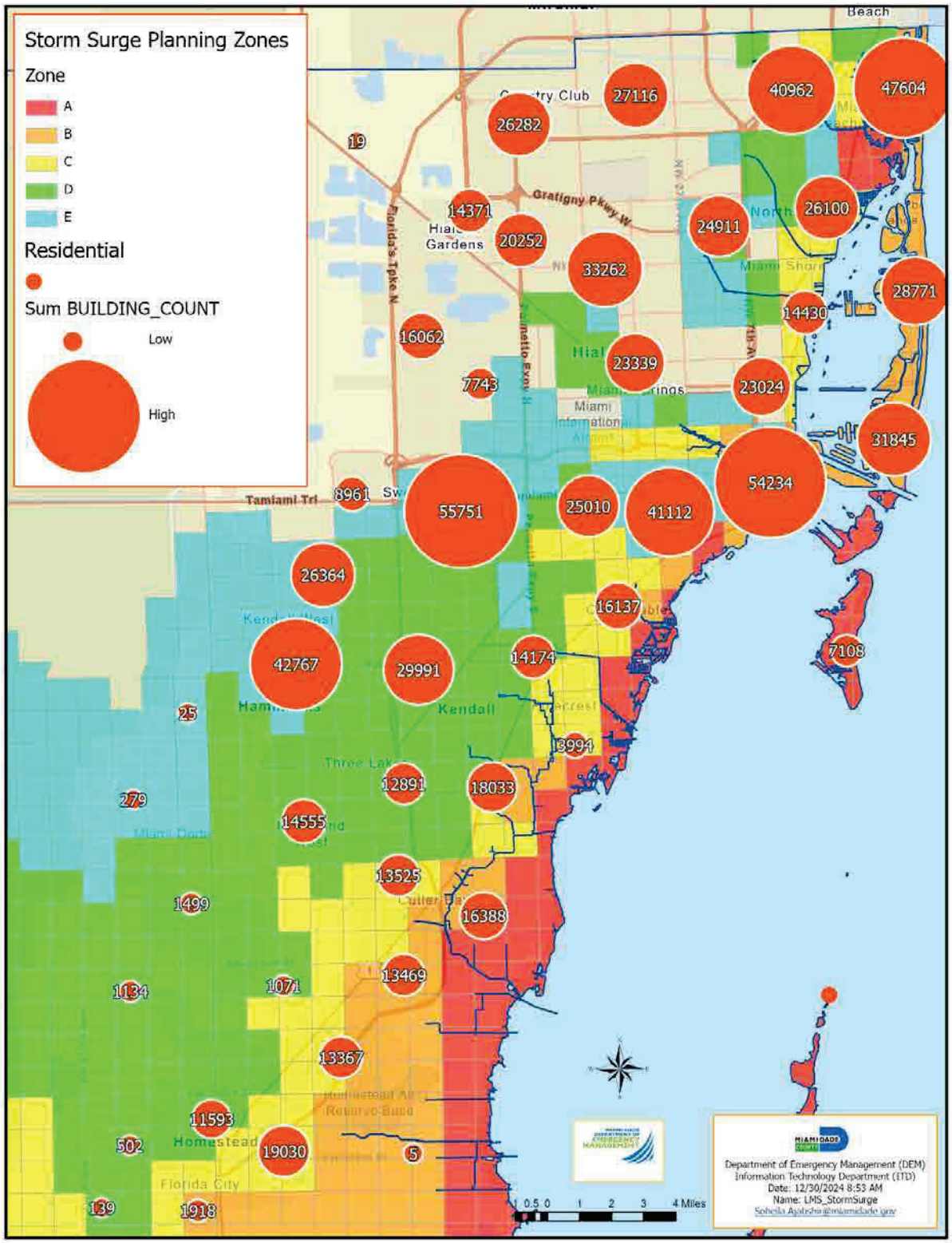


Figure 18. Buildings by Land Use Within Storm Surge Planning Zones – Commercial

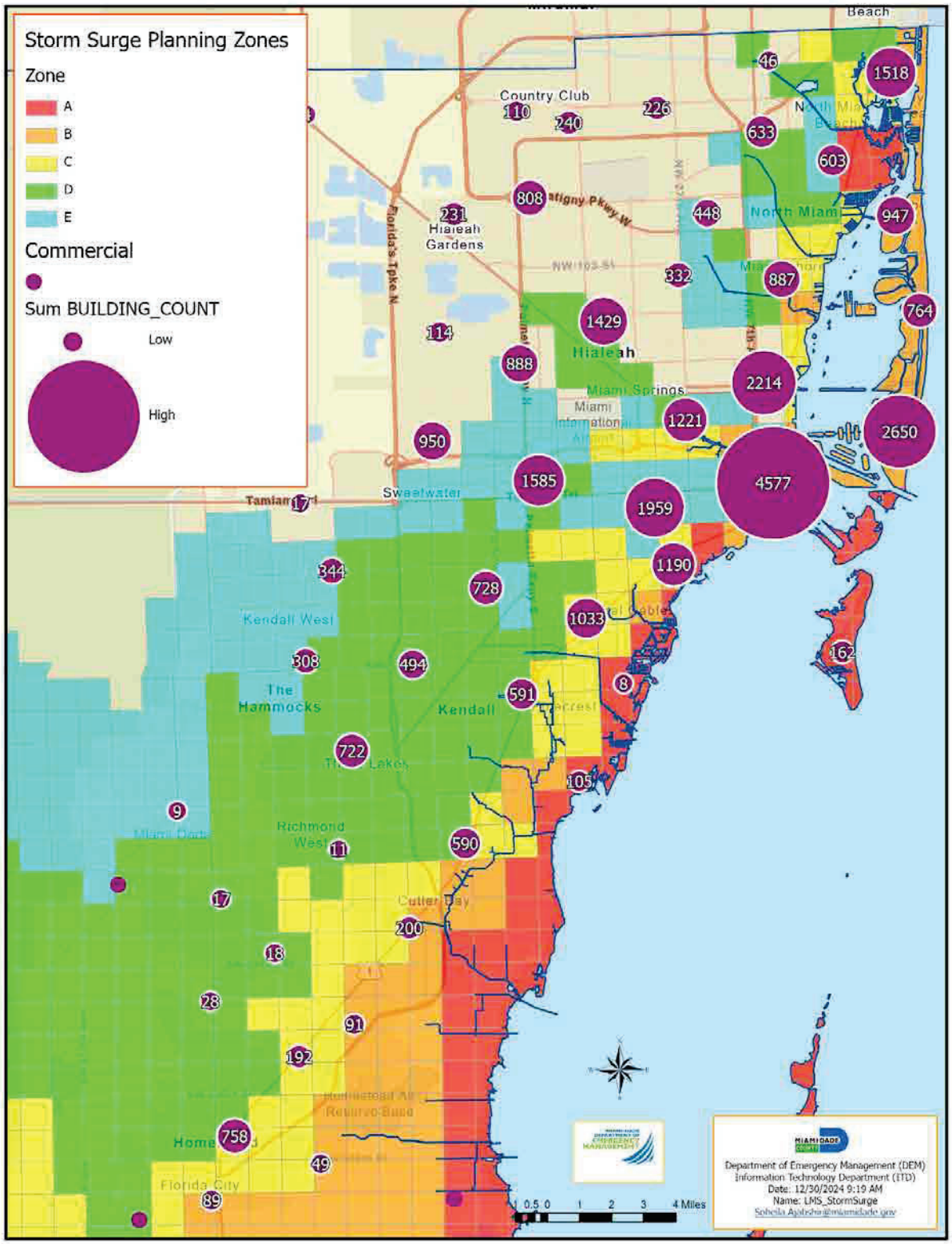


Figure 19. Buildings by Land Use Within Storm Surge Planning Zones – Agricultural

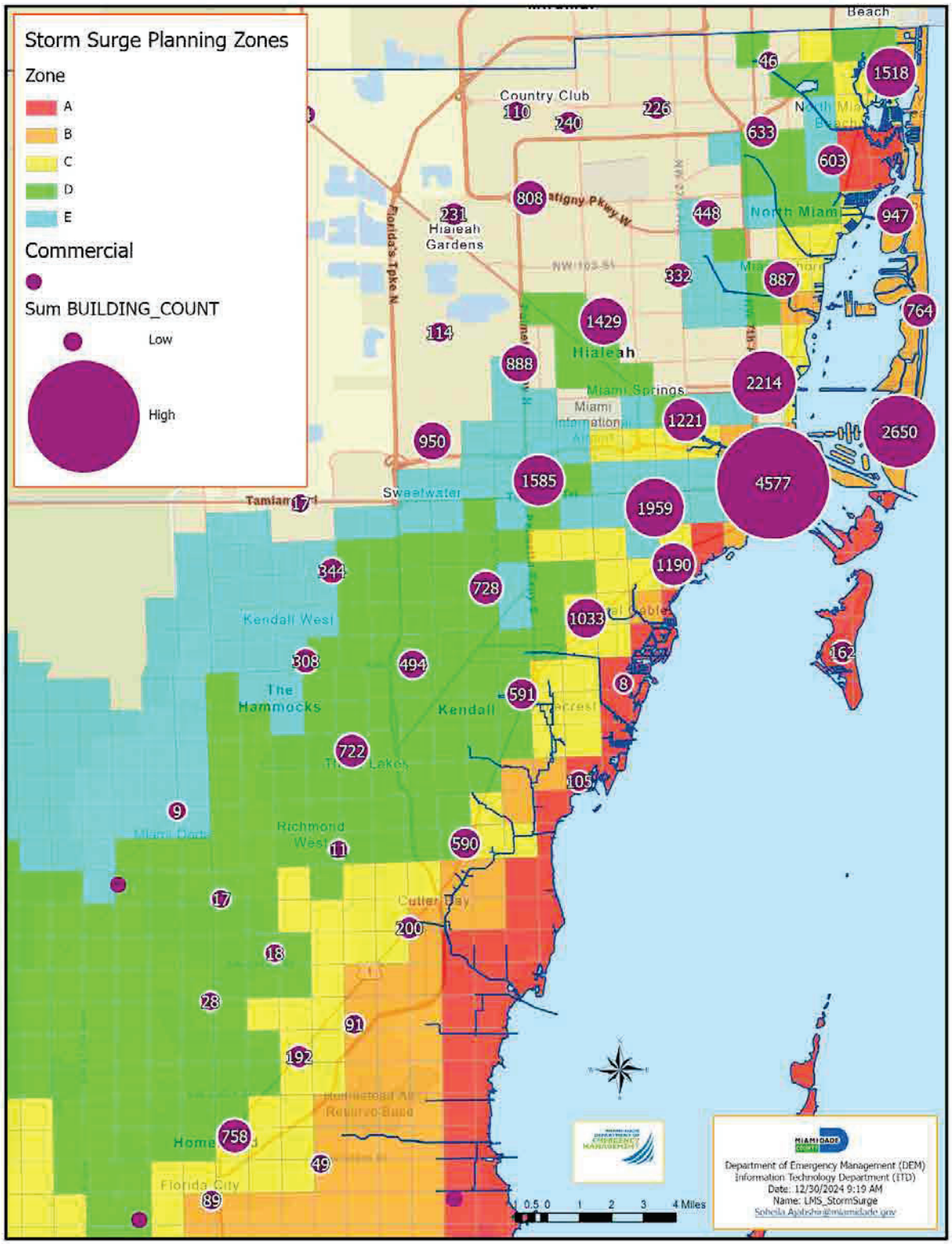


Figure 20. Buildings by Land Use Within Storm Surge Planning Zones – Governmental

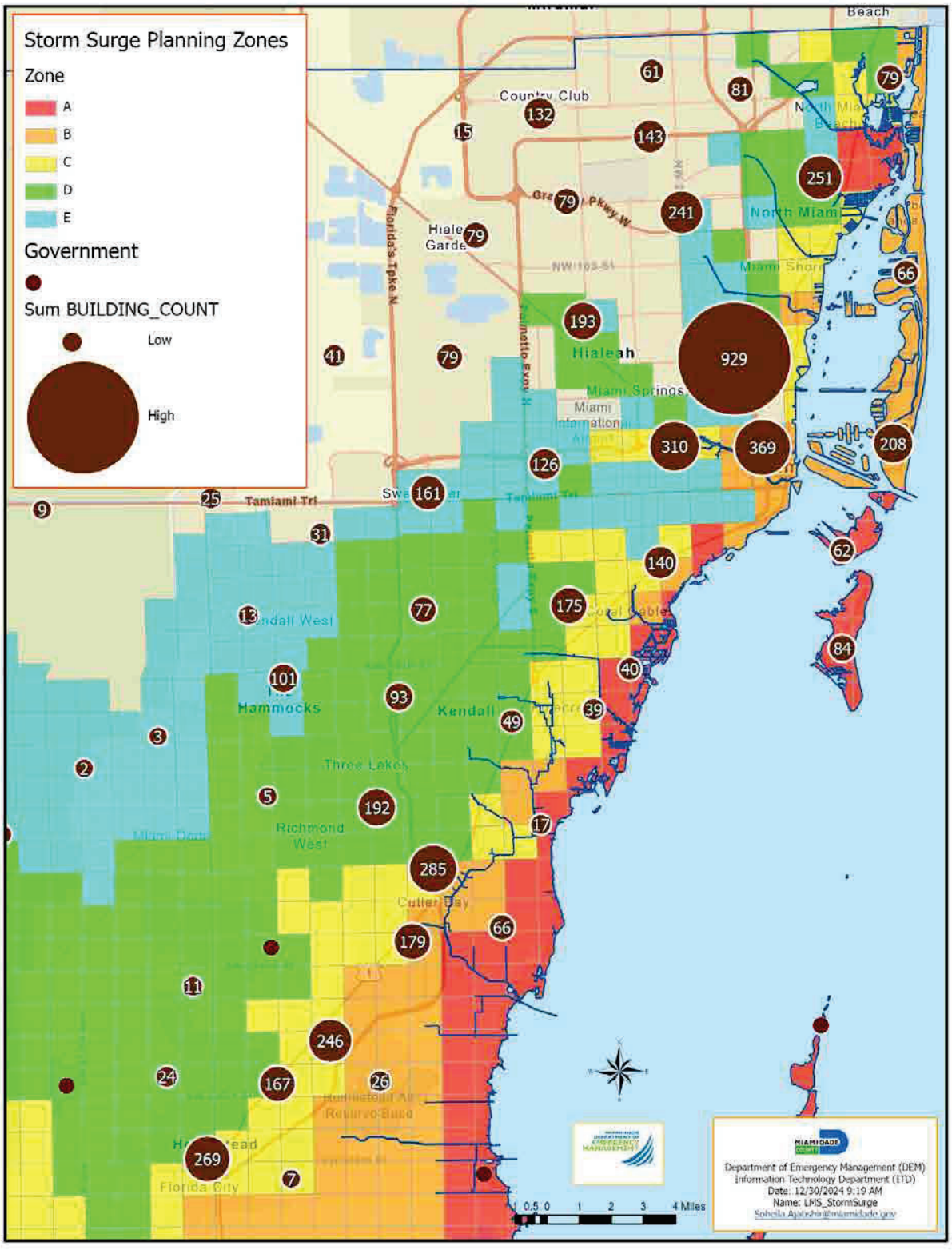


Figure 21. Buildings by Land Use Within Storm Surge Planning Zones – Industrial

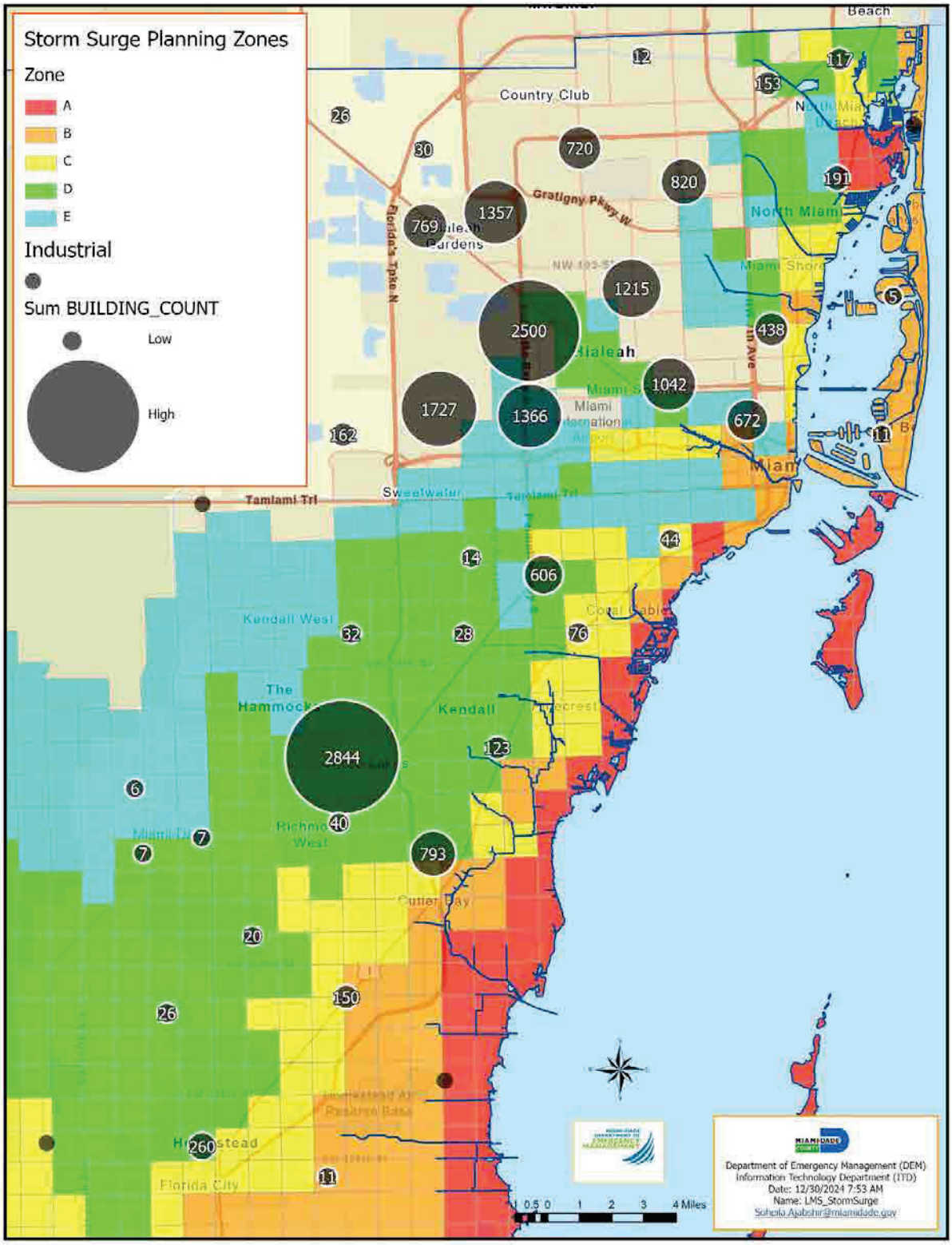


Figure 22. Buildings by Land Use Within Storm Surge Planning Zones – Institutional

