Miami-Dade County, Florida Office of Emergency Management (OEM)

MIAMI-DADE COUNTY

LMS

LOCAL MITIGATION STRATEGY

Part 7: National Flood Insurance Program and Community Rating System

JULY 2020

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 July 15, 2020, per the FEMA Community Status Book Report. The current effective Flood Insurance Risk 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	

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[1] FEMA Community Status Book Report (July 2020): https://www.fema.gov/cis/FL.pdf

![Miami-Dade County LMS - Local Mitigation Strategy]

Miami-Dade County Local Mitigation Strategy
Part 7: National Flood Insurance Program
and Community Rating System

Jurisdiction	Initial FIRM Identified	Entry Date	Additional Comments
North Miami Beach	9/29/1972	9/29/1972	
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 municipalities are responsible, but not limited to the following:

- 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

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 August 2019, 467 communities in Florida participate in the NFIP and 240 of these communities participate in the CRS Program. Unincorporated Miami-Dade County has a total of 122,414 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 50 Florida communities, with a total of 144,146 flood insurance policies-in-force. They all participate in the CRS Program.[3]

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[2] April 2019 NFIP Flood Insurance Manual, Appendix F: Community Rating System:
https://www.fema.gov/media-library-data/1559830308363-e690ed2aea6606fb81826904e4a7bd7f/app-f_crs_508_apr2019.pdf
[3] Florida CRS Map (October 2019):
https://crsresources.org/files/100/maps/states/florida_crs_map_october_2019.pdf

Unincorporated Miami-Dade County participates in the CRS Program since October 2003, and has currently achieved a Class 5 Community rating, which guarantees a 25 percent discount on all flood insurance premiums within a flood zone and a 10 percent discount on policies outside of a flood zone. Furthermore, there are 23 communities in Miami-Dade County that participate in the CRS Program with rating ranging from Class 5 (25% 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	5	**Miami Gardens**	6
Aventura	7	**Miami Lakes**	6
Bal Harbor	8	**Miami Shores**	8
Bay Harbour	7	**North Miami**	6
Coral Gables	7	**North Miami Beach**	8
Cutler Bay	5	**Opa-Locka**	8
Doral	7	**Palmetto Bay**	8
Golden Beach	10	**Pinecrest**	8
Homestead	9	**South Miami**	7
Key Biscayne	7	**Sunny Isles Beach**	7
City of Miami	7	**Surfside**	7
Miami Beach	5		

*As of May 1, 2019.[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 7, 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.

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[4] Flood Insurance Manual (April 1, 2019), Appendix F: https://www.fema.gov/media-library/assets/documents/178743

Scope

The scope of the Miami-Dade County Local Mitigation Strategy (LMS) Part 7: NFIP and CRS (LMS-Part 7) is to identify the County's CRS activities. The CRS/Flood Sub-Committee will be responsible for supporting the development and review of this section of the LMS. LMS-Part 7 is meant to be supplementary to, and not replace, the responsibilities of the community's (County or Municipality) CRS Coordinator.

Planning Process

LMS-Part 1 states that the LMS is a compilation of initiatives that are identified and supported by the LMS Coordinator, LMS Co-Chair, LMS Steering Committee, LMS Working Group (LMSWG) and LMS Sub-Committees (LMSSC). 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 December) 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 LMS Steering Committee and LMSSC meet on an as needed basis.

Meeting notes and attendance sheets are maintained in LMS-Part 5. The LMS Coordinator develops a monthly LMS Information Bulletin that is distributed to the LMSWG and posted on the LMS website.[5] The LMS Information Bulletin 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.

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. Therefore, when the BCC adopted the LMS in September 2015, all municipalities were included in the adoption; none opted out.

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.

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[5] CRS (2017 Edition) – 510 (Step 2)

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.[6]

Table 4.   Flood Types[7]

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

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[6] The National Severe Storms Laboratory, Severe Weather 101-Floods:
https://www.nssl.noaa.gov/education/svrwx101/floods/
[7] *Ibid.*

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Miami-Dade County Local Mitigation Strategy
Part 7: National Flood Insurance Program
and Community Rating System

the County, the extent, previous occurrences, the vulnerability and hazard assessment. The 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 OEM 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.[8]

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. Figures 1 illustrates Miami-Dade County's canal system and figures 2 illustrates the location of Miami-Dade County canals within the drainage basins.

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[8] 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

MIAMI-DADE COUNTY
LMS
LOCAL MITIGATION STRATEGY

Miami-Dade County Local Mitigation Strategy
Part 7: National Flood Insurance Program
and Community Rating System

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 jurisdictions, which demonstrates the importance of tracking drainage projects throughout Miami-Dade County to better collaborate on flood hazard mitigation with all jurisdictions.
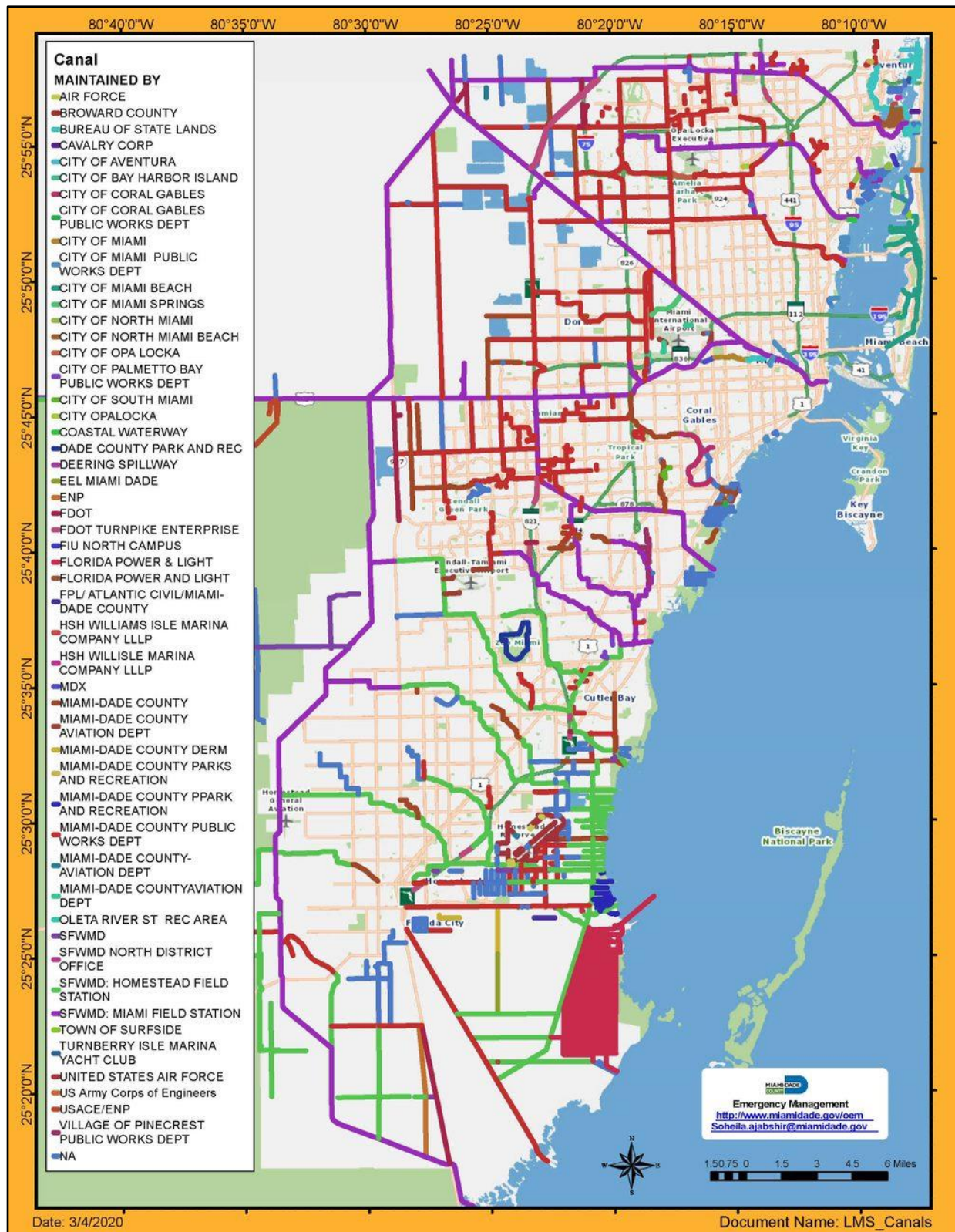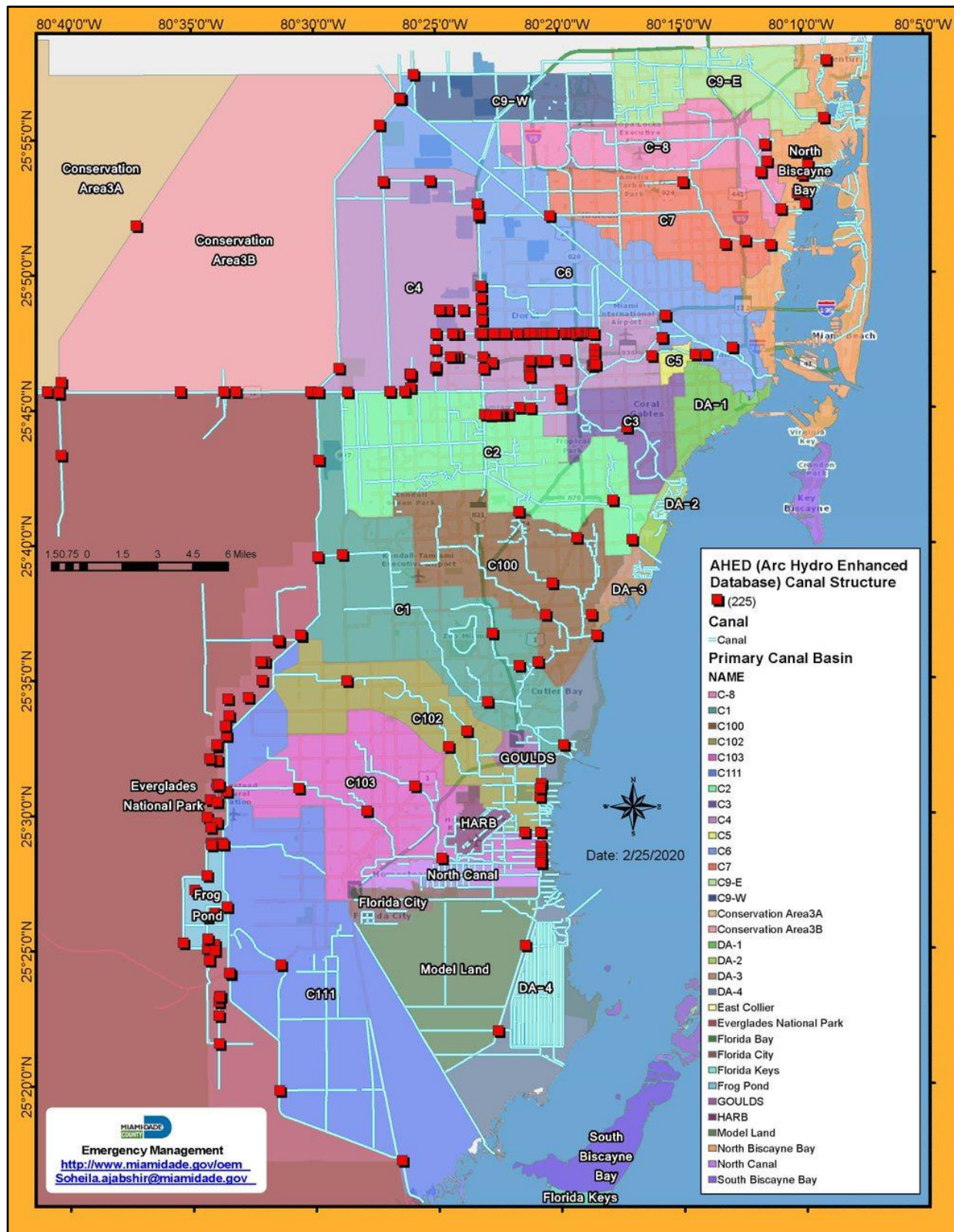
Figure 1.   Canals in Miami-Dade County