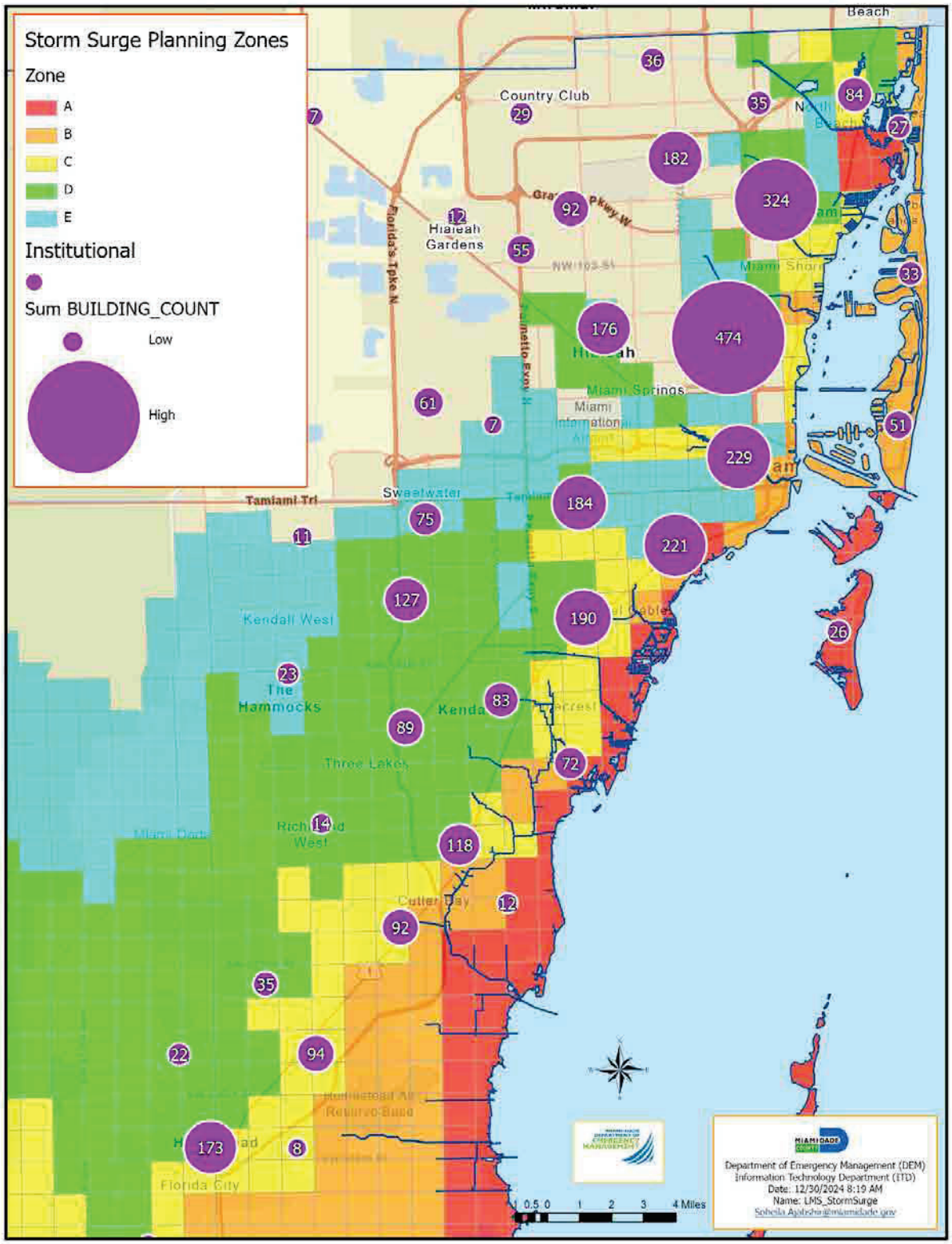


Figure 23. Buildings by Land Use Within Storm Surge Planning Zones – Other

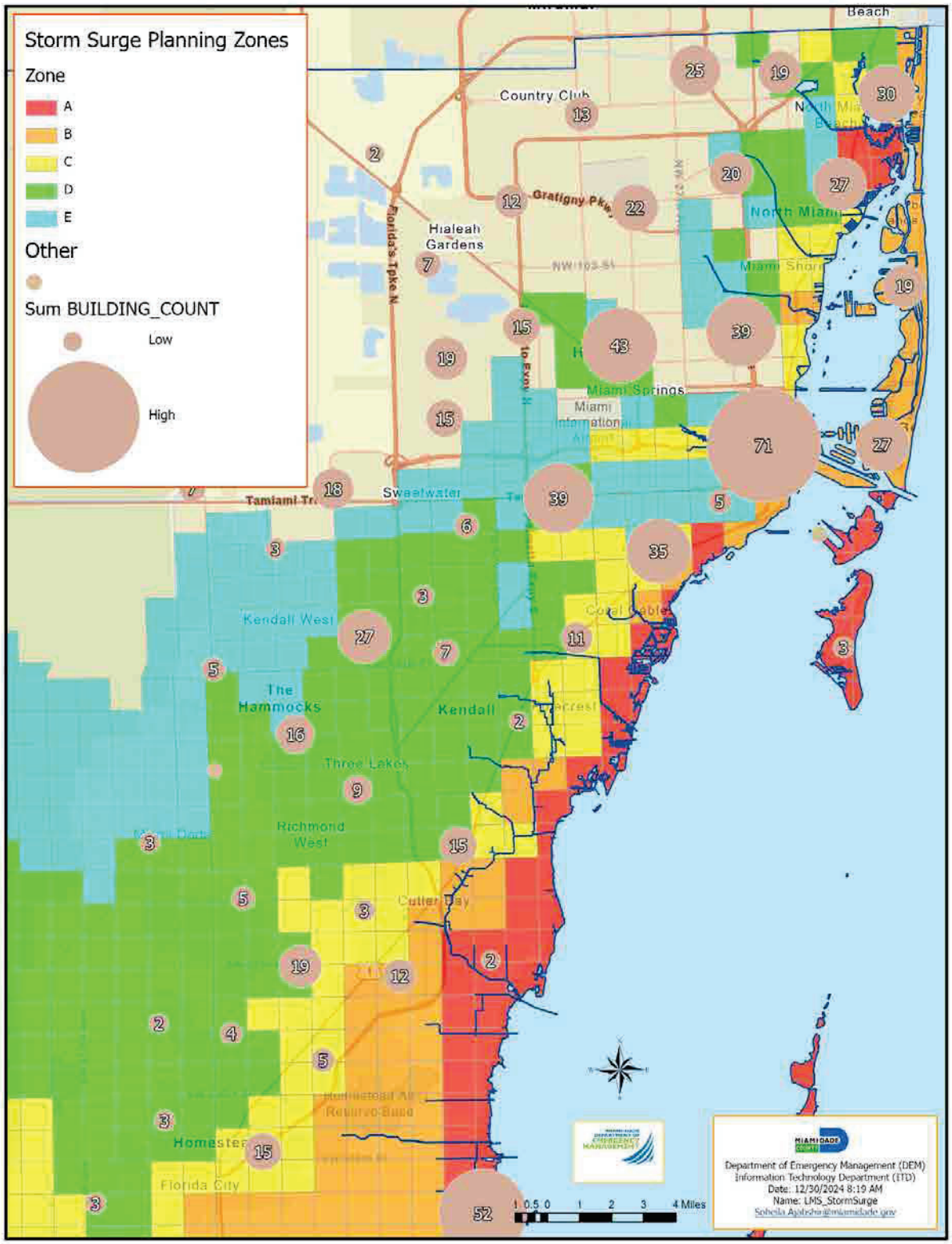


Table 10. Commercial and Industrial Facilities Within Storm Surge Planning Zones for Each Jurisdiction

Jurisdiction	Commercial		Industrial	
	Number of Buildings	Total Area (sq. ft.)	Number of Buildings	Total Area (sq. ft.)
Aventura	550	13,166,691	8	298,475
Bal Harbour	394	1,658,633	0	0
Bay Harbor Islands	103	664,325	0	0
Biscayne Park	0	0	0	0
Coral Gables	1,716	19,156,832	6	62,410
Cutler Bay	131	3,393,809	1	4,000
Doral	1,507	19,787,275	2,048	39,414,451
El Portal	11	41,253	1	35,777
Florida City	185	2,202,110	49	712,168
Golden Beach	0	0	0	
Hialeah	1,852	16,622,321	2,769	30,994,183
Hialeah Gardens	111	2,055,372	384	4,089,026
Homestead	640	5,110,437	204	1,374,518
Indian Creek Village	10	95,934	0	0
Key Biscayne	348	1,085,372	0	0
Medley	99	1,011,881	904	23,520,187
City of Miami	10,245	95,632,026	1,373	16,385,958
Miami Beach	6,352	30,988,354	15	217,650
Miami Gardens	437	7,693,989	515	12,507,800
Miami Lakes	456	4,605,825	174	6,487,657
Miami Shores	81	697,032	0	0
Miami Springs	191	2,624,973	9	93,150
North Bay Village	75	401,248	1	106,944
North Miami	688	5,462,042	124	2,358,690
North Miami Beach	556	5,273,613	74	990,693
Opa-Locka	219	831,091	680	7,900,011
Palmetto Bay	277	2,990,799	1	56,131
Pinecrest	159	2,157,620	6	16,211
South Miami	647	3,889,185	28	144,236
Sunny Isles Beach	2,299	3,307,366	1	56,279
Surfside	149	1,283,622	0	0
Sweetwater	620	3,966,773	363	3,009,111
Virginia Gardens	24	661,551	2	125,007
West Miami	100	520,240	2	10,935
Unincorporated	7,644	84,231,171	8,533	101,198,244
TOTAL	**38,876**	**343,270,765**	**18,275**	**211,642,621**

Table 11. Residential and Other Structures Within Storm Surge Planning Zones for Each Jurisdiction

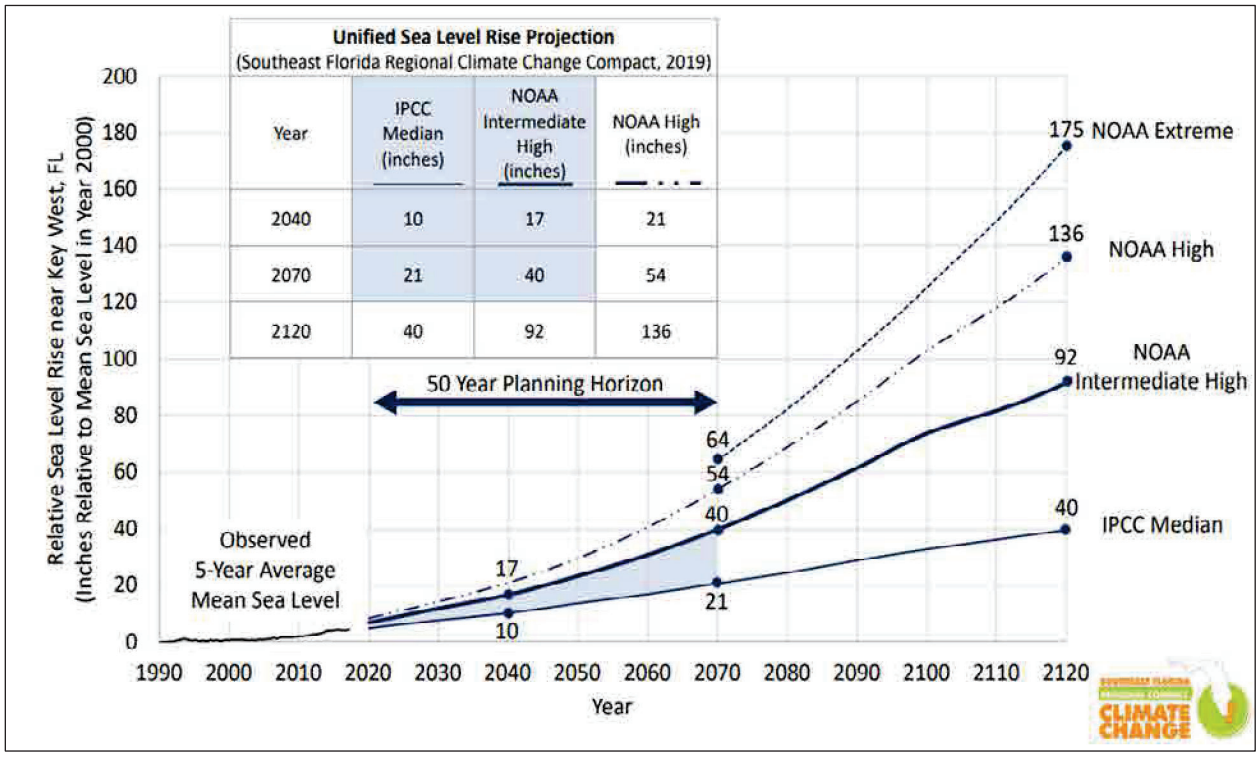
Jurisdiction	Residential		Other Structures	
	Number of Buildings	Total Area (sq. ft.)	Number of Buildings	Total Area (sq. ft.)
Aventura	24,433	40,077,779	46	2,646,134
Bal Harbour	3,530	7,817,227	6	1,055,206
Bay Harbor Islands	2,641	4,632,700	5	266,242
Biscayne Park	1,207	2,216,422	7	27,556
Coral Gables	18,398	48,645,372	311	9,395,643
Cutler Bay	15,148	30,666,505	121	1,614,728
Doral	21,299	47,644,906	140	4,482,052
El Portal	873	1,476,122	5	145,101
Florida City	2,327	4,751,097	163	964,999
Golden Beach	399	2,040,313	4	9,889
Hialeah	60,419	90,114,157	639	10,919,937
Hialeah Gardens	5,889	8,753,126	39	1,328,179
Homestead	19,707	37,785,681	317	3,917,077
Indian Creek Village	59	454,161	2	5,339
Key Biscayne	6,935	15,103,642	30	406,138
Medley	109	113,811	17	197,432
City of Miami	130,661	224,452,107	2,480	53,518,521
Miami Beach	49,646	72,803,391	278	8,420,819
Miami Gardens	32,598	53,622,580	449	7,433,666
Miami Lakes	9,546	22,226,808	86	1,277,680
Miami Shores	4,025	8,290,366	77	1,526,834
Miami Springs	4,691	8,697,842	85	947,992
North Bay Village	3,795	5,602,394	12	150,652
North Miami	16,293	29,148,481	319	4,152,616
North Miami Beach	13,903	21,866,386	145	1,966,375
Opa-Locka	3,378	6,108,934	222	4,904,946
Palmetto Bay	8,432	24,606,134	110	1,239,733
Pinecrest	6,674	24,438,701	76	1,206,556
South Miami	4.035	9,082,609	88	1,809,346
Sunny Isles Beach	16,347	27,511,257	33	1,122,319
Surfside	3,436	6,418,520	11	149,856
Sweetwater	3,585	6,441,572	35	1,035,351
Virginia Gardens	693	1,135,994	10	159,642
West Miami	1,715	4,015,137	18	215,623
Unincorporated	351,510	653,757,837	4,986	70,345,434
TOTAL	**844,305**	**1,552,520,071**	**11,372**	**198,965,613**

Climate Change and Sea Level Rise

There are a number of factors influencing sea level rise; such as, thermal expansion as a result of increasing sea surface temperatures and the melting of land ice due to the Earth's increase average of surface temperatures. Miami-Dade County is in a geographical area surrounded by major bodies of water – the Atlantic Ocean, Biscayne Bay, and rivers, lakes and canals. Figure 24 illustrates the anticipated range of sea level rise for Southeast Florida from 2000 to 2120. The graph and table demonstrate the projected rise of sea level above the 2000 mean sea level by 2040 (short term), by 2070 (medium term) and by 2120 (long term). These projections are intended to assist local and regional decision-makers to plan and make decisions about sea level rise and associated vulnerabilities.[37] Impacts associated to sea level rise in Miami-Dade County include:

- Coastal erosion
- Exacerbated storm surge
- Increased frequency of coastal flooding (i.e. tidal flooding)
- Urban flooding
- Saltwater intrusion
- Infrastructure impacts

Figure 24. Regional Unified Sea Level Rise Projections for Southeast Florida (2019)



[37] Southeast Florida Regional Climate Compact, Unified Sea Level Rise Projection Southeast Florida (2019 Update): https://southeastfloridaclimatecompact.org/initiative/regionally-unified-sea-level-rise-projection/

In July 2013, the BCC implemented the Sea Level Rise Task Force to explore the implications of sea level rise on Miami-Dade County's environment, economy, communities and policies. The Sea Level Rise Task Force presented seven (7) recommendations to the BCC which became six (6) resolutions and were passed unanimously in January 2015. Subsequently, RER's Office of Sustainability became the Office of Resilience.[38] In 2025, the Office of Resilience became the Office of Environmental Risk and Resilience. This office continues to work on strengthening the County's infrastructure, plan for more resilient communities, enhance natural protections and promote economic resilience through policies and task forces. Further details on Miami-Dade County's efforts to identify and develop mitigation and adaptation strategies to prepare for sea level rise, go to: https://www.miamidade.gov/global/economy/resilience/sea-level-rise-flooding.page.

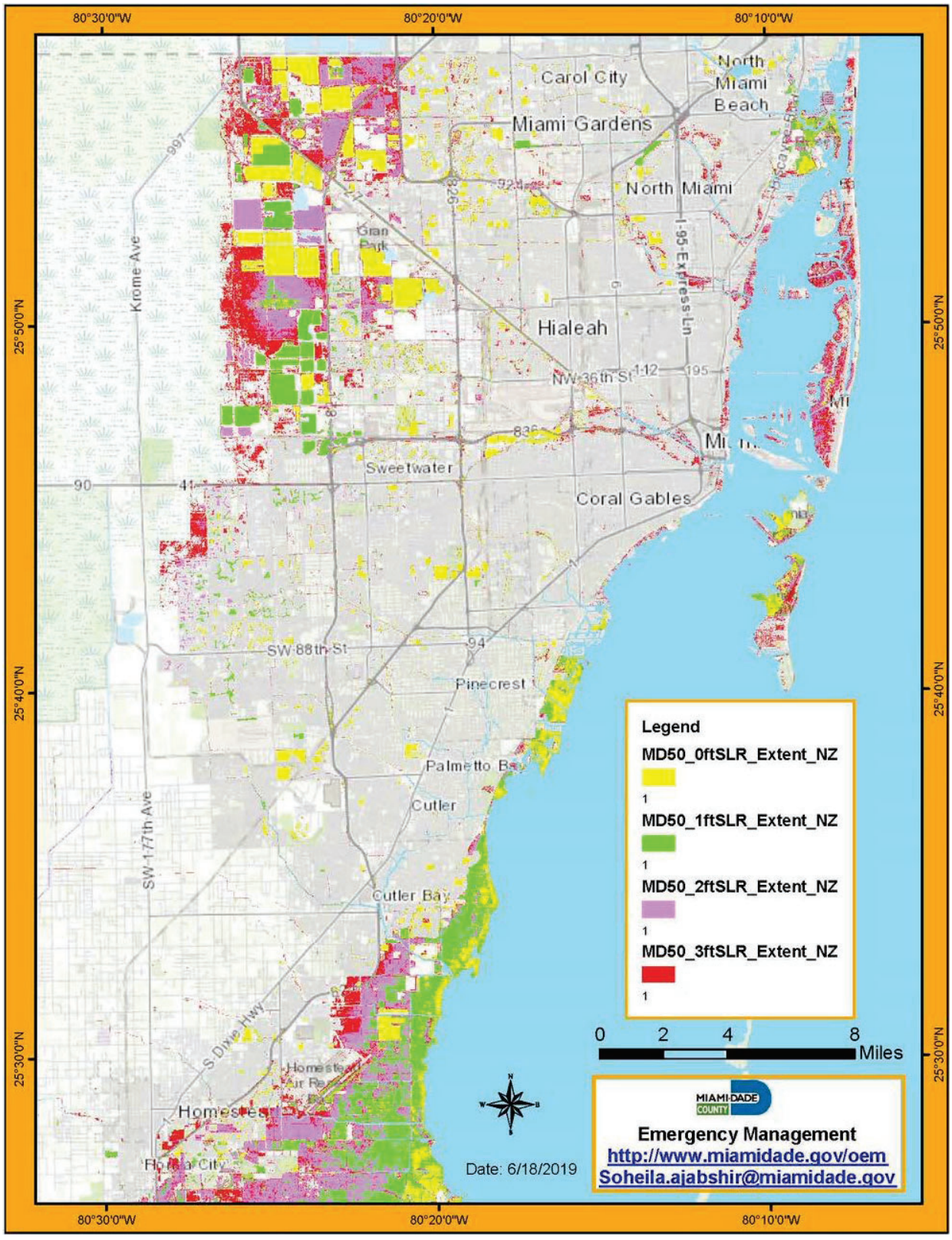
Miami-Dade County has incorporated climate change and sea level rise in a number of planning efforts through mitigation and adaptation.

- Miami-Dade County Comprehensive Development Master Plan (CDMP) incorporated climate change considerations and language in several of the CDMP Elements in October 2013. This implementation will form a foundation for Miami-Dade County to incorporate these considerations into existing capital investments and infrastructure planning processes.
- In 2010, Miami-Dade County partnered with Broward, Monroe and Palm Beach Counties to form the Southeast Florida Regional Climate Change Compact to coordinate mitigation and adaptation efforts for the region.
- Resilient Greater Miami & the Beaches (GM&B), a collaboration between Miami-Dade County, City of Miami, and Miami Beach was selected to join 100 Resilient Cities in 2016. A local multi-jurisdictional partnership to create an inclusive resilience strategy.
- In 2019, GM&B released the Resilient305 Strategy, a living document that addresses resilience challenges prioritized through intergovernmental and community collaboration.[39]
- In 2021, Miami-Dade County published its first Sea Level Rise Strategy outlining adaptation approaches, key actions, summary of impacts, and local and regional projects addressing increased flood risk.

Figure 17 illustrates the potential impacts of sea level rise in Miami-Dade County. This map was developed utilizing data collected for the Southeast Florida Regional Climate Change Compact.

[38] Miami-Dade County Sea Level Rise Report Executive Summary: https://www.miamidade.gov/green/library/sea-level-rise-executive-summary.pdf
[39] Resilient305 Strategy: https://resilient305.com/our-future/

Figure 25. Potential Sea Level Rise Impacts in Miami-Dade County



REPETITIVE LOSSES

For CRS purposes, a repetitive loss property is an insurable structure which has had two (2) or more claims of more than $1,000 paid by NFIP within a ten-year period, since 1978. A Severe Repetitive Loss (SRL) property is an NFIP-insured residential structure that meets at least one (1) of the following criteria since 1978, as defined under the Flood Insurance Reform Act of 2004:

- 1-4 family properties that had four (4) or more separate claims of more than $5,000 each; or
- Two (2) to three (3) claims that cumulatively exceeds the market value of the building

Non-residential structures that meet the same criteria as for 1-4 family properties are considered SRL properties, for CRS purposes.[40]

At least two (2) of the reference claims must have occurred within any ten-year period and must be greater than 10 days apart. Therefore, multiple losses in the same location, within ten days of each other, are counted as one (1) with the payment amounts added together. Repetitive loss designation remains with a structure regardless of ownership changes. Additionally, the designation remains in the community's list even if the insurance policy lapsed, has been terminated or the structure's risk has been mitigated.[41,42]

A repetitive loss area is a portion(s) of a community that includes buildings on FEMA's list of repetitive losses and also any nearby properties that are subject to the same or similar flooding conditions.[43] In Miami-Dade County, mitigation activities in repetitive loss areas are prioritized based on the number of claims placed in each neighborhood. Additionally, drainage capital improvement projects are prioritized in areas with most repetitive losses, flood complaints and low-lying areas with flood protection levels of service below the threshold identified in the CDMP. Figure 26 and 27 illustrates the Repetitive Loss Areas and Severe Repetitive Loss Areas within Miami-Dade County through clusters of their count and approximate locations.

In order to participate in the CRS Program, a jurisdiction must maintain and update its repetitive loss data. This data will assist a jurisdiction to better identify its repetitive flood problems and appropriate mitigation measures. FEMA produces a list of repetitive loss properties for communities that participate in the CRS Program, on a yearly basis and a jurisdiction can obtain it by contacting the ISO/CRS Specialist for the State of Florida. However, communities are required to provide updates to their ISO/CRS Specialist when preparing for a repetitive loss area analysis.

The State ISO/CRS Specialist contact information can be obtained via the following link: https://crsresources.org/100-2.

[40] 2017 CRS Coordinator's Manual: https://crsresources.org/manual/
[41] Developing a Repetitive Loss Area Analysis for Credit Under Activity 510 (Floodplain Management Planning) for the Community Rating System (2017): https://crsresources.org/files/500/rlaa-guide-2017.pdf
[42] FEMA Guidance for Severe Repetitive Loss Properties: https://www.fema.gov/pdf/nfip/manual201205/content/20_srl.pdf
[43] Mapping Repetitive Loss Areas for CRS Handout: https://crsresources.org/files/500/mapping_repetitive_loss_areas.pdf

Figure 26. Miami-Dade County Repetitive Loss (FEMA) Areas

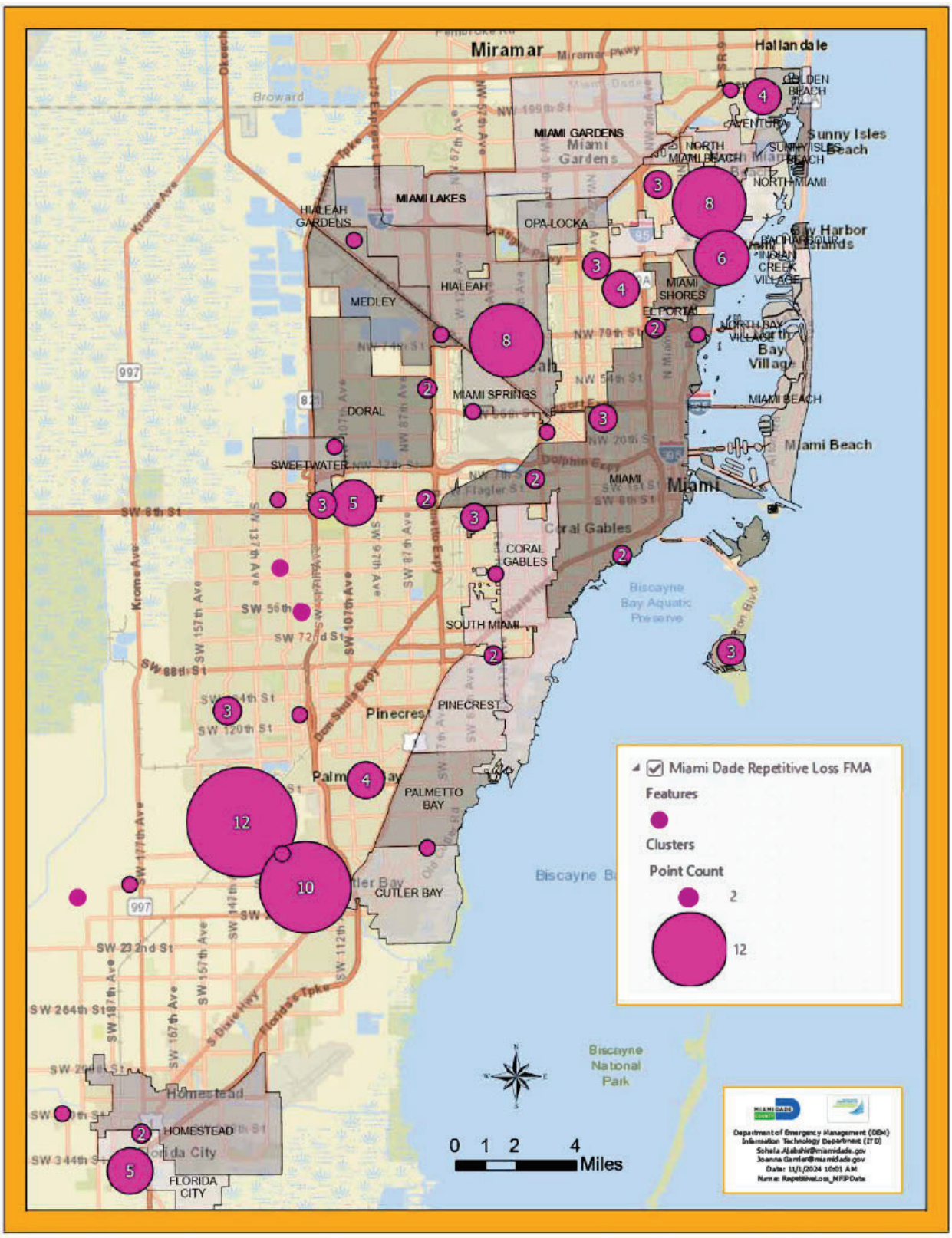


Figure 27. Miami-Dade County Severe Repetitive Loss (FEMA) Areas

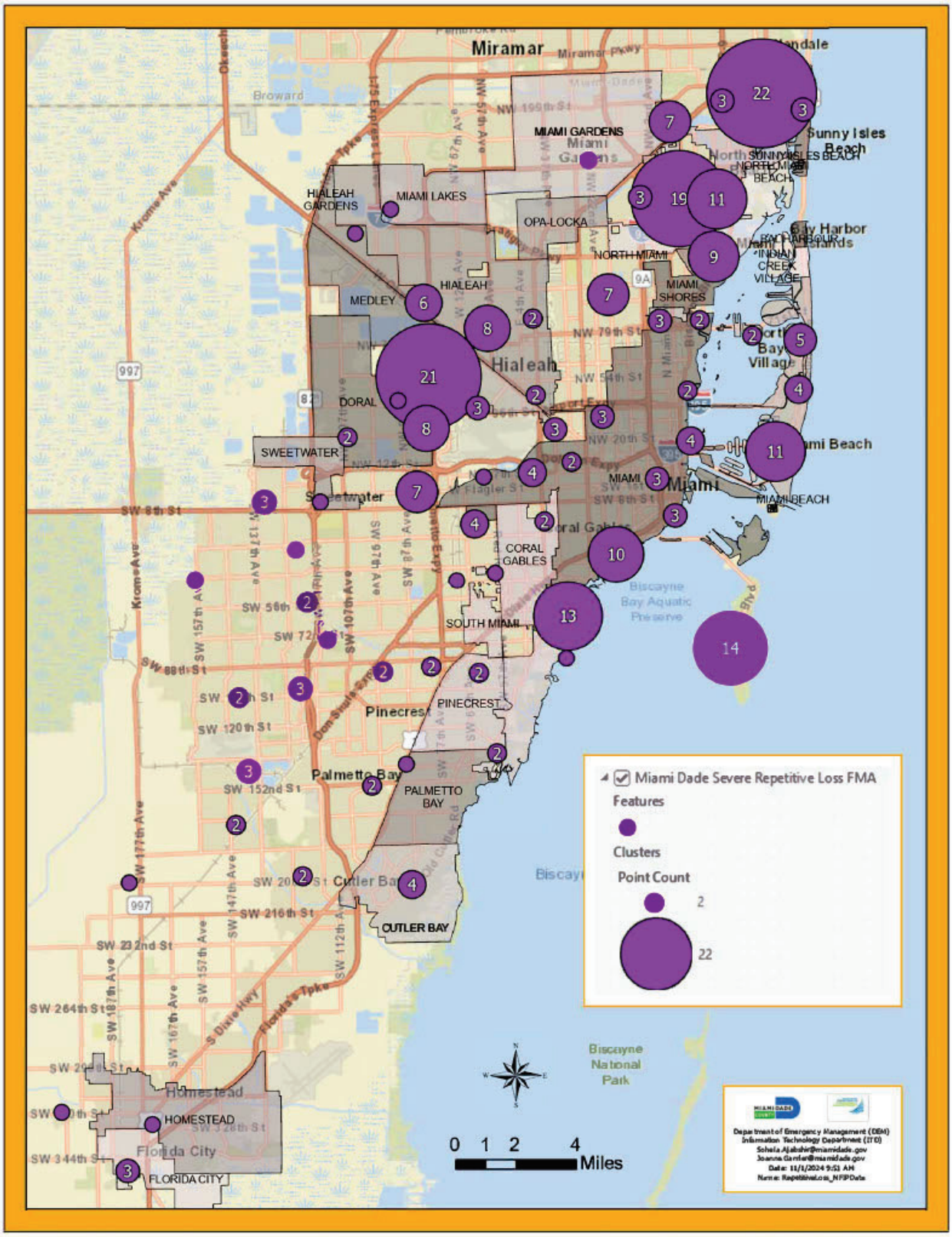


Table 12. 2024 Totals Repetitive Loss (RL) Properties by Land Use

Jurisdiction	Residential	Commercial	Industrial	Other
Aventura	20	9	0	0
Bal Harbour	1	3	0	0
Bay Harbor Islands	5	1	0	0
Biscayne Park	9	0	0	0
Coral Gables	45	1	0	1
Cutler Bay	45	0	0	0
Doral	36	9	57	0
El Portal	6	0	0	0
Florida City	51	1	0	1
Golden Beach	8	0	0	0
Hialeah	220	11	7	0
Hialeah Gardens	29	2	13	0
Homestead	34	4	0	1
Key Biscayne	30	3	0	0
Medley	1	34	0	0
Miami	209	29	2	3
Miami Beach	96	23	0	1
Miami Gardens	35	0	0	0
Miami Lakes	6	0	1	0
Miami Shores	14	1	0	0
Miami Springs	84	3	0	0
North Bay Village	13	0	0	0
North Miami	53	3	0	0
North Miami Beach	15	1	0	1
Opa-Locka	9	4	3	0
Palmetto Bay	16	1	0	0
Pinecrest	16	4	0	0
South Miami	8	1	0	1
Sunny Isles Beach	12	0	0	0
Surfside	3	2	0	0
Sweetwater	91	1	1	0
Unincorporated Miami-Dade	652	16	40	6
Virginia Gardens	11	0	0	0
West Miami	17	0	0	0

Table 13. 2024 Totals Severe Repetitive Loss (SRL) Properties by Land Use

Jurisdiction	Residential	Commercial	Industrial	Other
Aventura	5	1	0	0
Bal Harbour	0	0	0	0
Bay Harbor Islands	0	0	0	0
Biscayne Park	0	0	0	0
Coral Gables	7	0	0	0
Cutler Bay	4	0	0	0
Doral	2	3	14	0
El Portal	0	0	0	0
Florida City	3	0	0	0
Golden Beach	1	0	0	0
Hialeah	8	1	1	0
Hialeah Gardens	2	2	4	0
Homestead	1	0	0	0
Key Biscayne	8	0	0	0
Medley	0	6	0	0
Miami	24	5	0	1
Miami Beach	12	6	0	0
Miami Gardens	1	0	0	0
Miami Lakes	1	0	0	0
Miami Shores	14	1	0	0
Miami Springs	84	3	0	0
North Bay Village	13	0	0	0
North Miami	9	1	0	0
North Miami Beach	0	0	0	0
Opa-Locka	0	0	0	0
Palmetto Bay	0	1	0	0
Pinecrest	2	0	0	0
South Miami	0	0	0	1
Sunny Isles Beach	2	0	0	0
Surfside	0	0	0	0
Sweetwater	1	0	1	0
Unincorporated Miami-Dade	49	5	9	1
Virginia Gardens	2	0	0	0
West Miami	4	0	0	0

FLOOD THREAT RECOGNITION SYSTEM[44]

Miami-Dade DEM relies on automated flood warning systems that provide early notice of a flood for all locations within Miami-Dade County. Systems are able to provide flood warnings 24-hours a day, seven (7) days a week. These flood warning systems provide information such as timing and potential of an oncoming flood for the County. Miami-Dade County uses a series of different systems operated by NWS, DTPW, SFWMD, and the United States Geological Survey (USGS).