Figure 2. Canals and Canal Structures within Drainage Basins

Figure 3.   Municipal Boundaries in Relation to Drainage Basins

2019 Rainy Season[9]

South Florida's rainy season typically lasts an average of 155 days starting in mid-May and ending in mid-October. According to SFWMD, the season was mostly drier than normal for South Florida. The South Florida top ten rainfall sites listed on table 5, compiled by the National Weather Service (NWS) - Miami/South Florida Forecast Office, include six (6) Miami-Dade County sites (in blue). For Miami-Dade County, the Opa-Locka Airport and North Miami Beach sites, recorded the highest rainfall amounts with 48.40 inches of rainfall (9.50 inches above normal) and 46.14 inches of rainfall (4.33 inches above normal), respectively.

Table 5.   Top 10 Rainfall Sites in South Florida in 2019 Rainy Season

Location	May 15 – October 15 Rainfall (inches)	Departure from Normal (inches)
Pembroke Pines/North Perry Airport	50.59	+10.34
Opa-Locka Airport	48.40	+9.59
Naples East/Golden Gate	47.68	+8.24
North Miami Beach	46.14	+4.33
Miami International Airport	45.10	+4.20
Hialeah	42.94	-3.12
The Redland	40.70	-1.03
West Kendall/Miami Executive Airport	39.95	-0.85
Marco Island	39.38	+1.77
Juno Beach	39.28	+2.26

The first two (2) weeks of May, before the start of the rainy season, rainfall amounts were higher than normal. Through the end of the month, a large high pressure area set-up over the southeast United States and very little rainfall was recorded. June and most of July was relatively normal. A wetter than normal pattern began in late July when a persistent low pressure moved over the southeast United States and eastern Gulf of Mexico. As a result, August was the wettest month of the season. On the other hand, September was abnormally dry as a result of a high pressure area over the southeast United States. Abnormally dry conditions persisted through the rest of the season and Miami recorded its second driest Fall Season on record with 11.38 inches below normal.

The South Florida dry season typically lasts from October into May with an average rainfall of 12-19 inches, lowest in the interior and western portions of south Florida.

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[9] Winter/Dry Season 2019-2020 Outlook for South Florida by the Warning Coordination Meteorologist from the NWS – Miami/South Florida Forecast Office

MIAMI-DADE COUNTY
LMS
LOCAL MITIGATION STRATEGY

Miami-Dade County Local Mitigation Strategy
Part 7: National Flood Insurance Program
and Community Rating System

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.[10]

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.[11]

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

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[10] National Hurricane Center Tropical Cyclone Report for Hurricane Irene, October 13 – 19, 1999: http://www.nhc.noaa.gov/data/tcr/AL131999_Irene.pdf

[11] Miami-Dade County Flood Management Task Force – Report on Flood of October 3, 2000: https://www.miamidade.gov/environment/library/reports/flood-management.pdf

15.30 inches at the Miami International Airport.[12] Many of the same areas that were impacted by 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.[13]

"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 [14, 15]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

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[12] 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
[13] Miami-Dade County Flood Management Task Force – Report on Flood of October 3, 2000: https://www.miamidade.gov/environment/library/reports/flood-management.pdf
[14] National Hurricane Center's Costliest U.S. Tropical Cyclones Tables: https://www.nhc.noaa.gov/news/UpdatedCostliest.pdf
[15] 2017 Hurricane Harvey tied with Hurricane Katrina as the costliest tropical cyclone on record.

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.

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 7, 2011 and 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.[16]

Figure 4.   48-Hour Rainfall Accumulation Map (October 7 – 9, 2011)
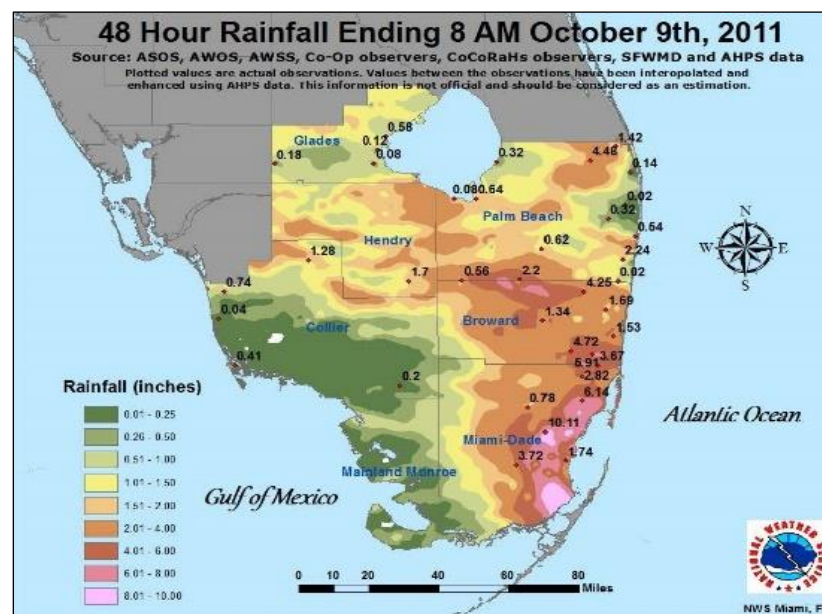
The second flood event occurred between Friday, October 28th and Monday, October 31st. A combination of high levels of atmospheric moisture in the Caribbean and the Gulf of Mexico, and a stalled frontal boundary produced heavy rainfall between October 28 and 31, 2011 (Friday – Monday). This resulted 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.