As stated previously in this Plan, the SLOSH models are utilized for coastal areas and Miami-Dade DEM utilized SLOSH MOM models to develop the County's Storm Surge Planning Zones. These zones indicate areas that are potentially at risk for storm surge and may be designated as evacuation areas. Miami-Dade County utilizes the following flood warning systems to monitor rainfall amounts and receive flood warnings on a daily basis.

National Weather Service (NWS) Miami/South Florida Weather Forecast Office

Miami-Dade DEM receives flood, flash flood, and urban and small stream watches and warnings from the NWS Office via e-mail, phone, text, and the Emergency Management Network (EMNet), during significant weather events that may result in flooding throughout the County. Weekly webinars are scheduled by NWS for weather briefings to Miami-Dade DEM and Municipal partners. Additional weather briefings are added in the event that a significant rain event is forecast or ongoing.

Miami-Dade Department of Transportation and Public Works (DTPW)

DTPW maintains a number of rain gauges throughout Miami-Dade County that collect breakpoint and rain total information over a 24-hour period. This data allows Miami-Dade County and its municipalities to track and identify the areas with the most significant rainfall, in real-time.

South Florida Water Management District (SFWMD)

SFWMD tracks rainfall and canal stage data in real-time. This real-time data is considered provisional until it undergoes the SFWMD's Quality Assurance and Quality Control (QA/QC) process and subsequently posted on DBHYDRO as "Archived." DBHYDRO is SFWMD's corporate environmental database that stores hydrologic, meteorological, hydrogeological and water quality data. The provisional (real-time) data is available via the following link: www.sfwmd.gov/portal/page/portal/levelthree/live%20data.

United States Geological Survey (USGS)

USGS has WaterWatch, a website that displays maps, graphs, and tables describing real-time, recent and past stream conditions.

Florida Interoperable Picture Processing for Emergency Response (FLIPPER)

This is a geographic information system (GIS) map-based platform. Through FLIPPER, the County and its municipalities can assess the risk of their facilities from potential storm surge, determine overall elevation of the land surrounding their facilities and determine the proximity to canal structures and which drainage basin they are in. FLIPPER has a number of integrated data layers including, but not limited to the following:

[44] CRS Activity 610 (Flood Warning and Response) Element – Flood Threat Recognition System

- Hydrology (canal structures, canal by type, canal maintained by, primary canal basing, ground elevation)
- FEMA Flood Zone (to the parcel level)
- Storm Surge Planning Zones
- Active Hurricane Information
- Live Weather Radar

Determination of a Significant Rain Event

Communities can utilize the National Oceanic and Atmospheric Administration (NOAA) Hydrometeorological Design Studies Center's Precipitation Frequency Data Server (PFDS) to determine if a particular incident should be considered a significant event. The PFDS is a point-and-click web portal for precipitation frequency estimates and supplementary products. The web portal can be accessed via the following link: hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=fl. After a location is selected, the precipitation frequency (PF) and confidence limits estimates are displayed in different formats (i.e. tables and graphs). [45] Figure 21 illustrates the PF in a table format (PF Tabular) for the Miami International Airport station. The numbers in parenthesis are the PF estimates at the lower and upper bounds of the 90% confidence interval. However, there is a 5% probability that the PF estimates will be greater than the upper bound or less than the lower bound.

Figure 28. Significant Rain Event Chart

NOAA Atlas 14, Volume 9, Version 2 MIAMI INTL AP
Station ID: 08-5663
Location name: Miami, Florida, USA*
Latitude: 25.7906°, Longitude: -80.3164°
Elevation:
Elevation (station metadata): 29 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.580 (0.475-0.717)	0.663 (0.542-0.820)	0.799 (0.651-0.991)	0.913 (0.739-1.14)	1.07 (0.836-1.37)	1.19 (0.909-1.55)	1.31 (0.966-1.75)	1.43 (1.01-1.97)	1.60 (1.08-2.25)	1.72 (1.14-2.47)
10-min	0.849 (0.695-1.05)	0.971 (0.794-1.20)	1.17 (0.954-1.45)	1.34 (1.08-1.67)	1.57 (1.22-2.01)	1.74 (1.33-2.27)	1.92 (1.42-2.56)	2.10 (1.48-2.88)	2.34 (1.59-3.30)	2.52 (1.67-3.61)
15-min	1.03 (0.847-1.28)	1.18 (0.968-1.47)	1.43 (1.16-1.77)	1.63 (1.32-2.03)	1.91 (1.49-2.45)	2.13 (1.62-2.77)	2.34 (1.73-3.12)	2.56 (1.81-3.51)	2.85 (1.94-4.02)	3.07 (2.03-4.41)
30-min	1.58 (1.29-1.95)	1.82 (1.48-2.25)	2.20 (1.80-2.73)	2.53 (2.05-3.15)	2.97 (2.32-3.81)	3.31 (2.53-4.31)	3.65 (2.69-4.87)	4.00 (2.82-5.48)	4.46 (3.02-6.28)	4.80 (3.17-6.89)
60-min	2.09 (1.71-2.58)	2.39 (1.96-2.96)	2.92 (2.38-3.63)	3.39 (2.75-4.22)	4.07 (3.20-5.28)	4.63 (3.55-6.08)	5.22 (3.86-7.01)	5.84 (4.14-8.06)	6.71 (4.57-9.52)	7.40 (4.89-10.6)
2-hr	2.60 (2.14-3.19)	2.97 (2.44-3.66)	3.64 (2.98-4.49)	4.25 (3.46-5.26)	5.17 (4.11-6.70)	5.95 (4.60-7.79)	6.78 (5.06-9.09)	7.69 (5.49-10.6)	8.97 (6.15-12.7)	10.0 (6.66-14.3)
3-hr	2.89 (2.38-3.53)	3.29 (2.71-4.03)	4.06 (3.33-4.98)	4.78 (3.90-5.90)	5.92 (4.74-7.69)	6.90 (5.37-9.05)	7.98 (5.98-10.7)	9.16 (6.58-12.6)	10.9 (7.51-15.4)	12.3 (8.20-17.4)
6-hr	3.40 (2.81-4.13)	3.91 (3.24-4.76)	4.90 (4.04-5.97)	5.86 (4.80-7.18)	7.38 (5.96-9.58)	8.72 (6.83-11.4)	10.2 (7.71-13.7)	11.9 (8.58-16.3)	14.3 (9.91-20.0)	16.2 (10.9-22.9)
12-hr	3.97 (3.30-4.79)	4.66 (3.88-5.63)	5.95 (4.93-7.21)	7.18 (5.92-8.74)	9.11 (7.37-11.7)	10.8 (8.47-14.0)	12.6 (9.56-16.7)	14.6 (10.6-19.9)	17.5 (12.2-24.4)	19.9 (13.5-27.9)
24-hr	4.64 (3.88-5.57)	5.51 (4.60-6.61)	7.09 (5.90-8.53)	8.57 (7.09-10.4)	10.8 (8.80-13.8)	12.8 (10.1-16.4)	14.9 (11.4-19.6)	17.2 (12.6-23.2)	20.5 (14.4-28.4)	23.2 (15.8-32.3)
2-day	5.46 (4.59-6.51)	6.43 (5.40-7.67)	8.20 (6.87-9.81)	9.85 (8.20-11.8)	12.4 (10.1-15.6)	14.5 (11.5-18.5)	16.8 (12.9-22.0)	19.4 (14.3-26.0)	23.0 (16.3-31.6)	26.0 (17.8-35.9)
3-day	6.06 (5.11-7.20)	7.07 (5.96-8.40)	8.91 (7.47-10.6)	10.6 (8.84-12.7)	13.2 (10.8-16.6)	15.4 (12.2-19.5)	17.7 (13.6-23.1)	20.3 (15.0-27.1)	24.0 (17.0-32.9)	27.0 (18.6-37.2)
4-day	6.61 (5.58-7.82)	7.61 (6.42-9.01)	9.43 (7.93-11.2)	11.1 (9.29-13.3)	13.7 (11.2-17.1)	15.9 (12.7-20.1)	18.2 (14.1-23.6)	20.8 (15.4-27.7)	24.5 (17.4-33.4)	27.5 (19.0-37.8)
7-day	8.07 (6.85-9.51)	8.97 (7.60-10.6)	10.6 (8.98-12.6)	12.2 (10.3-14.5)	14.7 (12.1-18.3)	16.8 (13.5-21.2)	19.2 (14.8-24.7)	21.7 (16.2-28.7)	25.4 (18.2-34.5)	28.5 (19.8-38.9)
10-day	9.32 (7.92-10.9)	10.2 (8.68-12.0)	11.9 (10.1-14.0)	13.5 (11.4-16.0)	16.0 (13.2-19.8)	18.1 (14.6-22.7)	20.4 (15.9-26.2)	23.0 (17.2-30.3)	26.7 (19.2-36.1)	29.7 (20.7-40.5)
20-day	12.6 (10.8-14.7)	14.0 (12.0-16.3)	16.4 (13.9-19.1)	18.4 (15.6-21.6)	21.3 (17.5-25.9)	23.7 (19.0-29.1)	26.1 (20.3-32.9)	28.6 (21.4-37.1)	32.1 (23.1-42.8)	34.9 (24.4-47.2)
30-day	15.4 (13.2-17.9)	17.3 (14.8-20.1)	20.3 (17.3-23.6)	22.8 (19.3-26.6)	26.1 (21.4-31.4)	28.7 (23.1-35.0)	31.2 (24.3-39.1)	33.8 (25.3-43.4)	37.1 (26.7-49.1)	39.6 (27.9-53.3)
45-day	19.1 (16.4-22.1)	21.5 (18.4-24.9)	25.2 (21.6-29.3)	28.2 (24.0-32.9)	32.1 (26.3-38.2)	34.9 (28.1-42.2)	37.6 (29.3-46.6)	40.2 (30.1-51.2)	43.3 (31.3-56.9)	45.6 (32.2-61.1)
60-day	22.4 (19.3-25.8)	25.1 (21.6-29.0)	29.4 (25.2-34.0)	32.7 (27.9-38.0)	37.0 (30.3-43.8)	40.0 (32.2-48.1)	42.8 (33.3-52.8)	45.4 (34.0-57.6)	48.5 (35.0-63.3)	50.5 (35.8-67.6)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

[45] Section 5 of the NOAA Atlas 14: https://www.weather.gov/media/owp/hdsc_documents/NA14_Sec5_PFDS.pdf

MIAMI-DADE COMPREHENSIVE DEVELOPMENT MASTER PLAN[46]

Miami-Dade County Regulatory and Economic Resources Department (RER) – Planning Bureau Division provides services related to sound growth management, historic preservation, urban planning, sustainability planning, and transportation development through the Comprehensive Development Master Plan (CDMP) and related activities.

The CDMP provides general objectives and policies that address the where and how Miami-Dade County will approach the development or conservation of land and natural resources during the next 10-20 years. Furthermore, it addresses the delivery of County services to accomplish the Plan's objectives. Miami-Dade County is comprised of approximately 2,000 square miles of land and over 420 square miles have been developed for urban use. The CDMP establishes the broad parameters for government to conduct detailed land use planning and zoning activities, functional planning and programming of infrastructure and services. Additionally, it establishes minimum standards, or Level of Service (LOS) standards for the delivery of certain County services and facilities including roadways/traffic, mass transit, parks, water, sewer, solid waste, and drainage.

The CDMP establishes a growth policy that encourages development:

1. At a rate commensurate with projected population and economic growth
2. In a contiguous pattern centered around a network of high-intensity urban centers well-connected by multi-modal intra-urban transportation facilities
3. In locations which optimize efficiency in public service delivery and conservation of valuable natural resources

CDMP Elements

Chapter 163 of the Florida Statutes requires each local government to adopt a comprehensive plan and sets the minimum criteria including the identification of the required elements of a comprehensive plan. The Miami-Dade County CDMP is comprised of 12 Elements preceded by a Statement of Legislative Intent. The first nine (9) elements listed below, are required by Chapter 163 and the remaining Elements are optional and included in the CDMP at the discretion of the County.

Statement of Legislative Intent
I. Land Use Element
II. Transportation Element
III. Housing Element
IV. Conversation, Aquifer Recharge and Drainage Element
V. Water, Sewer and Solid Waste Element
VI. Recreation and Open Space Element
VII. Coastal Management Element
VIII. Intergovernmental Coordination Element
IX. Capital Improvements Element
X. Educational Element
XI. Economic Element
XII. Community Health and Design Element
XIII. Property Rights Element

[46] CDMP - TOC, Introduction & Statement of Legislative Intent (2020): https://www.miamidade.gov/planning/library/reports/planning-documents/cdmp/table-of-contents.pdf

The documents for the aforementioned CDMP Elements can be accessed via the following link: miamidade.gov/planning/cdmp-adopted.asp.

A major review and update of the CDMP is done every seven (7) years, a process known as the Evaluation Appraisal Report (EAR). The EAR includes an evaluation of the County's progress in implementing goals, objectives, policies, maps and text to the CDMP. It also recommends changes. There is also a tri-annual CDMP amendment process for periodic review of the development capacity of the urban area.

Each CDMP Element contains Adopted Components and Support Components that have not been adopted, but provide background information. The current report only contains the CDMP components that have been adopted as a County policy. The Support Components are contained in separate documents. The Support Components and the EARs include background data and analyses, inventories of existing conditions, methodology projections or other estimates of future conditions, and summaries of applicable state, regional and preexisting County plan policies.

The CDMP addresses Unincorporated Miami-Dade and the 34 municipalities. However, Chapter 163 of the Florida Statutes, requires each Municipality to adopt their own plans for areas within their jurisdictions.

Further details and additional CDMP documents can be accessed via the following link: miamidade.gov/planning/cdmp.asp.

CRITICAL FACILITIES PLANNING[47]

The critical facilities inventory is managed by Miami-Dade DEM and Miami-Dade Information Technology Department. The facilities included in this inventory have been deemed critical by the state and federal government. This is updated annually. The list cannot be made public due to the sensitive information it contains. However, the list can be provided to the ISO/CRS Specialist by Miami-Dade DEM upon request.

The list of critical facilities includes the phone number(s) of the operators for all public and private critical facilities affected by flooding. Warning and notifications to these facilities are facilitated by the DEM distribution lists for all response and recovery agencies and organizations. Therefore, they receive all emergency information and distribute to their organizations and jurisdictions through their own processes.

[47] CRS Activity 610 (Flood Warning and Response) Element – Critical Facilities Planning

FLOOD PUBLIC INFORMATION ACTIVITIES

Flood protection information, at the local level, is readily available online to assist Miami-Dade County residents to understand their residence's flood risk. The flood protection webpage is maintained regularly by Miami-Dade RER and it can be accessed via the following link: www.miamidade.gov/environment/flood-protection.asp. Miami-Dade RER includes information on the following:

- Elevation Certificates
- Flood & Drainage Complaints
- Flood Insurance
- Flood Zone Maps
- Property Sale Disclosure
- How to protect your property
- Stormwater Utility
- Water Control Map and County Flood Criteria Update

FEMA Flood Zones

The FEMA Flood Maps can be accessed on Miami-Dade RER's webpage, via the Environment tab through the Flood Protection tab. Miami-Dade County has an interactive web tool for the Flood Zone Maps, where homeowners can enter their address for more detailed information on their Special Flood Hazard Areas or flood zones. Once the property address is entered, it will zoom to the location on the map and display an information panel to the right side of the screen. The user is able to view the elevation of each FEMA Flood Zone within the address entered and the appropriate contact information for the Municipality is provided.