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[16] NWS – Miami/South Florida Forecast Office, Public Information Statement:
https://www.weather.gov/media/mfl/news/RAIN_EVENT111009.pdf

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 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.[17]

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)
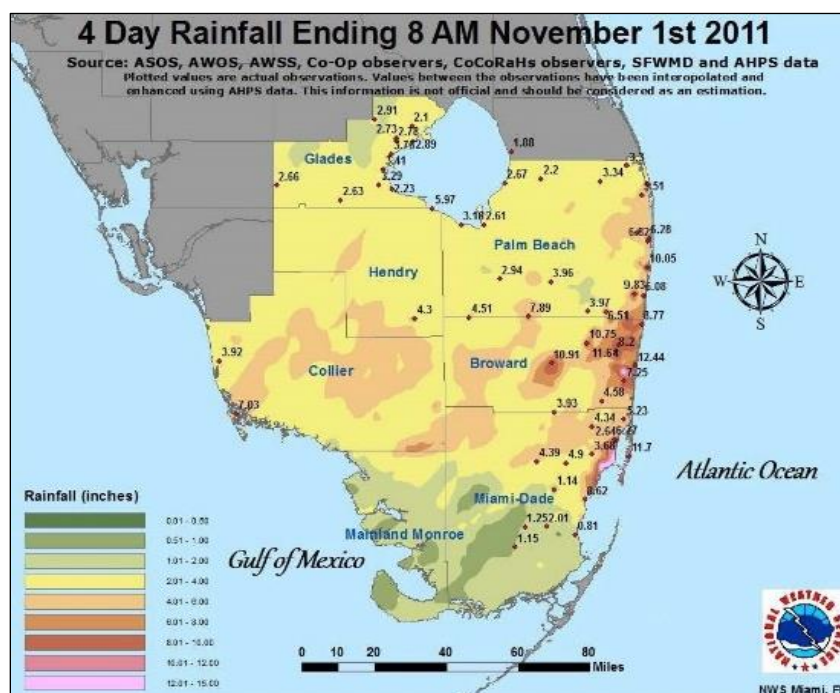
Tropical Storm Andrea (June 2013) – A trough developed north of a persistent cyclonic gyre located over the southeastern Mexico and northern Central America on June 2, 2013. On June 3rd, a broad area of low pressure formed over the southern Gulf of Mexico in response to a tropical wave entering the northwestern 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.

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[17] 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.[18, 19] 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)
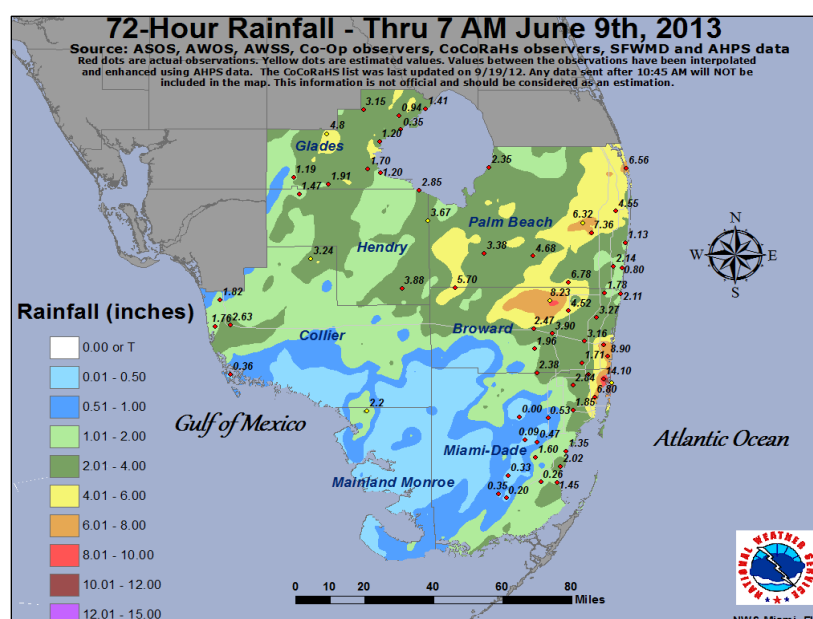
October 2013 – An area of low pressure near the Yucatan Peninsula directed tropical moisture into South Florida that produced heavy rainfall in the Kendall area, near the Falls Shopping Mall, during the late afternoon and early evening of October 2, 2013. The slow-moving showers and thunderstorms produced 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.[20]

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.[21] 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

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[18] National Hurricane Center Tropical Cyclone Report for Tropical Storm Andrea: https://www.nhc.noaa.gov/data/tcr/AL012013_Andrea.pdf
[19] NWS – Miami/South Florida Forecast Office, Tropical Storm Andrea (June 5 – 7, 2013): https://www.weather.gov/mfl/andrea
[20] NOAA's National Centers for Environmental Information Storm Events Database (Event Type: Flash Flood): https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=478777
[21] 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.[22]

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.[23]

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.[24]

Figure 7.   Observed Precipitation for December 2015
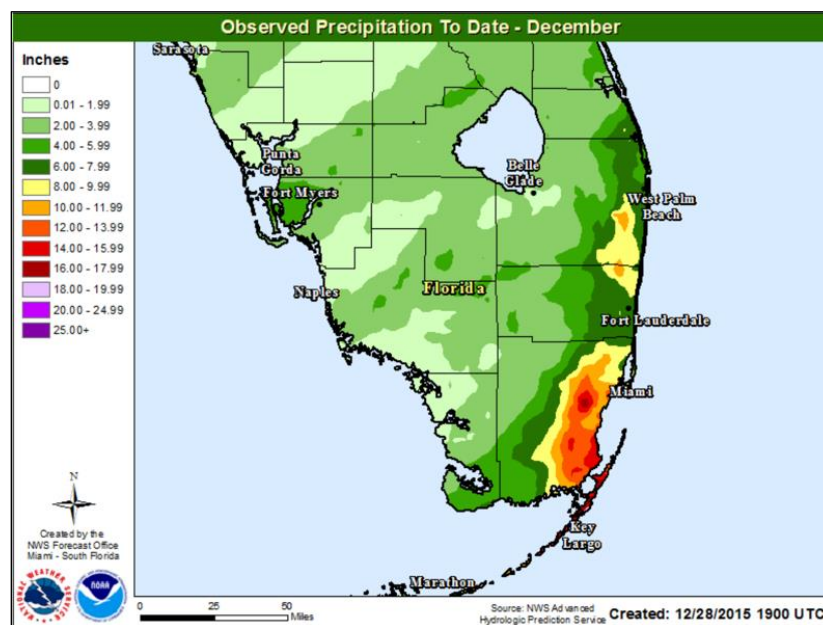
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[22] NOAA's National Centers for Environmental Information Storm Events Database (Event Type: Flash Flood): https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=565140
[23] NOAA's National Centers for Environmental Information Storm Events Database (Event Type: Flood): https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=605707
[24] NWS – Miami/South Florida Forecast Office, 2015 South Florida Weather Year in Review: https://www.weather.gov/media/mfl/news/2015WeatherSummary.pdf

MIAMI-DADE COUNTY
LMS
LOCAL MITIGATION STRATEGY

**Miami-Dade County Local Mitigation Strategy
Part 7: National Flood Insurance Program
and Community Rating System**

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.[25]

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.[26,27]

Figure 8.   Rainfall Map from NWS Weather and Hazards Data Viewer

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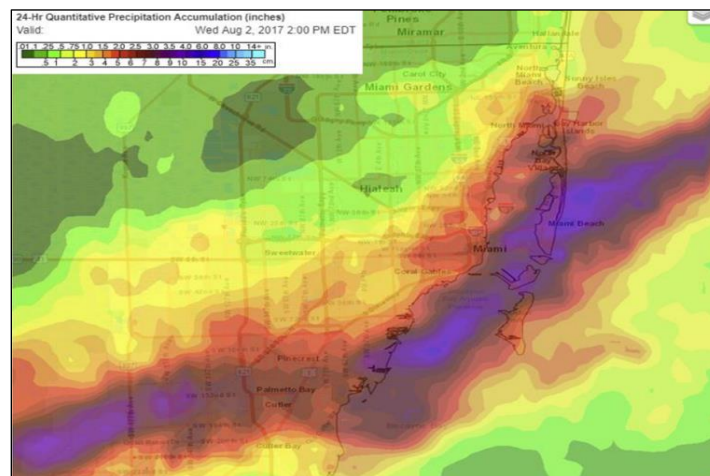
[25] NWS – Miami/South Florida Forecast Office, Tropical Storm Emily (July 13 – August 1, 2017): https://www.nhc.noaa.gov/data/tcr/AL062017_Emily.pdf