The FEMA Flood Zone Maps interactive web tool is available via the following link: gisweb.miamidade.gov/floodzone.

Property Sale Disclosure

The Miami-Dade County Code requires that any purchase of improved real estate in a Special Flood Hazard or Coastal High Hazard Area (also known as Flood Zones) include a full disclosure to the buyer stating that the property lies in either of the aforementioned zones. If the structure is substantially damaged or improved, it may be required to be raised to the current required flood elevation.

The seller of any improved real estate located in Unincorporated Miami-Dade County shall include in the contract, or a rider to the contract, the following disclosure in a bold font no less than a 10-point font size:

"THIS HOME OR STRUCTURE IS LOCATED IN A SPECIAL FLOOD HAZARD AREA. IF THIS HOME OR STRUCTURE IS BELOW THE APPLICABLE FLOOD ELEVATION LEVEL AND IS SUBSTANTIALLY DAMAGED OR SUBSTANTIALLY IMPROVED, AS DEFINED IN CHAPTER 11C OF THE METROPOLITAN MIAMI-DADE COUNTY CODE, IT MAY, AMONG OTHER THINGS, BE REQUIRED TO BE RAISED TO THE APPLICABLE FLOOD ELEVATION LEVEL."

The Unincorporated Miami-Dade County Flood Zone Disclosure Form can be accessed via the following link: miamidade.gov/environment/library/forms/flood-disclosure.pdf. For further details, please refer to Chapter 11-C of the Code of Miami-Dade County.

COMMUNITY PREPAREDNESS

Increasing the community's flood preparedness and awareness is achieved through different avenues, such as, public education, the countywide distribution of the official Hurricane Readiness Guide, social media, and community outreach events throughout the year. In addition to Miami-Dade County's efforts, municipalities conduct their own, or in partnership with the County, public information and community outreach activities to promote flood education, preparedness and mitigation.

Miami-Dade County Hurricane Webpage

The Miami-Dade County official hurricane preparedness webpage includes information for every resident to be aware of before, during and after a hurricane or any other emergency. Emergency planning information included on the webpage includes the following:

- Emergency Kits and Checklists
- Emergency Evacuation
- Evacuation Assistance for residents with accessibility issues
- Pet Preparedness
- Hurricane Readiness Guide
- Tree Preparation prior to the hurricane season
- Shelter-in-Place
- Storm Surge Planning Zones
- And more

The hurricane preparedness webpage can be accessed via the following link: miamidade.gov/hurricane.

Know Your Zone

Miami-Dade County residents are encouraged to know if their residence is within a Storm Surge Planning Zone prior to a storm making landfall. The Storm Surge Planning Zone section of the County's hurricane webpage provides information on storm surge's threat to life and property, a description of each of the planning zones, and an FAQ in English, Spanish and Haitian Creole. Additionally, residents can locate if their home or business is within a Planning Zone by entering the address into the Storm Surge Planning Zone Finder (Know Your Zone application). The Know Your Zone application can be accessed via the following link: https://mdc.maps.arcgis.com/apps/webappviewer/index.html?id=4919c85a439f40c68d7b3c81c3f44b58.

StormReady Community[48]

NWS created the StormReady® Program to encourage communities to take a proactive approach on improvising hazardous weather operations and strengthen local safety programs. To receive this recognition the County or Municipality must establish a 24-hour warning point and Emergency Operations Center, have more than one way to receive severe weather warning and forecasts to alert citizens, have a system that monitors weather conditions locally, promote public readiness, and develop a formal hazardous weather plan.

[48] CRS Activity 610 (Flood Warning and Response) Element – StormReady Community

Miami-Dade County has been a StormReady® Community since 2002 and was awarded this status again in September 2019. Other StormReady® Communities in Miami-Dade County include Doral, Homestead, Miami Beach, North Miami, Florida International University, Miami-Dade College, St. Thomas University and University of Miami.

#HurricaneStrong

#HurricaneStrong is part of the National Hurricane Resilience Initiative created in 2016 to improve hurricane preparedness, mitigation, and overall readiness through increased public awareness and engagement. The initiative consists of a partnership between FEMA, NOAA, The Weather Channel and the Federal Alliance for Safe Homes (FLASH), which is the country's leading consumer advocate for strengthening homes and safeguarding families from natural and manmade disasters.

The #HurricaneStrong initiative follows five (5) key messages to promote and elevate hurricane resilience:

- Personal safety
- Family Preparedness
- Financial Security
- Damage Prevention
- Community Service

In May 2018, Miami-Dade County was selected as the second County in the nation to receive this designation of a #HurricaneStrong community. This was a result of the County's profound commitment to a more resilient community by continuously improving the County's ability to recover after a disaster.

Weather-Ready Nation Ambassador

The Weather-Ready Nation (WRN) Ambassador is NOAA's initiative to strengthen partnerships with local, state, federal and private organizations toward building a more resilient community in the face of increasing vulnerability to extreme weather events. WRN Ambassadors will promote and encourage preparedness and mitigation activities by encouraging the community to be "weather-ready" and promoting Weather-Ready Nation key messages through outreach activities.

The Miami-Dade LMS and DEM were named WRN Ambassadors on October 2014 and March 2016, respectively.

Ready MDC App

Ready Miami-Dade County (ReadyMDC) is a free local hurricane preparedness and decision-making support mobile application available to Miami-Dade County residents and visitors. ReadyMDC provides users with access to various local preparedness resources and materials, such as the Miami-Dade County Hurricane Readiness Guide and Storm Surge Planning Zones online education page. Real-time information is available before, during and after a storm or hurricane.

Information includes:

- Evacuation Order
- Emergency Evacuation Bus Pick-Up Sites
- Know Your Zone
- Open Evacuation Centers
- Important Evacuation Information
- Direct Contact with Miami-Dade County's 311 Contact Center
- Safety Tips
- Phone numbers, websites and social media

The Ready MDC App provides real-time information relevant to recovery relief efforts. This application is available for Android and iOS devices.

Miami-Dade Alerts

Miami-Dade Alerts is a free service that enables County residents and visitors to receive emergency texts and/or emails regarding public safety issues, recommended public protected actions, or other emergency information. Additionally, this service provides weather advisory notifications issued by NWS (e.g. tornado, tropical storm and hurricane warnings) or any other emergency which may require protective actions.

Residents and visitors who live or work in Miami-Dade County can register for this service online at miamidade.gov/alerts.

Social Media

A large number of the population utilizes social media as a source of news and information. Therefore, Miami-Dade DEM manages social media government pages on Facebook and X (formely Twitter). DEM provides information on regionally adopted preparedness messages, informs the public on events being monitored (emerging or occurring), and provides insight on DEM programmatic areas.



Facebook.com/MiamiDadeCountyEM



X.com/MiamiDadeEM

Table 15 outlines several community outreach activities performed by different Miami-Dade County agencies throughout the year. Additionally, please refer to Appendix A for samples of the public information materials provided.

Table 15. Community Outreach Activities

Activity	Frequency	Topics/Actions	Audience
RER's *Do You Know Your Flood Zone?* Brochure Mailout	Annual	The brochure is mailed out via the Stormwater Utility Bill and it is available online. The topics included in the brochure include: • General Flood Information • FEMA Flood Zone Maps • Flood Protection • Flood Insurance • Elevation Certificates • Building Permit Requirement(s) • Repetitive Losses	Over 43,000 Households (mailed) Countywide (online)
Flood Protection on RER's Website www.miamidade.gov/environment/flood-protection.asp	Continuous	The webpage is updated regularly with the most current information on the following topics: • Elevation Certificates • Repetitive Losses • Flood and Drainage Complaints Form • Flood Insurance • Flood Zone Maps/Flood Risk Maps • Coastal Flooding • Real Estate and Insurance Agents • Property Sale Disclosure • Protect Your Property • Stormwater Utility	Countywide
Miami-Dade County Official Hurricane Readiness Guide	Annual	The official Hurricane Readiness Guide contains important information for every resident to be aware of before, during and after a hurricane or any other emergency. The Guide includes information on the Storm Surge Planning Zones, what to do in preparation to a hurricane threatening Miami-Dade County, what to do when an evacuation order is given, available County services and more. The Hurricane Readiness Guide is available in English, Spanish and Haitian Creole.	Mailed to every residential address in Miami-Dade County (1 Million households) and distributed during outreach events, to County Commissioners' offices, County departments, Municipal governments, private businesses, public sector partners and not-for-profit organizations

Activity	Frequency	Topics/Actions	Audience
Bring Your Kid(s) to Work Day	Annual	On a designated date every year, Miami-Dade Fire Rescue and DEM Employees bring their kids to work to experience a day at work with their parents. The kids are brought in to the EOC for DEM Staff to discuss Miami-Dade County's natural hazards, hurricane and disaster preparedness.	MDFR and DEM Employees
StormZone	Annual	StormZone is a school-based multidisciplinary science and social studies education program that teaches students about the science of severe natural disasters. Students that are part of this program, participate in an interactive exercise at the Miami-Dade EOC in which they learn about hurricane and disaster preparedness.	Approximately 60 students (5th and 6th Grade) from Miami-Dade Public Schools
County Mayor's Hurricane Preparedness Press Conference	Annual	The Miami-Dade County Mayor conducts a Hurricane Preparedness Press Conference at the beginning of each Atlantic Hurricane Season. The Press Conference is broadcasted via the Miami-Dade County TV Channel, webpage and Social Media pages.	Countywide
Youth Fair	Annual	DEM has a booth/table at the Youth Fair staffed with DEM Staff to provide information on hurricane and disaster preparedness to attendees. Staff facilitates discussions on hurricane and disaster preparedness with attendees and reading material is provided for adults and kids to take home.	Approximately 2,000 attendees
Emergency and Evacuation Assistance Program (EEAP) Call Down	Semi-Annually	Call down is conducted by calling all active EEAP registrants to update their records and provide them information on hurricane preparedness.	4,200 EEAP Clients
Hurricane Preparedness Events/Community Outreach Presentations by DEM	Over 100 events throughout the Year	Throughout the year, DEM continuously participates in a number of local events hosted by municipalities, hospitals, schools, businesses, and non-for-profit, community and faith-based organizations. These events provide an opportunity to directly engage with residents and provide essential information on hurricane and disaster preparedness, and mitigation measures for the hurricane season and other Miami-Dade County hazards (e.g. flooding). These presentations are conducted in English, Spanish and Haitian Creole to better engage and educate the community.	17,736 *(in 2019)*

Activity	Frequency	Topics/Actions	Audience
Residential Healthcare Facility (RHCF) CEMP Workshop	Annual	This workshop is conducted to educate RHCF owners and administrators in developing RHCF CEMP with an all-hazards approach to insure the residents' life safety. The workshop serves an opportunity to provide emergency and disaster preparedness information.	All Hospitals, Group Homes, Nursing Homes, Assisted Living Facilities, Adult Day Cares, Ambulatory Surgical Centers and Intermediate Care Centers within Miami-Dade County

EMERGENCY WARNING DISSEMINATION[49]

In accordance with the Miami-Dade County CEMP, DEM provides flood warnings as early as it is practical in an effort to provide as much advance notice as possible. For tropical cyclones, notifications begin approximately five (5) days prior to the anticipated arrival of the storm. When the Miami-Dade EOC is activated, ESF 14 (Public Information) is responsible for the dissemination of emergency information to all media outlets and the public.

In order to expedite the dissemination of information, Miami-Dade County developed pre-scripted messages and message templates for staff to quickly issue appropriate flood advisories. These will provide guidance and can be modified, as needed, to fit the specific emergency or incident. ESF 14 contains pre-scripted messages that are disseminated to the public. Additionally, the DEM Severe Weather Standard Operating Procedures (SOP) has pre-scripted messages for the Duty Officer to disseminate to Miami-Dade DEM Staff and DEM partner agencies. Municipal emergency management, colleges and universities are part of DEM's distributions lists; therefore, they receive all emergency notifications and disseminate it to the residents and students within their jurisdiction through their own processes.

Messaging on flood advisories in Miami-Dade County via the Emergency Alert System (EAS) through all channel/stations, is done by NWS – Miami/South Florida Forecast Office. NWS utilizes pre-scripted draft messages for all types of flood advisories. The pre-scripted messages include the type of advisory, time the advisory expires, the reason the advisory was issued and location(s) that will experience flooding as a result of the weather system. Additionally, NWS has several pre-scripted messages with precautionary/preparedness statements that they can choose from when preparing the advisory for issuance.

Miami-Dade County uses a cable override system for the public notification of emergency warnings. A Florida EAS Plan is prepared by the State Emergency Communications Committee in conjunction with FDEM and is based on recommendation from the state and County emergency management officials, NWS, and the broadcast industry and cable operators. The purpose of this Plan is to put in place a system that can be utilized by emergency officials to announce or transmit an emergency alert to the potentially impacted population. The Florida EAS Operational Plan can be accessed via the following link: https://www.fab.org/eas-plan. The EAS is tested monthly and the schedule can be accessed via the following link: fab.org/eas-test-schedule/.

There are additional forms of public notification that are utilized to send emergency alerts in the event that an emergency or event requires protective action(s). When emergency protective action(s) are issued, an EAS and/or Wireless Emergency Alert (WEA) message can be disseminated via DEM's Integrated Public Alert Warning System (IPAWS) compliant software systems EMnet or WebEOC. Simultaneously, DEM would also disseminate messages through Miami-Dade Alerts and social media (i.e. Facebook and X). When an emergency notification to a specific geographic area is required, the VESTA Alert Notification System can be utilized. A brief description of each system is below.

- **IPAWS** is a national warning system used to notify the public of emergency situations which may require protective actions. It is designed to warn the public of local weather emergencies, such as flooding. The primary method utilized for developing and

[49] CRS Activity 610 (Flood Warning and Response) Element – Emergency Warning Dissemination

disseminating an IPAWS message is through the EMnet system, located in the supervisor platform of the Miami-Dade Fire Rescue (MDFR) Dispatch Center Headquarters. In the event EMnet is not operational, the fax request methodology or the WebEOC IPAWS messaging system will be utilized as the backup methods to disseminate information to the public.

- **Everbridge Alert Notification System** is a notification system is designed to handle a large volume of alerts, ensuring that messages are delivered to a vast number of recipients simultaneously. This scalability is crucial during large-scale emergencies when timely communication with the public is critical. The system incorporates multiple delivery channels (text,email, voice) to ensure that messages are received even if one channel fails.
- **Social Media** is utilized to disseminate emergency information, such as protective actions and general emergency information before, during and after an incident. During a Miami-Dade EOC activation, the Social Media Unit Leader of the EOC Planning Section is responsible for the collection, evaluation, and posting of public information through all of the County's social media platforms. Additionally, Miami-Dade DEM uses social media to promote personal preparedness awareness in the community, severe weather advisories, safety tips, among other topics.

Along with the aforementioned public information systems, many of Miami-Dade County buildings have NOAA Weather Radios to provide notification of flood and severe weather watches and warnings. Some of these buildings include the Fire Alarm Office, EOC, DEM offices, County executive offices, Miami International Airport (Air Traffic Control Tower), hospitals, healthcare centers, educational facilities and fire stations, among others.

Additionally, Miami-Dade County disseminates press releases with emergency information and general preparedness information for all types of incidents. During a countywide emergency (e.g. hurricane), the Miami-Dade County utilizes the miamidade.gov/emergency webpage to provide residents and visitors with the most accurate information, including updates to County services during a particular emergency. This webpage provides updates on:

- Evacuation Orders
- Schools
- Waste Collection
- Animal Services
- Parks
- Seaports
- Libraries
- Museums
- Correction and Rehabilitation Facilities
- Government Offices and Courthouse
- Transit
- Airports
- Streets, Expressways, Tolls and Bridges
- Beaches and Marinas
- Curfews
- Open/closed Shelters
- Water and Sewer
- Hospital and Clinics

When necessary, in-person notifications of protective measures orders are conducted by law enforcement (County and Municipal). This is used to supplement information disseminated via means of mass communication. In-person communication by law enforcement include:

- Door-to-door communication – individually notifying residents within a specific geographic region
- Vehicle Public Address System – communication of evacuation orders via the public address system in police vehicles, also known as route alerting

FLOOD RESPONSE OPERATIONS[50]

The Miami-Dade CEMP and Protective Measures Plan identify flood response roles and responsibilities for all our County stakeholders. The clearance times illustrated on Table 8, dictate the time needed to implement response activities which includes hurricane evacuation operations.

Miami-Dade County's CEMP establishes the framework that the County and its municipalities utilize to address all types of hazards. The CEMP outlines the basic strategies, assumptions, operational goals and objectives, and mechanisms through which Miami-Dade County will mobilize resources and conduct activities to guide and support emergency management efforts through preparedness, response, recovery and mitigation. Additionally, it includes the roles and responsibilities of the local government, state and federal agencies, and other stakeholders.

The Miami-Dade CEMP was adopted by the BCC on October 18, 2022 by Resolution R-982-22. Volume I of the CEMP can be accessed via the following link: miamidade.gov/fire/library/OEM/CEMP.pdf. Volumes II, III and IV can be obtained by contacting Miami-Dade DEM.