[26] 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

[27] 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
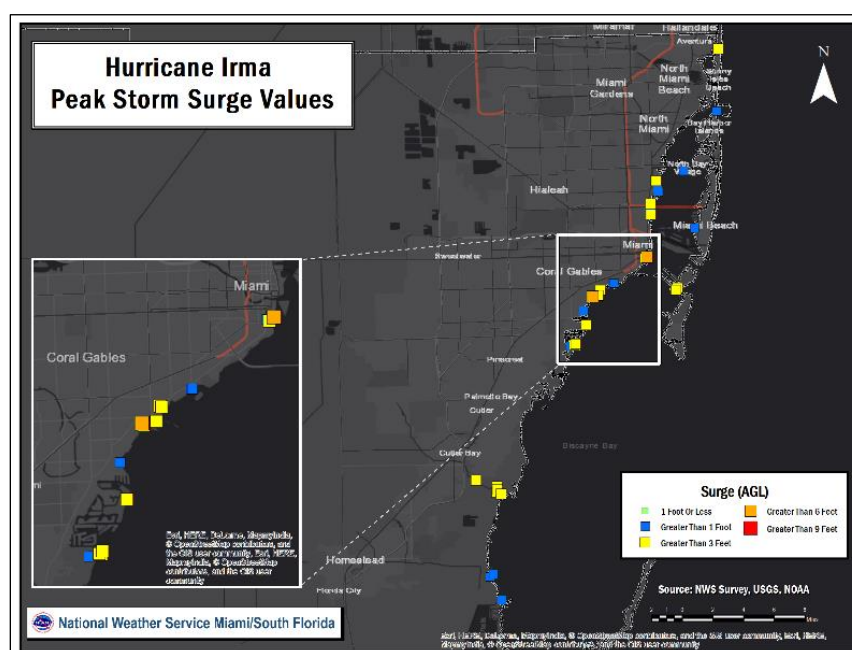
December 2019 - A strong cold front moved across the region behind a low pressure system that developed over the Gulf of Mexico. Ahead of the cold front, a strong line of storms crossed through South Florida and produced heavy rainfall and flooding across the east coast metro areas of northeast Miami-Dade 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.[28, 29]

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[28] NWS – Miami/South Florida Forecast Office, December 2019 South Florida Flooding: https://www.weather.gov/mfl/dec2019flooding
[29] NOAA's National Centers for Environmental Information Storm Events Database (Event Type: Flood): https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=869837

![LMS Logo](MIAMI-DADE COUNTY LMS LOCAL MITIGATION STRATEGY)

Miami-Dade County Local Mitigation Strategy
Part 7: National Flood Insurance Program
and Community Rating System

Figure 10.   December 23rd Rainfall Accumulation Map
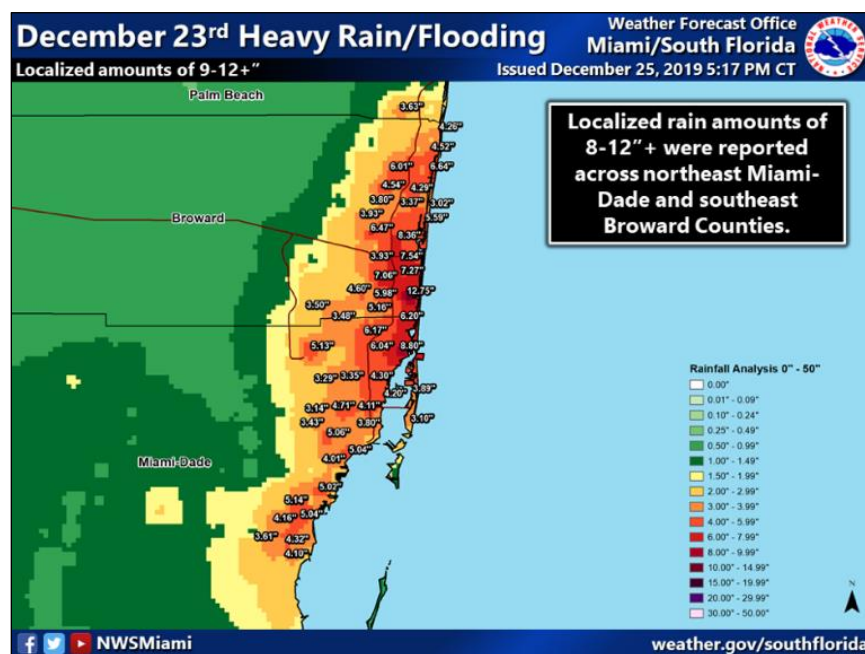
Local flood events are documented by NWS Miami/South Florida Forecast Office at https://www.weather.gov/mfl/events_index and by NOAA's National Centers for Environmental Information Storm Events Database at https://www.ncdc.noaa.gov/stormevents/.

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.[30] 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.[31]

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.   Major Flood Regulation Dates for Miami-Dade County (March 2020)

Color	Year	Description	% of housing stock
	Pre-1957	No special elevation requirements in effect.	21.49%
	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	23.35%
	1973-1992	First FIRM maps developed identifying flood areas. CFC still enforced.	26.95%
	1993-2008	Incorporated areas begin enforcing flood codes.	19.45%
	2009-2011	Updated FEMA Flood Maps	0.98%
	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	4.50%

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.

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[30] Pre-FIRM Definition/Description (FEMA): https://www.fema.gov/pre-flood-insurance-rate-map-firm
[31] 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: [32]

- 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.[33]

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[32] NFIP Elevation Certificate and Instructions (FEMA): https://www.fema.gov/media-library/assets/documents/160
[33] 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**
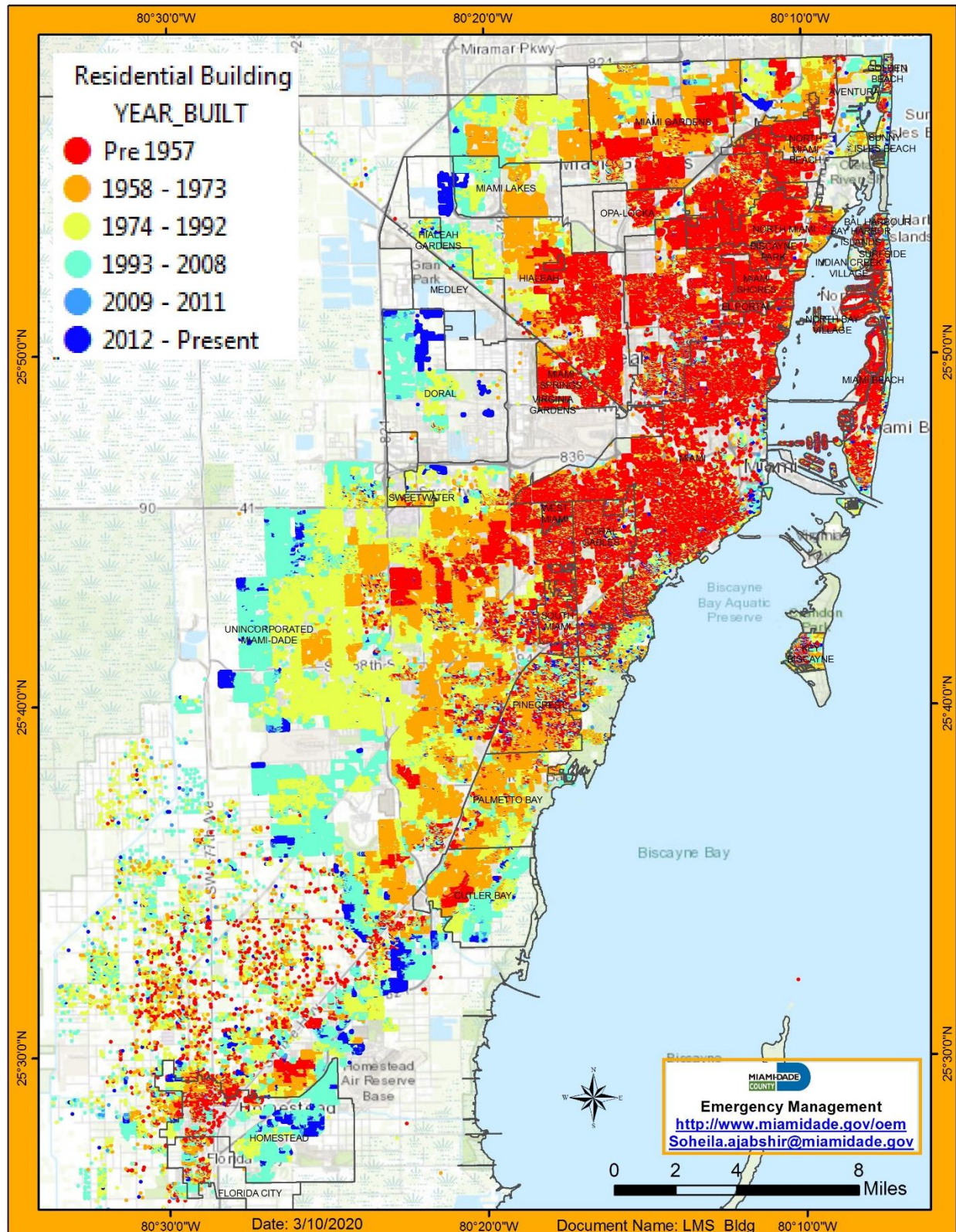
Table 7.   Residential Structures by Flood Regulation Dates for Each Jurisdiction

Jurisdiction	Pre 1957	1957 – 1973	1974 – 1992	1993 – 2008	2009 – 2011	2012 – Present
Aventura	35	3,740	10,574	7,533	66	70
Bal Harbour	457	810	1135	598	8	5
Bay Harbor	708	1380	167	139	5	38
Biscayne Park	943	89	36	2	1	0
Coral Gables	7,943	4,252	1,987	3,650	217	571
Cutler Bay	1,307	4,132	2,853	4,647	286	200
Doral	20	843	4,112	10,926	749	1,278
El Portal	682	47	4	14	1	2
Florida City	316	484	265	1,018	26	14
Golden Beach	141	29	77	86	10	14
Hialeah Gardens	4	273	2,148	3,210	5	139
Hialeah	14,882	12,762	16,910	5,606	58	68
Homestead	1,399	989	2,969	11,261	280	226
Indian Creek Village	7	4	6	13	2	0
Key Biscayne	570	2,352	2,317	1,192	41	60
Medley	19	20	21	14	1	0
Miami Beach	12,384	17,229	6,305	9,847	435	236
Miami Gardens	9,125	12,970	4,389	2,295	187	119
Miami Lakes	12	2,866	2,717	3,240	8	288
Miami Shores	3,120	538	177	80	3	3
Miami Springs	2,808	818	248	71	7	9
Miami	457	810	1,135	598	8	1,592
North Bay Village	709	1,392	581	713	39	1
North Miami Beach	6,161	5023	1,270	159	12	11
North Miami	8,305	5,271	1,217	644	15	10
Opa-Locka	1,873	589	151	274	9	73
Palmetto Bay	348	4,452	2,152	965	12	13
Pinecrest	1,464	2,891	831	800	47	37
South Miami	1,929	743	541	565	16	15
Sunny Isles Beach	196	5,009	4,107	5,531	854	2
Surfside	1,144	714	644	616	3	268
Sweetwater	60	817	1,826	767	7	2
Virginia Gardens	435	128	50	8	0	0
West Miami	1,405	85	23	70	2	0
Unincorporated	41,310	75,601	120,150	70,366	1,689	3,625
TOTAL	**114,755**	**166,743**	**196,220**	**154,794**	**5,641**	**8,989**

Figure 12 illustrates the FEMA Flood Zones, also known as the FIRMs, which went into effect in 2009.   Additionally, 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 and the publication of the preliminary maps is scheduled late 2020 with Public Outreach in January 2021.

Figure 13 illustrates the number of buildings that are within the Miami-Dade County FEMA Flood Zones based on 2019 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)

FEMA Flood Zone
FLOOD_ZONE
- VE - 100-year floodplain with wave action, with BFEs determined
- A - 100-year floodplain, no BFEs determined
- AE - 100-year floodplain, with BFEs determined
- AH - 100-year floodplain, with ponding, with BFEs determined
- D - Possible but undetermined flood hazards
- X - Outside 100-year and 500-year floodplain
- OPEN WATER

Emergency Management
http://www.miamidade.gov/oem
Soheila.ajabshir@miamidade.gov

Date: 2/25/2020

Figure 13.   Buildings by FEMA Flood Zones
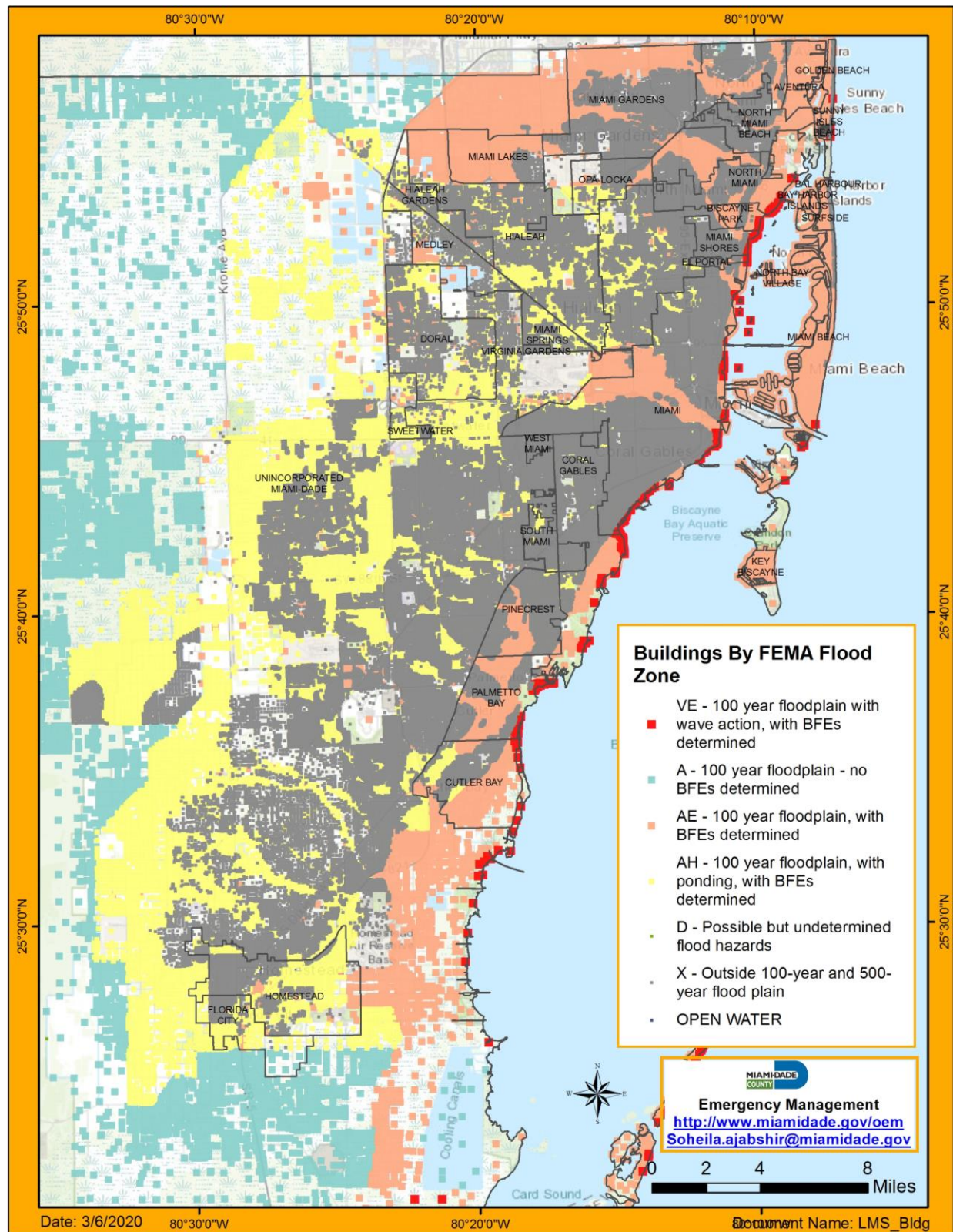
Table 8.   Number of Buildings in FEMA Flood Zones for Each Jurisdiction (2019)

Jurisdiction	A	AE	AH	D	VE	X
Aventura		24,614				155
Bal Harbour		642				3,288
Bay Harbor		2,752				
Biscayne Park		1,123				92
Coral Gables		2,897	1,414		65	15,989
Cutler Bay		9,041	2,012			4,354
Doral		143	6,264			18,592
El Portal		15	116			760
Florida City	9	20	1,229			1,469
Golden Beach		267				139
Hialeah		3,078	21,623			40,990
Hialeah Gardens		8	404			6,019
Homestead		286	10,708			9,912
Indian Creek Village		51				20
Key Biscayne		7,317				
Medley		10	326			793
City of Miami		50,254	7,040		3,840	83,686
Miami Beach		52,498				3,848
Miami Gardens		13,729				20,326
Miami Lakes		8,926				1,343
Miami Shores		855			22	3,306
Miami Springs		48	2,384			2,546
North Bay Village		3,863				
North Miami		8,642			140	8,647
North Miami Beach		6,470				8,211
Opa-Locka		840	575			3,085
Palmetto Bay		4,874			45	3,916
Pinecrest		2,288	75			4,595
South Miami		1	824			3,991
Sunny Isles Beach		11,522			2	7,075
Surfside		1,587				2,014
Sweetwater		10	3,655			939
Virginia Gardens			132			597
West Miami						1,837
Unincorporated	859	50,569	113,255	1	97	212,371
TOTAL	**868**	**269,240**	**172,036**	**1**	**4,211**	**474,905**

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.[34] 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.