The Miami-Dade DEM Protective Measures Plan focuses on an all-hazards approach to respond to all types of emergencies. It provides contingencies to lessen the exposure of people to hazards related to the incident through protective measures such as evacuation, shelter-in-place, isolation/quarantine and restricted entry/repopulation. The Plan provides a decision-making process that defines which protective measure is best for the current conditions of each incident and an implementation process. This Plan can be found of Volume III of the CEMP. Figures 30 and 31 are part of the DEM Protective Measures Plan. Figure 30 illustrates the protective measures decision matrix for evacuations, sheltering-in-place, and isolation/quarantine. Figure 31 illustrates the protective measures decision matrix for restricted entry/repopulation.

[50] CRS Activity 610 (Flood Warning and Response) Element – Flood Response Operations

Community Information and Reporting

Miami-Dade County operates the 311 Contact Center which provides a fast, simple, and convenient way for residents to obtain accurate information on local government services throughout an emergency and non-emergency situation. Additionally, the 311 Contact Center can be utilized to report neighborhood problems such as building code violations, roadways issues (e.g. pothole, damaged sidewalk), water and sewer issues (e.g. clogged drains) canal issues, flooding reports, among others. The 311 Contact Center can be reached via:

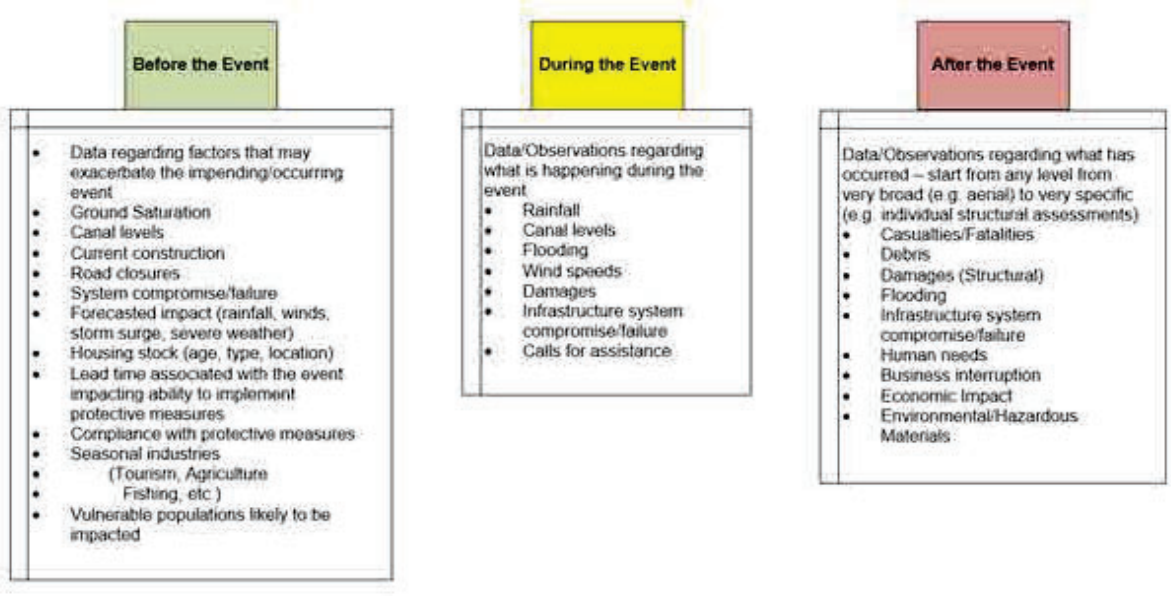
- Phone, by dialing 311 or (305) 468-5900
- Online at https://311.miamidade.gov/311/s/
- X (formerly Twitter) at X.com/miamidade311
- 311Direct Mobile App on the Google Play store and on Apple App Store
- Email at 311@miamidade.gov

Further information on Miami-Dade County's 311 Contact Center can be accessed via the following link: https://www.miamidade.gov/global/311/home.page

Hazard Impact Assessment

Hazard impact assessments of potential and actual impacts are conducted by gathering data before, during and after an incident. Details of this process are outlined on DEM's Hazard Impact Assessment Plan (HIAP) which can be found in Volume III of the CEMP. Figure 29 provides an overview of how hazard impact assessments will be conducted by Miami-Dade County agencies and municipalities.

Figure 29. Impact Assessments Before, During and After an Incident



Damage Assessment Software

In order to standardize how damages are reported, Miami-Dade County created the Snapshot Damage Assessment (Neighborhood Damage Assessment Form) after Hurricane Andrew. The

system provides four (4) basic levels of structural damage and two (2) levels of flooding that are helpful for reporting impacts to residential structures. Currently, this system is used for public reporting.

In 2024, Miami-Dade DEM implemented a more robust damage assessment tool for our partner agencies and municipalities, called Crisis Track. Crisis Track became the County's official damage assessment software. Crisis Track is a comprehensive system where information can be collected on impact areas, incidents, initial damage assessments and detailed structural assessments. The software has been designed for assessment data to be gathered via a tablet or laptop on the field, subsequently, the data is synchronized and viewed on the Crisis Track Viewer at the agency and Municipal Emergency Operations Centers (EOC). Crisis Track can be utilized for countywide incidents (e.g. hurricane) or local incidents (e.g. tornado). Miami-Dade DEM, in conjunction with local building officials, developed a guide and training on reporting flood and structural damage for mobile/manufactured homes, residential structures, and mid and high-rise structures. Furthermore, a training component was established to complement the system and provide uniform training for personnel who conduct on-field assessments, and personnel who may be working in the EOC and generating damage assessment reports within their jurisdiction.

Special Needs Evacuation Assistance

Miami-Dade DEM maintains and manages the Emergency and Evacuation Assistance Program (EEAP) for residents with functional and access needs. This program offers specialized transportation for individuals that live at home and are in need of assistance during an evacuation, are electrically-dependent and require sheltering in a Medical Management Facility (MMF) and/or would like to receive a wellness call after an incident or disaster.

Eligible EEAP applicants will be assigned to an evacuation center (Medical Evacuation Center or MMF) appropriate for the level of care required due to their medical condition(s). When any incident, such as a hurricane or flood, requires evacuation of Miami-Dade County's vulnerable population, the Evacuation Support Unit (ESU) is activated. The ESU is responsible for:

- Coordinating the call down of registrants prior to an evacuation order
- Verifying the evacuation status
- Appropriate facility and transportation assignment
- Transportation for the evacuation and repopulation
- Wellness Checks
- Demobilization of assets and facilities when they are no longer needed

Residents with functional and access needs should register for the EEAP prior to an emergency to ensure the appropriate assistance will be provided, when needed. Applications go through a review process by the DEM Vulnerable Populations Coordinator and the Florida Department of Health (FDOH) in Miami-Dade County. Subsequently, applications are entered into the EEAP database, which utilizes GIS, to manage registrants throughout the year and during an emergency evacuation. In order to maintain EEAP client information up-to-date, a call-down is conducted twice a year by calling all active EEAP registrants to update/confirm their records.

Further information on the EEAP can be accessed via the following link: miamidade.gov/global/service.page?Mduid_service=ser1539637068904426.

Figure 30. Protective Measure Decision-Making Matrix (Evacuation, Shelter-in-Place and Isolation/Quarantine)

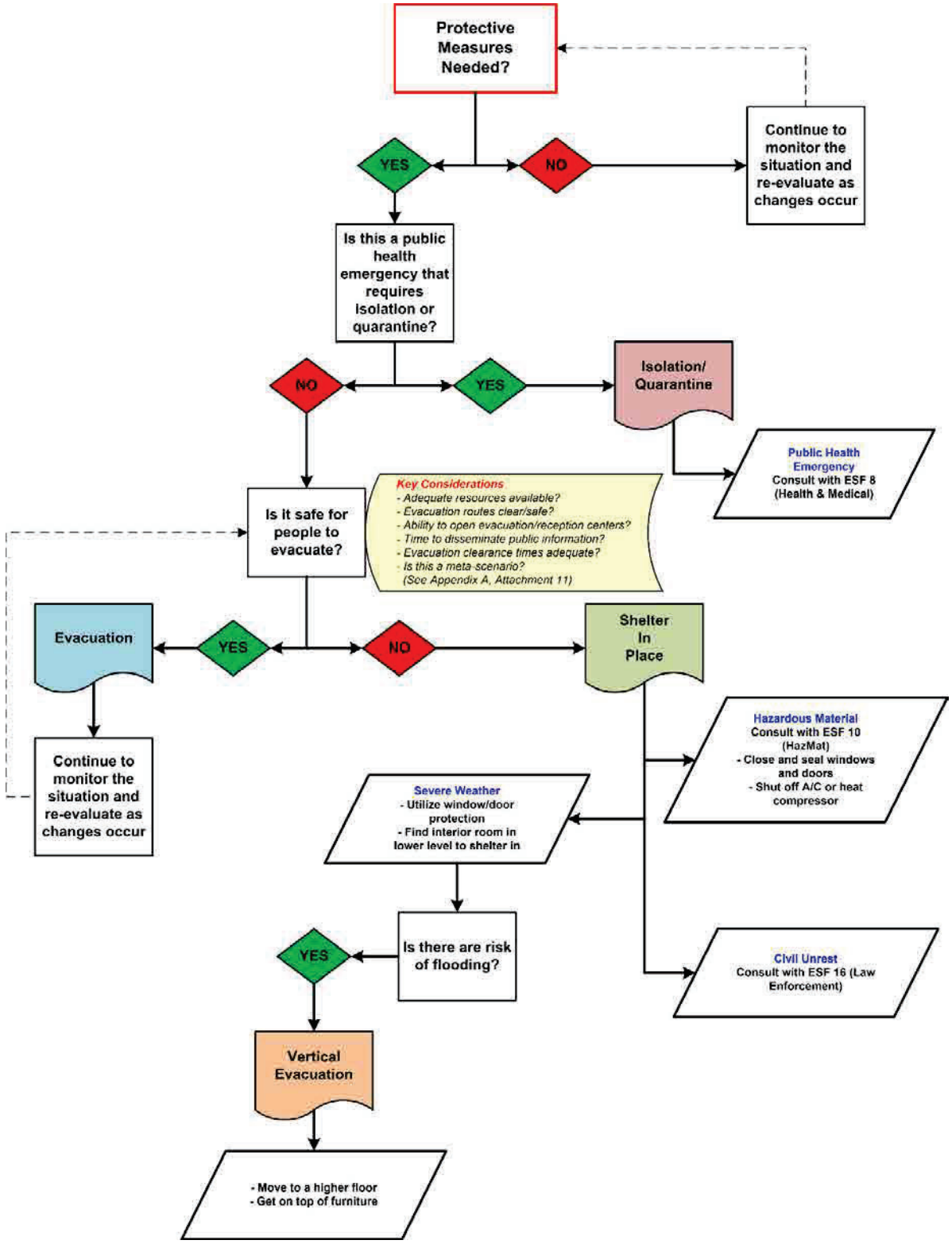
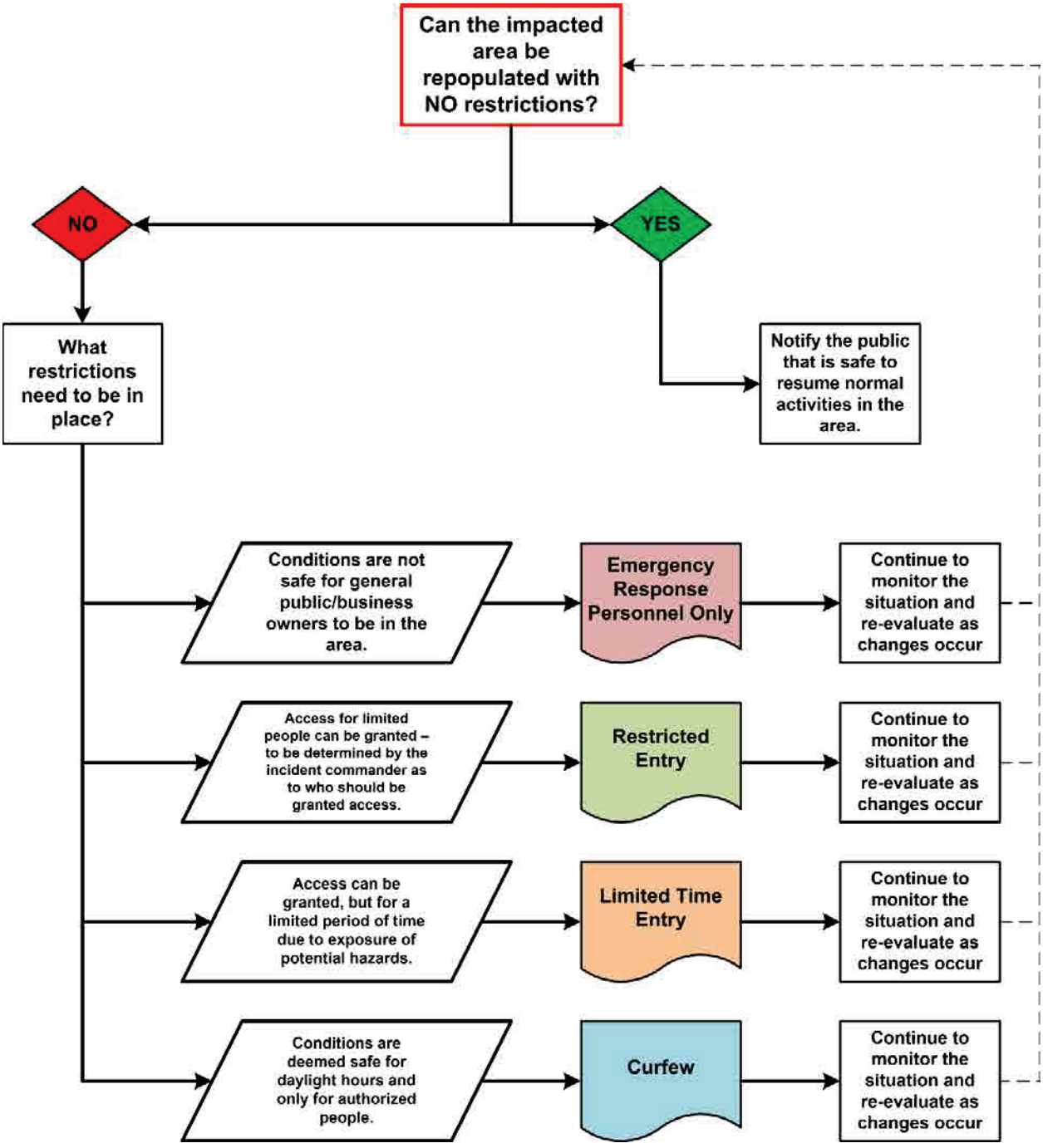


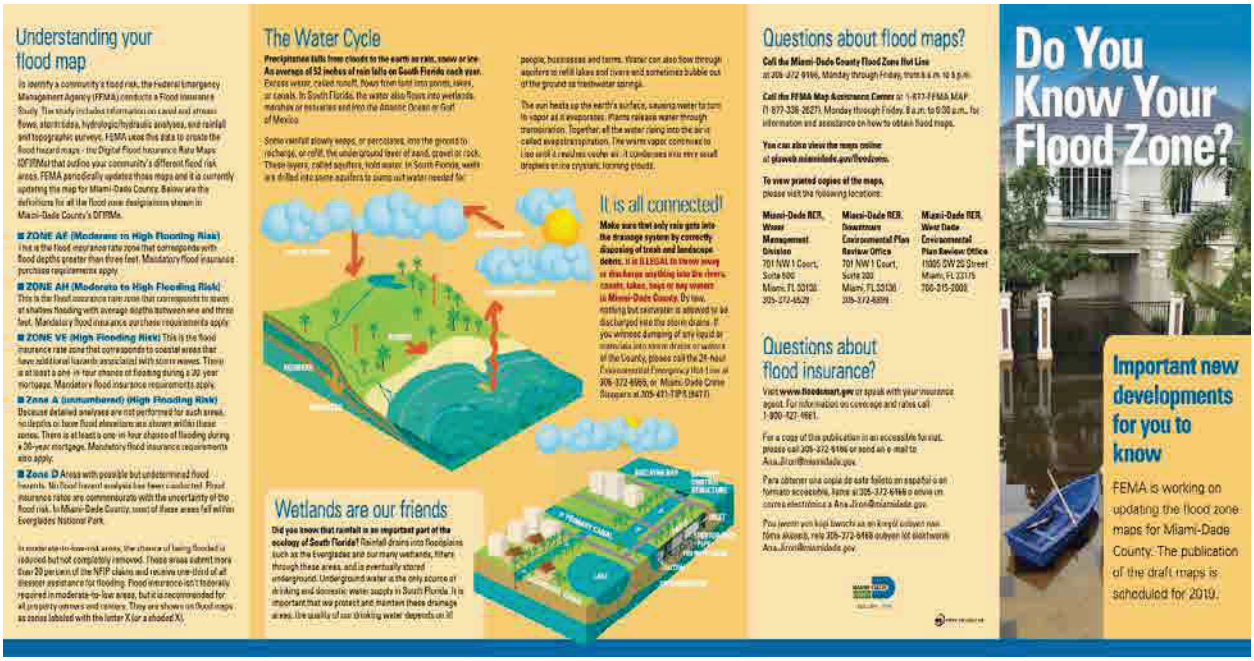
Figure 31. Protective Measure Decision-Making Matrix (Repopulation/Restricted Entry)



APPENDICES

Appendix A: Do You Know Your Flood Zone? Brochure

Available Online: www.miamidade.gov/environment/flood-maps.asp
Available in English, Spanish and Haitian Creole



Understanding your flood map

To identify a community's flood risk, the federal Emergency Management Agency (FEMA) conducts a Flood Insurance Study. The study includes information on coast and stream flows, storm tides, hydrologic/hydraulic analyses, and rainfall and topographic surveys. FEMA uses this data to create the flood hazard maps - the Digital Flood Insurance Rate Maps (DFIRMs) that outline your community's different flood risk areas. FEMA periodically updates these maps and it is currently updating the map for Miami-Dade County. Below are the definitions for all the flood zone designations shown in Miami-Dade County's DFIRMs.

ZONE AE (Moderate to High Flooding Risk)
This is the flood insurance rate zone that corresponds with flood depths greater than three feet. Mandatory flood insurance purchase requirements apply.

ZONE AH (Moderate to High Flooding Risk)
This is the flood insurance rate zone that corresponds to areas of shallow flooding with average depths between one and three feet. Mandatory flood insurance purchase requirements apply.

ZONE VE (High Flooding Risk) This is the flood insurance rate zone that corresponds to coastal areas that have additional hazards associated with storm waves. There is at least a one-in-four chance of flooding during a 30-year mortgage. Mandatory flood insurance requirements apply.

Zone A (unnumbered) (High Flooding Risk)
Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these zones. There is at least a one-in-four chance of flooding during a 30-year mortgage. Mandatory flood insurance requirements also apply.

Zone D Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk. In Miami-Dade County, most of these areas fall within Everglades National Park.

In moderate-to-low-risk areas, the chance of being flooded is reduced but not completely removed. These areas submit more than 20 percent of the NFIP claims and receive one-third of all disaster assistance for flooding. Flood insurance isn't federally required in moderate-to-low areas, but it is recommended for all property owners and renters. They are shown on flood maps as zones labeled with the letter X (or a shaded X).

The Water Cycle

Precipitation falls from clouds to the earth as rain, snow or ice. An average of 52 inches of rain falls on South Florida each year. Excess water, called runoff, flows from land into ponds, lakes, or canals. In South Florida, the water also flows into wetlands, marshes or estuaries and into the Atlantic Ocean or Gulf of Mexico.

Some rainfall slowly seeps, or percolates, into the ground to recharge, or refill, the underground layer of sand, gravel or rock. These layers, called aquifers, hold water. In South Florida, wells are drilled into some aquifers to pump out water needed for people, businesses and farms. Water can also flow through aquifers to refill lakes and rivers and sometimes bubble out of the ground as freshwater springs.

The sun heats up the earth's surface, causing water to turn to vapor as it evaporates. Plants release water through transpiration. Together, all the water rising into the air is called evapotranspiration. The warm vapor continues to rise until it reaches cooler air. It condenses into very small droplets or ice crystals, forming clouds.

It is all connected!

Make sure that only rain gets into the drainage system by correctly disposing of trash and landscape debris. It is ILLEGAL to throw away or discharge anything into the rivers, canals, lakes, bays or bay waters in Miami-Dade County. By law, nothing but rainwater is allowed to be discharged into the storm drains. If you witness dumping of any liquid or materials into storm drains or waters of the County, please call the 24-hour Environmental Emergency Hot Line at 305-372-6955, or Miami-Dade Crime Stoppers at 305-471-TIPS (8477).

Wetlands are our friends

Did you know that rainfall is an important part of the ecology of South Florida? Rainfall drains into floodplains such as the Everglades and our many wetlands, filters through these areas, and is eventually stored underground. Underground water is the only source of drinking and domestic water supply in South Florida. It is important that we protect and maintain these drainage areas, the quality of our drinking water depends on it!

Questions about flood maps?

Call the Miami-Dade County Flood Zone Hot Line at 305-372-6100, Monday through Friday, from 8 a.m. to 5 p.m.

Call the FEMA Map Assistance Center at 1-877-FEMA MAP (1-877-336-2627), Monday through Friday, 8 a.m. to 6:00 p.m., for information and assistance on how to obtain flood maps.

You can also view the maps online at **gisweb.miamidade.gov/floodzone.**

To view printed copies of the maps, please visit the following locations:

Miami-Dade RER, Water Management Division	Miami-Dade RER, Downtown Environmental Plan Review Office	Miami-Dade RER, West Dade Environmental Plan Review Office
701 NW 1 Court, Suite 500 Miami, FL 33128 305-372-6529	701 NW 1 Court, Suite 300 Miami, FL 33136 305-372-6399	11805 SW 26 Street Miami, FL 33175 786-315-2000

Questions about flood insurance?

Visit **www.floodsmart.gov** or speak with your insurance agent. For information on coverage and rates call 1-800-427-4661.

For a copy of this publication in an accessible format, please call 305-372-6100 or send an e-mail to Ana.Jiron@miamidade.gov.

Para obtener una copia de este folleto en español o en formato accesible, llame al 305-372-6100 o envíe un correo electrónico a Ana.Jiron@miamidade.gov.

Pou jwenn yon kopi bwochi sa an Kreyòl ayisyen nan fòma aksesib, rele 305-372-6100 oubyen lòt atravè Ana.Jiron@miamidade.gov.

Do You Know Your Flood Zone?

Important new developments for you to know

FEMA is working on updating the flood zone maps for Miami-Dade County. The publication of the draft maps is scheduled for 2019.

Why do floods occur?

Because Miami-Dade County is located in a unique geographical area, it is particularly susceptible to flooding from major rain events and storm surge. The County is surrounded by major water bodies, the Atlantic Ocean, Biscayne Bay, and many rivers, lakes and canals. Miami-Dade County lies close to sea level and its underground water supply is just below the ground surface. Therefore, major rain events sometimes leave rainwater nowhere to drain, causing occasional flooding in some areas of the County.

Know your flood risk

If you are not sure where your property is located on the map, please call Miami-Dade County's 311 Contact Center or Flood Zone Hotline at 305-372-6466 and your exact flood zone designation will be confirmed.

You can also find the flood zone for your property, using the website: **gisweb.miamidade.gov/floodzone.**

You can also visit the FEMA Map Service Center Website to download a copy of the maps at **msc.fema.gov.**

The Stormwater Utility Section also provides flood protection assistance to citizens, in the form of site visits and advice on how to protect your property from flooding. Please call Miami-Dade County's 311 Contact Center or 305-372-6688 to report any unusual flooding in your area or to request a site visit for your property.

Additional floodplain information

The hotline also provides additional information about your flood risk, such as location of coastal high hazard areas, flood depths at your property, historical flood maps, newly mapped flood prone areas, special rules for building in the floodplain, and future sea level vulnerability.

For information about natural conservation areas, and other protected areas, visit our Environmental Considerations tool at **www.miamidade.gov/environment/environmental-gis.asp** or call the Flood Zone Hotline.

Get an Elevation Certificate

Once you have determined that your house lies in a flood zone, an Elevation Certificate can then tell you how high your house was built in relation to that flood zone. These Certificates are required for all new constructions, as well as for construction projects that involve making substantial improvements to a structure. An Elevation Certificate is an important document that every homeowner should have, and in case of a disaster, could demonstrate to County authorities that your house is at or above the required elevation. If the Certificate shows that your house is lower than the required elevation, then the so-called "50% rule" would apply to your house. This rule means that if your house is in a flood zone and is damaged and/or improved to an amount greater than 50% of its market value, it will have to be raised to meet the current elevation requirement. Miami-Dade County has kept records of these Certificates on file since the County began participating in the Community Rating System (CRS). For more information about the 50% rule or Elevation Certificates, please call Miami-Dade County's 311 Contact Center or the Flood Zone Hotline at 305-372-6466.

Insure your home

Flood insurance is required for any federally backed mortgage in a Special Flood Hazard Area. PLEASE NOTE: when purchasing flood insurance, the policy does not go into effect until 30 days after purchase. Please visit **www.floodsmart.gov** for the most current information on flood insurance premiums and to locate a flood insurance agent in your area.

Because of Miami-Dade County's rating under the National Flood Insurance Program's (NFIP) Community Rating System, Miami-Dade County policy holders who live in a flood zone have enjoyed a 25% discount on their flood insurance premiums since October 1, 2003. A 10% discount on flood insurance is also available for those who live outside of flood zones, except on preferred risk policies.

Protect your home

There are things you can do to minimize or eliminate property damage before a flood event occurs. By raising your property, elevating and securing electrical appliances, placing all low-lying electrical fixtures on separate electrical circuits, and using flood-resistant materials on exterior surfaces are some ways you can help yourself. Under emergency conditions, sand bags can be used to protect structures from flood waters, and elevating or covering furniture and valuables can help minimize damage.

Retrofitting your home

All construction in Miami-Dade County requires the issuance of building permits prior to construction. Building permits are obtained after submittal and approval of building plans. An important part of the review process is the requirement that structures be built high enough and use proper design to protect against flood damage. If you plan to construct an addition to your home, build a new house, or for any other type of development, call Miami-Dade County's Department of Regulatory and Economic Resources (RER) at 786-315-2000 for information on how to obtain the necessary permits. If you see construction taking place in Miami-Dade County without the proper permits, please call the Miami-Dade County's 311 Contact Center or the Code Enforcement Office at 786-315-2424 to report it. To obtain information on how to select a contractor to repair your home after a flood or other natural disaster, or to conduct a search to find out if a complaint has been filed on a contractor working in Miami-Dade County, please visit **www.miamidade.gov/building/contractor-inquiry-search.asp.**



If you live in a condo

If you live in a condominium, private community with an association, or if your place of business is located in a commercial property such as a warehouse or shopping mall, then you should become familiar with the drainage system in your private community and/or place of business. Specifically, you should be aware of the location, condition and operation of the on-site drainage system that your homeowner's association or place of business is responsible for maintaining. It is also a good idea to develop a list of important contact persons/phone numbers associated with the maintenance of the drainage system BEFORE an emergency arises.

Be aware

When an Emergency Flood Warning Notice is issued for your area, take safety precautions immediately:

- Do not walk or drive through flowing or standing water. Unseen obstructions or hazards may harm you or your vehicle. Also, sewage from overflowing sewer lines may be present in the water.
- Avoid downed power lines and electrical wires. These lines can cause shock and electrocution.
- Turn off the power in your house. This should include electrical power as well as all propane gas tanks and lines.
- Watch your step in flooded areas. Slip-and-fall accidents are common in wet, slippery areas.
- Be alert for small animals that are flushed out by flooding conditions. Under stress, animals may react by biting when disturbed.
- Be aware of gas leaks in the home. Do not smoke, nor use candles or open flames, until you are sure no leaks exist; ventilate enclosed areas if you think gas is present.

For more information, please visit the Red Cross website at: **www.redcross.org/get-help/how-to-prepare-for-emergencies/types-of-emergencies/flood.html.**

Repetitive losses

A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP. Currently there are over 122,000 RL properties nationwide. To find out more about repetitive loss properties, visit our website at: **www.miamidade.gov/environment/repetitive-losses.asp.**

Weather warnings / watches.

The National Weather Service monitors local weather conditions. If flooding from rain is anticipated, the Service will broadcast Flood Warning Notices through television, radio and wire services. These notices are intended to make you aware and help you prepare for possible flooding. If an Emergency Flood Warning Notice is issued, the National Weather Service will broadcast this warning through the Emergency Alert System, and through TV and radio stations. For more information visit **www.miamidade.gov/fire/alerts-and-notifications.asp.**



Your opinion counts

Miami-Dade County is constantly updating its Floodplain Management Plan. To reduce storm flooding, the County's Stormwater Utility is in the process of identifying, prioritizing and implementing local drainage projects throughout the County. We would like to hear from you, to be sure we are meeting your needs. Please see the following questions and respond by calling our Flood Complaints Hotline, from 8 a.m. to 5 p.m., Monday through Friday, at 305-372-6692.

We would like to know:

Do you have flooding problems in your neighborhood or at your place of business? If so, have you notified the County, and if you did, was our response satisfactory?

Have you noticed the drainage improvements being constructed by Miami-Dade County? Have they helped reduce flooding in your local community?

Appendix B: 2024 Hurricane Readiness Guide

Available Online: www.miamidade.gov/hurricane/library/guide-to-hurricane-readiness.pdf
The Guide is fully translated in English, Spanish and Haitian Creole



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Neurodivergent individuals can prepare for a hurricane by visiting https://padlet.com/djffumnsucard/hurricanepreparedness.

E Las personas neurodivergentes pueden encontrar información sobre cómo prepararse para un huracán en el sitio web https://padlet.com/djffumnsucard/hurricanepreparedness.

K *Moun ki newodivèjan yo ka prepare pou yon siklòn lè yo vizite https://padlet.com/djffumnsucard/hurricanepreparedness.*

For up-to-the-minute hurricane information, download the **Ready MDC** mobile app.

E **Para obtener información actualizada sobre huracanes, descargue la aplicación para dispositivos móviles Ready MDC.**

K ***Pou w jwenn enfòmasyon aktyalize sou siklòn, telechaje aplikasyon mobil Ready MDC a.***

iPhone

Android

To learn more, visit miamidade.gov/hurricane.

E **Para más información, visite miamidade.gov/hurricane.**

K ***Pou plis enfòmasyon, vizite miamidade.gov/hurricane.***

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MIAMI-DADE DEPARTMENT OF EMERGENCY MANAGEMENT

BEFORE

TORNADOES AND STORM SURGE

TORNADOES

Hurricanes and tropical storms can also produce tornadoes. Usually, these tornadoes are relatively weak and short lived, but they pose a significant threat to life and property.

STORM SURGE

During a hurricane, storm surge is the greatest threat to life and property. It is an abnormal rise of water generated by a hurricane. Storm surge can travel several miles inland, especially along bays and canals, and can reach heights well over 20 feet.

If you live in a high-rise building and choose to shelter-in-place, stay on floors just above flood water or storm surge, but not higher than the 10th floor. Hurricanes bring dangerous winds and the higher up you go in a building, the stronger the wind speed.

KNOW YOUR ZONE

All Miami-Dade County residents should know which Storm Surge Planning Zone they live in. To determine your zone, go to **miamidade.gov/hurricane**, find the Storm Surge Planning Zone section, then enter your address. You can also download the Ready MDC mobile app or call 311.

Upon identification of a threat, each zone (or portions of a zone) will be evacuated depending on the hurricane's track and projected storm surge, independent of the hurricane's category.

A Storm Surge Planning Zone is an area that could be affected by storm surge of 1 ½ feet or higher during a hurricane. These planning zones are not to be confused with your flood zone.

Know Your Zone

- Zone A is at greatest risk for storm surge from a Category 1 hurricane and higher.
- Zone B is at greatest risk for storm surge from a Category 2 hurricane and higher.
- Zone C is at greatest risk for storm surge from a Category 3 hurricane and higher.
- Zone D is at greatest risk for storm surge from a Category 4 hurricane and higher.
- Zone E is at greatest risk for storm surge from a Category 5 hurricane.

To view Storm Surge Planning Zones please refer to the map at the end of this Hurricane Guide.

Appendix C: News Release Samples

https://www.miamidade.gov/global/release.page?Mduid_release=rel1728416338588230



Media Contact

EOC PIO
eocpio@miamidade.gov
786-788-5303

Miami-Dade County Officials provide update on Hurricane Milton Preparations

MIAMI-DADE (October 08, 2024)– Hurricane Milton is currently a major category 4 hurricane as it heads toward landfall on the west coast of Florida. The storm is expected to bring life-threatening storm surge to the Tampa Bay area and west coast – even as they continue to recover from Hurricane Helene.

Miami-Dade is now under a tropical storm warning. The most likely impacts in our County includes heavy rainfall, localized flooding, and sustained tropical storm force winds, starting as early as tonight. Milton is a major storm and it remains important to stay prepared as the county will be affected by the outer bands.

The Emergency Operations Center remains activated to ensure the community is ready to respond. County services including water and sewer and transit services including Metrorail, Metrobus, and Metromover currently remain open. The Trash and Recycling Centers have extended their hours until 7pm and all other waste collection services are operating normally, weather permitting.

All non-essential County government offices will be closed Wednesday, October 9 and Thursday, October 10.

As emergency personnel continue to monitor potential impacts over the next 48 hours, Miami-Dade County will keep the community updated on any other service changes.

The county announced voluntary evacuation of mobile home parks yesterday.

- The E. Darwin Fuchs Pavilion, located at 10901 Coral Way, is a pet-friendly evacuation center open only for mobile home residents who voluntarily wish to relocate.
- Miami-Dade Transit is providing transportation assistance for mobile home residents who are voluntarily evacuating; residents should call the 311 Contact Center or submit the online form for assistance to request transportation assistance. 311 is open extended hours until 10 pm tonight.

Miami-Dade County departments have been aggressively preparing for and responding to flooding over the last few days.

Yesterday, the Parks, Recreation and Open Spaces (PROS) Department began distributing sandbags at nine regional parks countywide. PROS has already successfully distributed more than 70,000 sandbags to residents in need and the majority of our sites have closed based on the enormous demand.

The County is grateful for the many residents and families who have volunteered to foster the most vulnerable cats and dogs from the Animal Services Department (ASD). ASD staff has been overwhelmed by the number of residents who have stepped up to take in pets this week and Miami-Dade remains extremely grateful for their service.

MIA is currently open and operating, although some airlines have cancelled or will cancel flights. Travelers are encouraged to confirm their flight status before heading to the airport.

PortMiami is currently under port readiness condition Yankee. Under Yankee, the Port will not be receiving any inbound vessels and crews are busy emptying yards this morning. The tunnel is closed into the port but remains open for outbound vehicles.

The US Coast Guard also announced that they will begin locking down all drawbridges for boat traffic starting at noon today.