OEM utilizes the National Hurricane Center (NHC) Sea, Lake and Overland Surges from Hurricanes (SLOSH) model[35] to estimate storm surge heights in Miami-Dade County. In order to assist Miami-Dade County residents to understand their risk to storm surge, OEM 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, OEM 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.[36]

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 14 illustrates Miami-Dade County's Storm Surge Planning Zones map.   Table 9 demonstrates the projected population [37] and clearance times based on revised evacuation modeling done by the South Florida Regional Planning Council (SFRPC) in December 2013. The revised data is based on additional evacuation center locations and revised Storm Surge Planning Zones provided to SFRPC by OEM. The time reflected here is based on the SLOSH MOM data models and it projects a maximum timeframe based upon compliance with evacuation orders.

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[34] Ocean Facts, What is Storm Surge? (NOAA): https://oceanservice.noaa.gov/facts/stormsurge-stormtide.html
[35] NHC's SLOSH: https://www.nhc.noaa.gov/surge/slosh.php
[36] NHC SLOSH Storm Surge MOM: https://www.nhc.noaa.gov/surge/momOverview.php
[37] 2016 Population – Evacuation Clearance Times were revised in 2016

Figure 14. Storm Surge Planning Zones Map

Table 9.   Population and Evacuation Clearance Times for Storm Surge Planning Zones*

	Population[38]			In County Clearance Times.[39] (hours)	Out of County Clearance Times (hours)
	Risk Area	Cumulative	Mobile Homes & Tourists		
A	68,317			26	26
B	354,068	422,385		28	28
C	302,039	724,424	103,238	37	37
D	631,399	1,355,823		56	56
E	495,629	1,851,452		73	73
TOTAL	1,851,452		1,954,690		

*Clearance times from Base Scenario provided by SFRPC and FDEM on 5/12/2016.

Figure 15 illustrates the Miami-Dade County buildings by land use within the Storm Surge Planning Zones. 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.

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[38] 2010 Census Data

[39] In-county clearance times include out-of-county trips other counties that pass through evacuation zones in the evacuating County. Therefore, clearance times for Miami-Dade County in all level B and higher will reflect the out-of-county clearance time for Monroe County. Source: Regional Evacuation Transportation Analysis by SFRPC: http://www.sfrpc.com/sresp.htm

Figure 15.   Buildings by Land Use Within Storm Surge Planning Zones
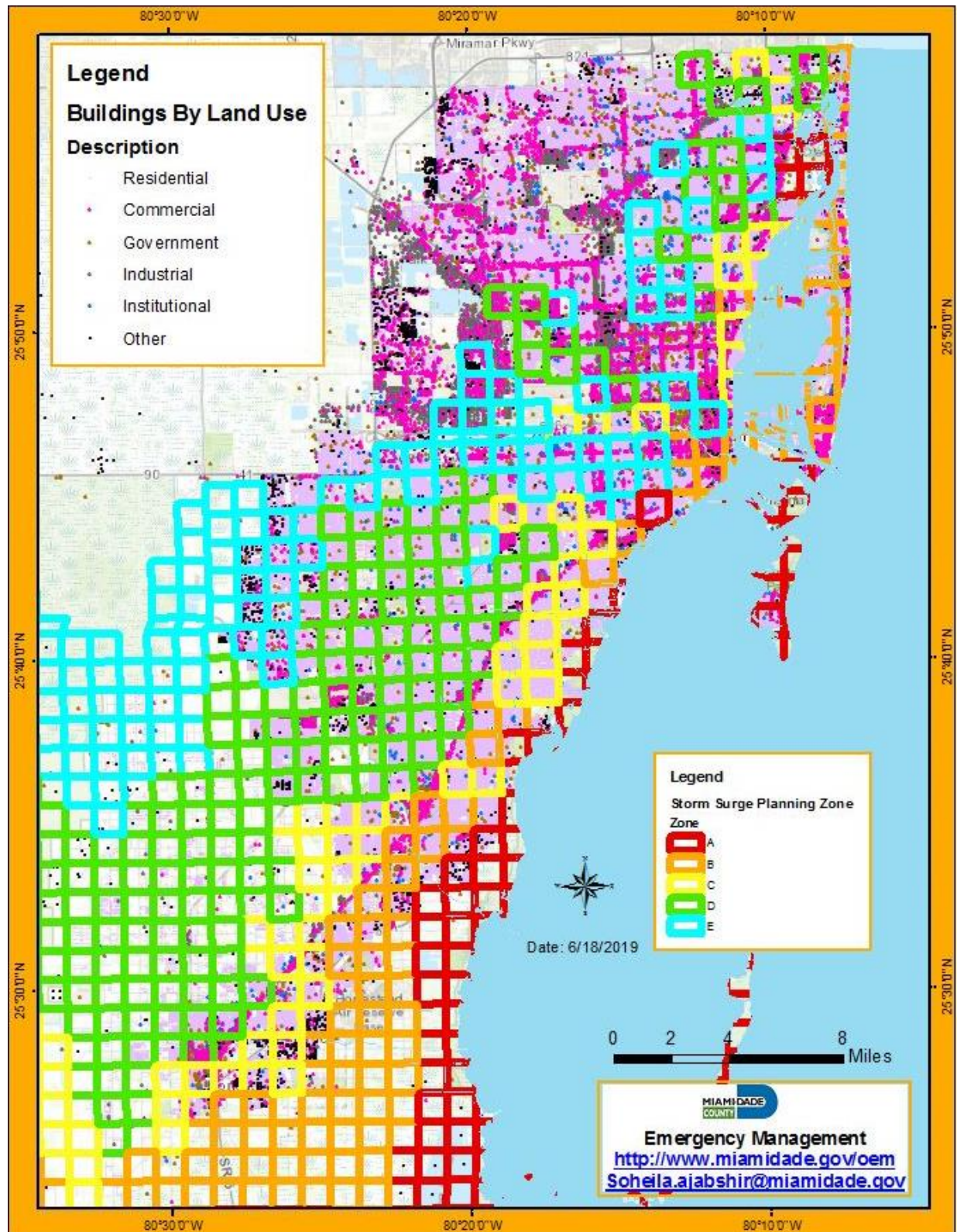
Table 10. Commercial and Industrial Facilities Within Storm Surge Planning Zones for Each Jurisdiction

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**

MIAMI-DADE COUNTY
LMS
LOCAL MITIGATION STRATEGY

Miami-Dade County Local Mitigation Strategy
Part 7: National Flood Insurance Program
and Community Rating System

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 located in geographical area surrounded by major bodies of water – the Atlantic Ocean, Biscayne Bay, and rivers, lakes and canals. Figure 16 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.[40] 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 16.   Regional Unified Sea Level Rise Projections for Southeast Florida (2019)

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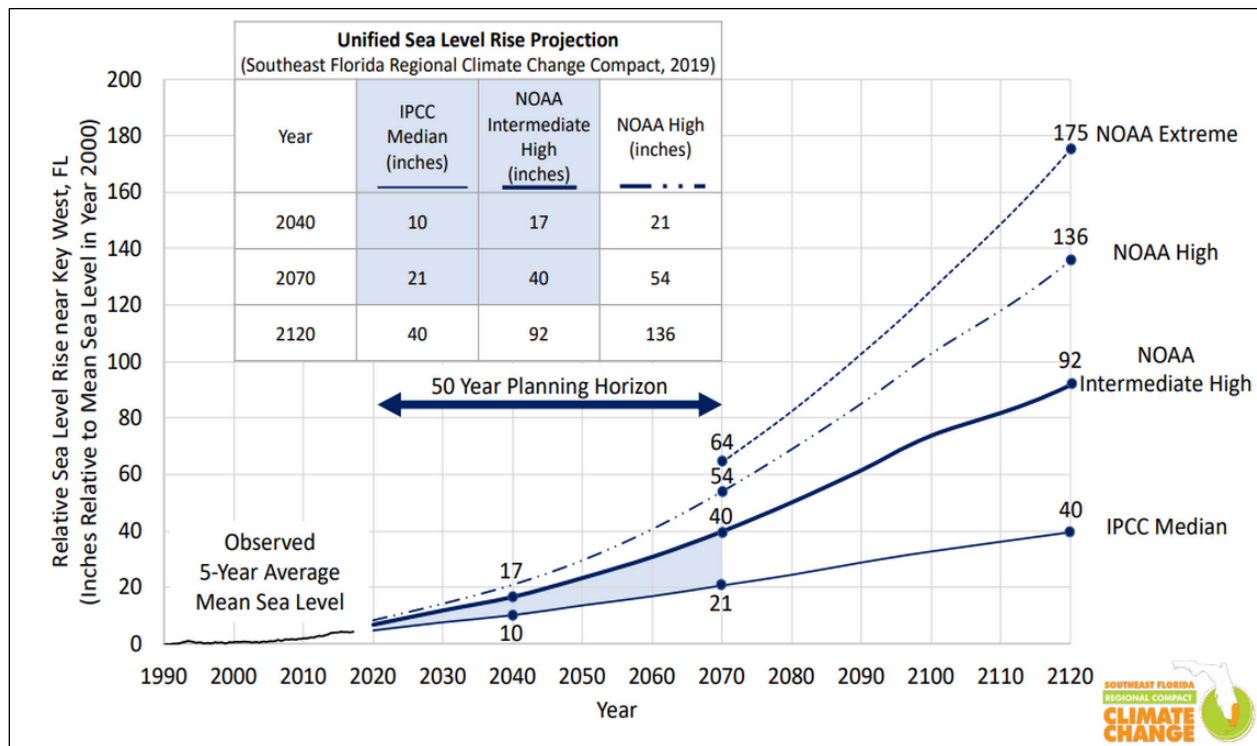
[40] Southeast Florida Regional Climate Compact, Unified Sea Level Rise Projection Southeast Florida (2019 Update): https://southeastfloridaclimatecompact.org/wp-content/uploads/2020/04/Sea-Level-Rise-Projection-Guidance-Report_FINAL_02212020.pdf

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.[41] The Office of Resilience 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 as a way 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.[42]

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.