It is important that the community takes key steps to prepare:

- Gather hurricane supplies now. Make sure three days of supplies (e.g., non-perishable food and water) are on hand for each person in the household. Residents can fill their own containers with Miami-Dade tap water!
- Put up hurricane shutters.
- Fill any vehicle's gas tank with gasoline. Extra gasoline should be stored in an appropriate container and in a safe area of the home.
- Do not trim trees or shrubs at this time. The County's 13 Trash and Recycling Centers have extended their operating hours and will remain open until 7 p.m. today.
- Make sure home, yard and construction debris are properly secured. Any objects that hurricane winds could blow about should have been tied down or brought indoors (garbage cans, patio furniture, garden tools, toys, etc.).

Keep in mind the following flood and water safety measures:

- Help minimize overflows to the wastewater system by keeping manhole covers closed, and by minimizing water usage in the morning and evening during heavy rain.
- Residents can report severe flooding within unincorporated Miami-Dade or the city of Miami by calling 311 or using the 311Direct app. Residents should only call 911 if they have a medical- or life-threatening emergency.
- County crews are on standby to drain flooded areas as needed.
- Residents and visitors are urged to practice flood safety – "turn around don't drown." AVOID walking or driving in flooded areas.
- Head to miamidade.gov/hurricane or download the Ready MDC app for more flood safety information and updates.

Continue monitoring local media and verified social media platforms as the County shares important updates this week.

# # #

To request materials in accessible format, sign language interpreters, and/or any accommodation to participate in any County-sponsored program or meeting, please contact at or email, , five days in advance to initiate your request. TTY users may also call 711 (Florida Relay Service).

DANIELLA LEVINE CAVA,OFFICE OF THE MAYOR

Stephen P. Clark Center
111 NW 1st Street, Miami, FL 33128



https://www.miamidade.gov/global/release.page?Mduid_release=rel172744219098971



Media Contact

Media and Public Relations Bureau
mdfrpio@miamidade.gov
305-204-2526

Inclement Weather from Hurricane Helene

MIAMI-DADE (September 25, 2024)– According to the National Hurricane Center (NHC), Hurricane Helene is currently located approximately 45 miles east-northeast of Cozumel, Mexico, and is moving northwestward at 10 mph. Helene is likely to become a major hurricane by Thursday as it crosses the eastern Gulf of Mexico. The forecast track indicates the storm will make landfall along the Big Bend coast of Florida late Thursday.

While Miami-Dade County is under a Tropical Storm Warning, the county remains outside of the immediate forecast cone. Tropical storm-force winds could reach parts of South Florida, including Miami-Dade County, as early as tonight. County officials are closely monitoring the situation and preparing for any potential impacts. Residents are urged to remain informed and follow safety guidelines.

Though Governor Ron DeSantis has declared a state of emergency for multiple counties in Florida, including those in the storm's path, Miami-Dade County has not been included on that list. However, we continue to work closely with state and federal authorities to monitor any changes and ensure preparedness.

"The Miami-Dade Department of Emergency Management continues to monitor the path of Hurricane Helene, and although it is not currently a direct threat to our county, this is a great opportunity to remind everyone of the importance of being prepared," said Pete Gomez, Director for Miami-Dade Department of Emergency Management.

This heavy rainfall may cause localized flooding in areas that are low-lying or with poor drainage. Miami-Dade County is actively monitoring the potential for flooding in our area and advises everyone to stay updated on weather forecasts. Other Miami-Dade County departments have been preparing for the upcoming rainy season.

"We continue to build a resilient community by providing our residents and visitors with all the tools they need to be safe," said Mayor Daniella Levine Cava. "We remain vigilant and all of our County departments are ready to respond to mitigate any impacts this storm may have in our region. We also stand at the ready to assist other communities in northern Florida who will be directly impacted by the storm."

Please be prepared and stay safe. The Miami-Dade Department of Emergency Management (DEM) encourages our community to follow these tips during inclement weather:

- Visiting South Florida? Know what to do when your vacation is suddenly interrupted due to severe weather. Before heading out to catch your flight, be sure to check with your airline directly for any possible delays
- It is never safe to drive or walk into flood waters: Don't drive or walk around road barriers or through large puddles. Hidden debris may be just under the surface that could hurt you or disable your car
- It is vital to know what to do if you are driving and hit a flooded road: More than half of the deaths from flooding each year occur in vehicles. Turn around, don't drown
- Don't underestimate the power of water: 6 inches of fast-moving flood water can knock over an adult. It takes just 12 inches of rushing water to carry away a small car, while 2 feet of rushing water can carry away most vehicles
- Stay away from downed power lines and electrical wires: Electrocution is also a major killer in floods. Electrical current can travel through water. Report downed power lines to Florida Power and Light's customer service number at 305- 442-8770
- Do not play in standing water: If water is stagnant for extended periods, there is a potential for contamination. Playing or remaining in standing water should be avoided
- Do not remove manhole covers: Removing manhole covers can inundate sewage pipes and overwhelm sewer facilities. It can also suck in people and debris which can cause drowning and loss of life

- Sign up for free emergency alerts: Receive emergency texts or emails regarding public safety issues, recommended public protective actions or other emergency information by signing up for Miami-Dade Alerts
- Monitor media: Continue monitoring local media or verified social media platforms for the latest updates, advisories, and instructions from public safety officials. Follow DEM on X @MiamiDadeEM and on Facebook

For more information, please contact Miami-Dade Fire Rescue's Media and Public Relations Bureau at 305-204-2526.

###

To request materials in accessible format, sign language interpreters, and/or any accommodation to participate in any County-sponsored program or meeting, please contact at or email, , five days in advance to initiate your request. TTY users may also call 711 (Florida Relay Service).

PETE GOMEZ,EMERGENCY MANAGEMENT

R. David Paulison Fire Rescue Headquarters
9300 NW 41st St, Miami, FL 33178-2414



Appendix D: Emergency and Evacuation Assistance Program

Information available online:
https://www.miamidade.gov/global/service.page?Mduid_service=ser1470238193996672

MIAMI-DADE COUNTY

Delivering Excellence Every Day

Miami-Dade County
Office of Emergency Management
9300 NW 41 St, Doral, FL 33178

We Need Your Assistance!
VOLUNTEERS NEEDED

The Office of Emergency Management (OEM) works year-round to prepare for any type of disaster or emergency. As we prepare, we would like to invite you to participate in an important upcoming event.

On **Saturday, March 16th, 2019,** OEM will be conducting a call-down of the **Emergency and Evacuation Assistance Program (EEAP)** registry and the **Community Emergency Response Team (CERT)** database.

Emergency and Evacuation Assistance Program (EEAP) provides evacuation support to individuals with functional and access needs. The program is targeted towards residents of Miami-Dade County who need specialized transportation assistance or have medical needs that prevent them from evacuating on their own.

The **Community Emergency Response Team (CERT)** Program enables community citizens to prepare themselves for hazards that may impact their community in any major disaster or event and to provide assistance in their neighborhood.

Please join us in making calls to update information for the EEAP and CERT registries. We need your support in being part of the solution and helping the community!

Date: **Saturday, March 16th, 2019**
Time: **8:00 a.m. to 5:00 p.m.** *(or anytime between these hours, minimum 4 hours)*
Location: **Miami-Dade County Emergency Operations Center**
9300 NW 41 Street, Doral, Florida 33178

Lunch will be provided.

We need ***English, Spanish and Haitian Creole speaking volunteers*** to help us place phone calls and update registrant's information.

3 options to RSVP as a volunteer:

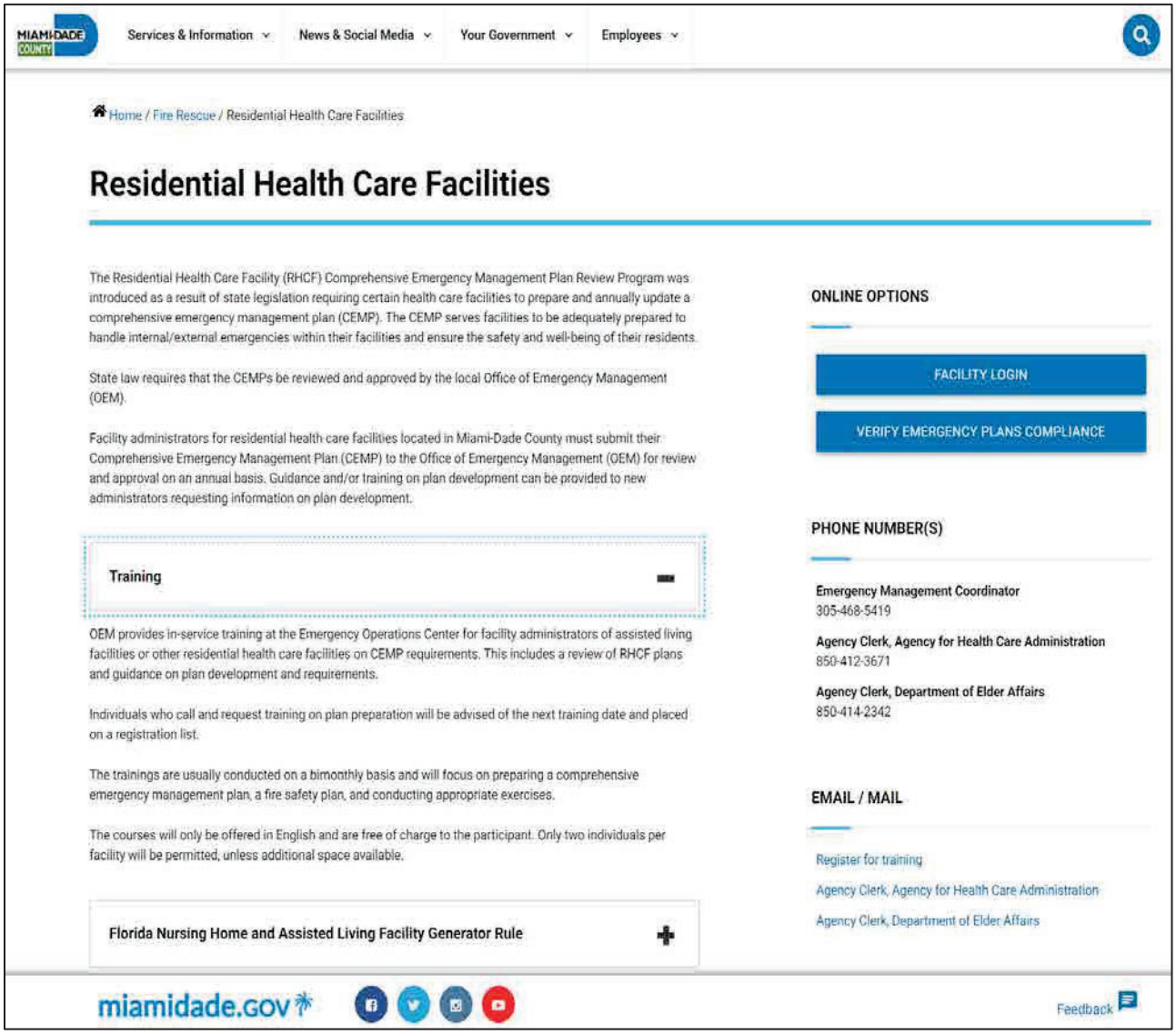
1. Use Eventbrite registration: **https://calldown2019march.eventbrite.com**
2. E-mail [redacted]: [redacted]@miamidade.gov
   Specify in your email:
   - What hours are you available to participate (start and end time)?
   - What languages do you speak (English, Spanish or Haitian Creole)?
3. Call or text us at 305-[redacted]

If you need any accommodations, please let us know.

Your participation is greatly appreciated!
Thank you for your support!

Appendix E: Residential Health Care Facility (RHCF) Requirements

Information available online:
https://www.miamidade.gov/global/service.page?Mduid_service=ser1539637068904426



Appendix F: Acronyms

BCC	Miami-Dade Board of County Commissioners
BFE	Base Flood Elevation
BOS	Back of Sidewalk
CDMP	Comprehensive Development Master Plan
CEMP	Comprehensive Emergency Management Plan
CFC	County Flood Criteria
COR	Crown of Road
CRS	Community Rating System
DTPW	Miami-Dade Department of Transportation and Public Works
EAR	Evaluation Appraisal Report
EAS	Emergency Alert System
EEAP	Emergency and Evacuation Assistance Program
EMNet	Emergency Management Network
EOC	Emergency Operations Center
ESU	Emergency Support Unit
FDEM	Florida Division of Emergency Management
FDOH	Florida Department of Health
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FLASH	Federal Alliance for Safe Homes
FLIPPER	Florida Interoperable Picture Processing for Emergency Response
GIS	Geographic Information System
GM&B	Greater Miami & the Beaches
HIAP	Hazard Impact Assessment Plan
IPAWS	Integrated Public Alert Warning System
ISO/CRS	Insurance Services Office, Inc. /Community Rating System
LMS	Local Mitigation Strategy
LMSSC	Local Mitigation Strategy Sub-Committees
LMSWG	Local Mitigation Strategy Working Group
LOMA	Letter of Map Amendment
LOS	Level of Service
MDFR	Miami-Dade Fire Rescue
MOM	Maximum of Maximums
NFIP	National Flood Insurance Program
NHC	National Hurricane Center
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
PF	Precipitation Frequency
PFDS	Precipitation Frequency Data Server
QA/QC	Quality Assurance and Quality Control
RER	Miami-Dade County Regulatory and Economic Resources
RHCF	Residential Healthcare Facility
SFRPC	South Florida Regional Planning Council
SFWMD	South Florida Water Management District
SLOSH	Sea, Lake and Overland Surges from Hurricanes
SOP	Standard Operating Procedures
SRL	Severe Repetitive Loss
THIRA	Threat and Hazard Identification and Risk Assessment
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
WEA	Wireless Emergency Alert
WRN	Weather-Ready Nation

Appendix G: Floodplain Managers

Jurisdiction	Name	Title	Email
Aventura	Jake Ozyman, PE, PMP	Public Works & Transportation Director	jozyman@cityofaventura.com
Bal Harbour	Lourdes M Rodriguez	Building Department Administrator	lrodriguez@balharbourfl.gov
Bay Harbor Islands	Randy L. Daniel, P.E., PMP, CFM	Town Engineer	rdaniel@bayharborislands-fl.gov
Biscayne Park	Pedro Martinez	Contracted Building Official	pmartinez@capfla.com
Coral Gables	Manuel Lopez, P.E.	Building Official	mlopez@coralgables.com
Cutler Bay	Alfredo Quintero	Director of Public Works	aquintero@cutlerbay-fl.gov
Doral	Ingrys Farias, CFM	Floodplain Manager	Ingrys.Farias@cityofdoral.com
El Portal	Pedro Martinez	Contracted Building Official	pmartinez@villageofelportal.org
Florida City	Pedro Gonzalez	City Engineer	pgonzalez@baljet.com
Golden Beach	Christopher Grapz	Zoning Reviewer	pens@bellshouth.net
Hialeah	Lilibet Muniz Del Castillo	Building Plans Examiner	Lmdc17497@hialeahfl.gov
Hialeah Gardens	Jose Lopez	Public Works Director	jlopez@cityofhialeahgardens.com
Homestead	Jose Perez, EMPA, CFM	Director of Code Compliance	Japerez@homesteadfl.gov
Key Biscayne	Rene Velazco	Building Official	rvelazco@keybiscayne.fl.gov
Medley	Mohan Thampi	Contracted Civil Engineer	building@townofmedley.com
Miami	Mr. Guari Mascaro	Floodplain Administrator	gmascaro@miamigov.com
Miami Beach	Jarahpour, Mohsen	Flood Plain Manager	mohsenjarahpour@miamibeachfl.gov
Miami Gardens	Mike Gambino CFM	Flood Plain Administrator Consultant	mgambino1@miamigardens-fl.gov
Miami Lakes	Richard Annese	Building Official	anneser@miamilakes-fl.gov
Miami Shores	Michael Orta	Neighborhood Services Manager	OrtaM@msvfl.gov
Miami Springs	Ulises Fernandez	Building Official and Code Compliance Director	ufernandez@miamigardens-fl.gov
North Bay Village	Mohan Thampi	Contracted Civil Engineer	mthempi@nbvillage.com

Jurisdiction	Name	Title	Email
North Miami	Debbie Love	Director - Development Services Department	dlove@northmiamifl.gov
North Miami Beach	Zafar Ahmed	Director Department of Community Development	Zafar.Ahmed@citynmb.com
Opa-Locka	Esin Daniel Abia, EI,CGC, CBO, CFM	Building Official	eabia@Opalockafl.gov
Palmetto Bay	Dario Gonzalez	Chief Structural Engineer/ Floodplain Reviewer	dgonzalez@palmettobay-fl.gov
Pinecrest	Paul Buckler, RA	Building Director	pbuc@pinecrest-fl.gov
South Miami	Surami Cabrera	Director of Development Services	scabrera@southmiamifl.gov
Sunny Isles Beach	Dylan Battles	Building Official	dbattles@sibfl.net
Surfside	Manuel Salazar	Building Official	MSalazar@townofsurfsidefl.gov
Sweetwater	Alejandro Gómez, PE	City Engineer	agomez@cityofsweetwater.fl.gov
Unincorporated Miami-Dade	Marina Blanco-Pape	Deputy Director - Regulatory and Economic Resources	marina.blanco-pape@miamidade.gov
Virginia Gardens	Lazaro Garaboa	Public Works Director	LGaraboa@virginiagardens-fl.gov
West Miami	Frank Alonso	Contracted Building Official	falonso@amiengineer.com