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[41] Miami-Dade County Sea Level Rise Report Executive Summary:
https://www.miamidade.gov/green/library/sea-level-rise-executive-summary.pdf
[42] Resilient305 Strategy: https://resilient305.com/our-future/

Figure 17.   Potential Sea Level Rise Impacts in Miami-Dade County

![LMS Logo] MIAMI-DADE COUNTY
LMS
LOCAL MITIGATION STRATEGY

Miami-Dade County Local Mitigation Strategy
Part 7: National Flood Insurance Program
and Community Rating System
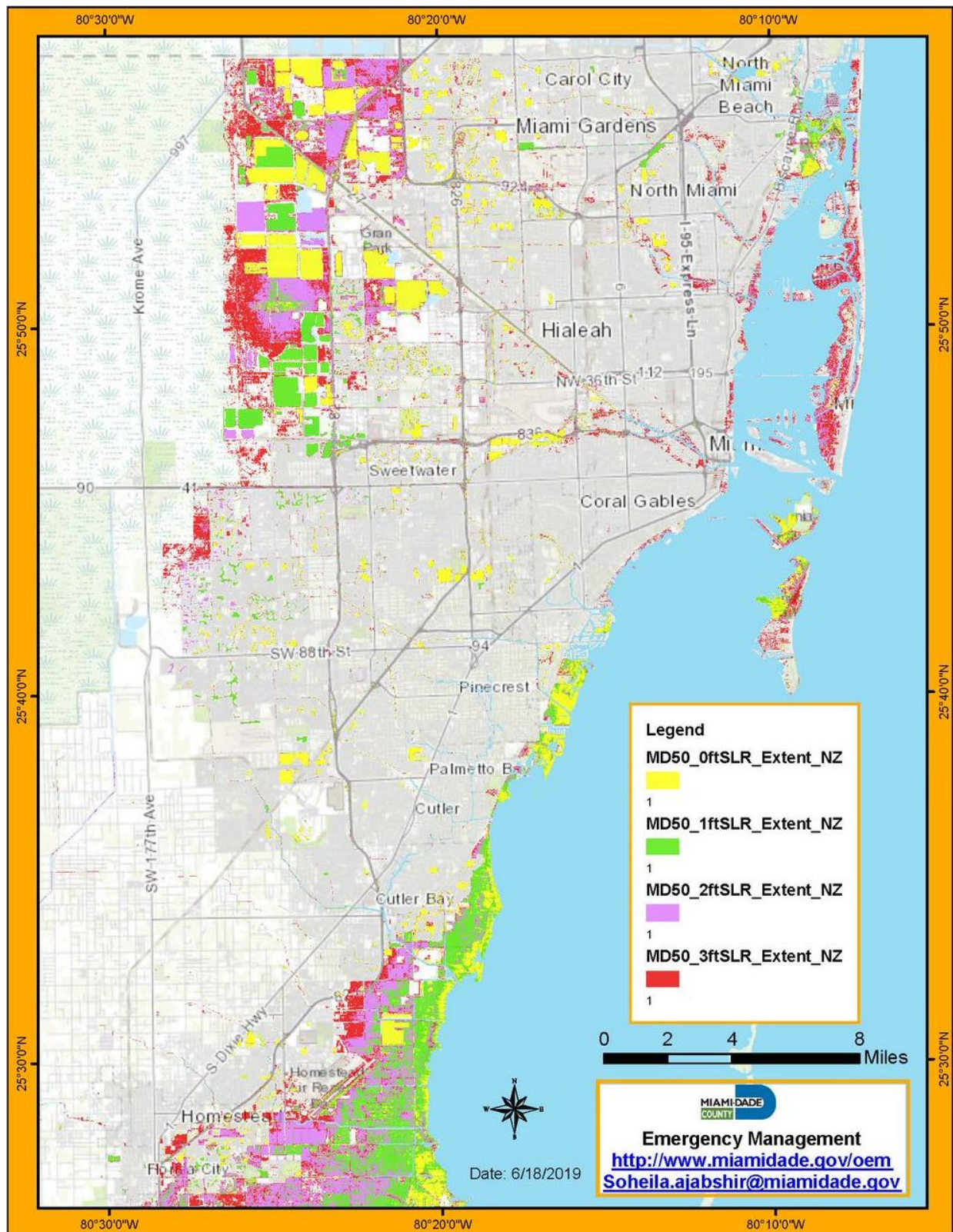
REPETITIVE LOSSES

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.[43]

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.[44,45]

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.[46] 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 18 illustrates the Repetitive Loss Areas of within Unincorporated Miami-Dade County.[47]

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.

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[43] 2017 CRS Coordinator's Manual: https://crsresources.org/manual/
[44] 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
[45] FEMA Guidance for Severe Repetitive Loss Properties: https://www.fema.gov/pdf/nfip/manual201205/content/20_srl.pdf
[46] Mapping Repetitive Loss Areas for CRS Handout: https://crsresources.org/files/500/mapping_repetitive_loss_areas.pdf
[47] Miami-Dade RER, Repetitive Losses: https://miamidade.gov/environment/repetitive-losses.asp

Figure 18. **Miami-Dade County Repetitive Loss Areas (Unincorporated Miami-Dade)[48]**

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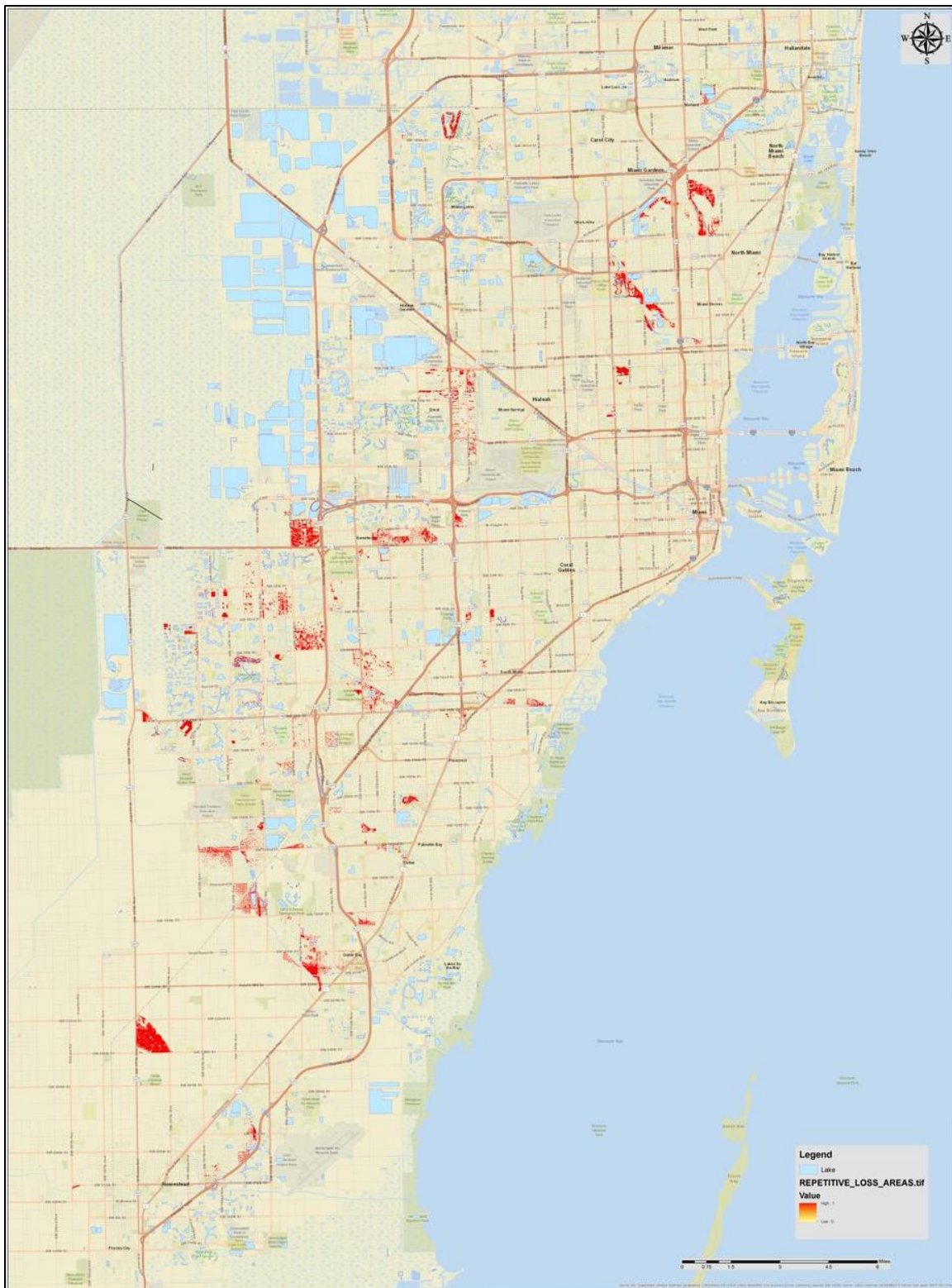
[48] Miami-Dade County Stormwater Master Plan (2019), Map Revision 8/9/2019

Table 12. 2019 Changes in Repetitive Loss (RL) and Severe Repetitive Loss (SRL) Properties

Jurisdiction	# of RL properties removed	# of RL properties added	# of SRL properties removed	# of SRL properties added
Aventura	9	6	0	0
Doral	0	0	0	0
Medley	0	0	0	0
City of Miami	0	11	0	0
Miami Gardens	0	0	0	0
Miami Lakes	0	0	0	0
Miami Shores Village	0	0	0	0
South Miami	0	0	0	0
Sweetwater	0	0	0	0
Unincorporated	0	0	0	0

Miami-Dade County is working with the Federal Emergency Management Agency to sign the Information Sharing Access Agreement. These agreement will allow the County to report on the types and numbers (residential, commercial and institutional) of repetitive loss and severe repetitive loss properties.

FLOOD THREAT RECOGNITION SYSTEM[49]

Miami-Dade OEM 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 OEM 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 OEM 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 OEM 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.

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[49] CRS Activity 610 (Flood Warning and Response) Element – Flood Threat Recognition System

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:

- 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). [50] 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 19.   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

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.

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

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[50] Section 5 of the NOAA Atlas 14:
https://www.nws.noaa.gov/oh/hdsc/PF_documents/NA14_Sec5_PFDS.pdf

MIAMI-DADE COMPREHENSIVE DEVELOPMENT MASTER PLAN[51]

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

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[51] CDMP - TOC, Introduction & Statement of Legislative Intent (2013):
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[52]

The critical facilities inventory is managed by Miami-Dade OEM 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 OEM 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 OEM 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.

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[52] 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

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=4919c85a439f40c68d7b3c81c 3f44b58.

StormReady Community[53]

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.

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[53] 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 OEM 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 OEM manages social media government pages on Facebook and Twitter. OEM provides information on regionally adopted preparedness messages, informs the public on events being monitored (emerging or occurring), and provides insight on OEM programmatic areas.

Facebook.com/MiamiDadeCountyEM

Twitter.com/MiamiDadeEM

Table 13 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 12.   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 OEM Employees bring their kids to work to experience a day at work with their parents. The kids are brought in to the EOC for OEM Staff to discuss Miami-Dade County's natural hazards, hurricane and disaster preparedness.	MDFR and OEM 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	OEM has a booth/table at the Youth Fair staffed with OEM 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 OEM	Over 100 events throughout the Year	Throughout the year, OEM 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[54]

In accordance with the Miami-Dade County CEMP, OEM 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 OEM Severe Weather Standard Operating Procedures (SOP) has pre-scripted messages for the Duty Officer to disseminate to Miami-Dade OEM Staff and OEM partner agencies. Municipal emergency management, colleges and universities are part of OEM'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: fab.org/wp-content/uploads/2014/01/State-of-Florida-EAS-Plan-Revised-2.27.27v3.pdf. 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 OEM's Integrated Public Alert Warning System (IPAWS) compliant software systems EMnet or WebEOC. Simultaneously, OEM would also disseminate messages through Miami-Dade Alerts and social media (i.e. Facebook and Twitter). 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

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[54] 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.

- **Communicator NXT** is a notification system used to send emergency text messages. The system has the capability of sending voice alerts and email messages as well, but the primary use is emergency mass text messaging. Communicator NXT is used to send Miami-Dade Alerts to the public who subscribe for the service.
- **VESTA Alert Notification System** is another emergency notification system utilized to assist OEM in geographically delivering critical information to area(s) affected by a life-threatening hazard. While the system has the capability to send text messages and emails, the primary use is for mass emergency voice alerts.
- **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 OEM 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, OEM 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[55]

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 November 7, 2017 by Resolution R-983-13 and by FDEM on July 17, 2017. Volume I of the CEMP can be accessed via the following link: miamidade.gov/fire/library/OEM/CEMP.pdf. Volume II, III and IV can be obtained by contacting Miami-Dade OEM.

Miami-Dade OEM 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 21 and 22 are part of the OEM Protective Measures Plan. Figure 21 illustrates the protective measures decision matrix for evacuations, sheltering-in-place, and isolation/quarantine. Figure 22 illustrates the protective measures decision matrix for restricted entry/repopulation.

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[55] 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 miamidade.gov/311direct/#/categorylist
- Twitter at twitter.com/miamidade311
- 311Direct Mobile App
- Email at 311@miamidade.gov

Further information on Miami-Dade County's 311 Contact Center can be accessed via the following link: miamidade.gov/global/311.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 OEM's Hazard Impact Assessment Plan (HIAP) which can be found in Volume III of the CEMP. Figure 19 provides an overview of how hazard impact assessments will be conducted by Miami-Dade County agencies and municipalities.

Figure 20.   Impact Assessments Before, During and After an Incident
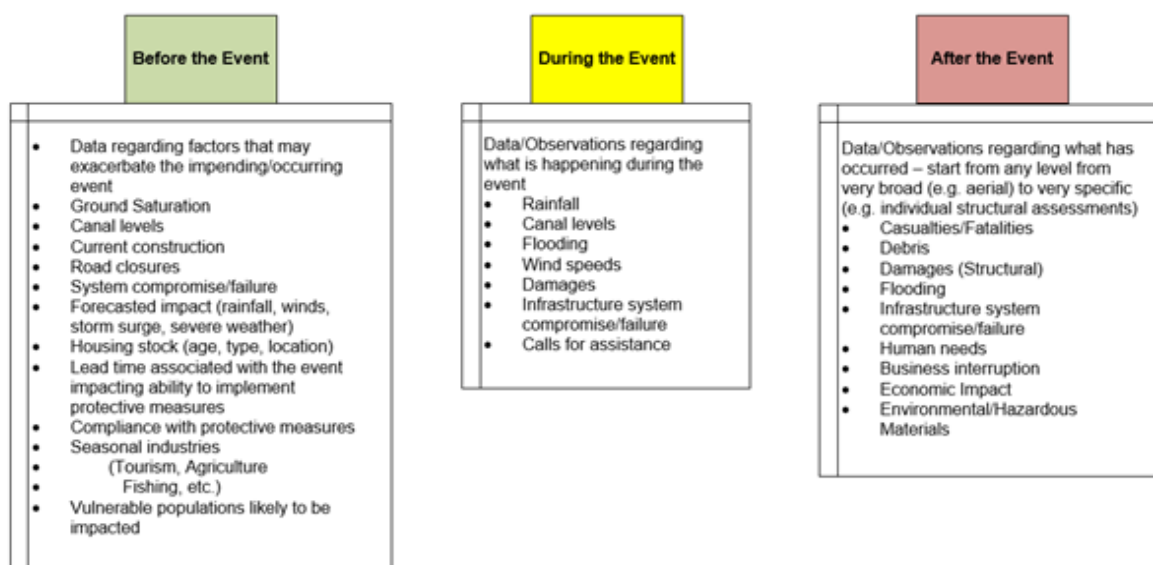
Damage Assessment Software

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 2013, Miami-Dade OEM implemented a more robust damage assessment tool for our partner agencies and municipalities, called ARM360. ARM360 became the County's official damage assessment software. ARM360 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 ARM360 Viewer at the agency and Municipal Emergency Operations Centers (EOC). ARM360 can be utilized for countywide incidents (e.g. hurricane) or local incidents (e.g. tornado). Miami-Dade OEM, 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 OEM 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 OEM 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.

![LMS Logo] MIAMI-DADE COUNTY LMS LOCAL MITIGATION STRATEGY

Miami-Dade County Local Mitigation Strategy
Part 7: National Flood Insurance Program
and Community Rating System

Figure 21. Protective Measure Decision-Making Matrix (Evacuation, Shelter-in-Place and Isolation/Quarantine)
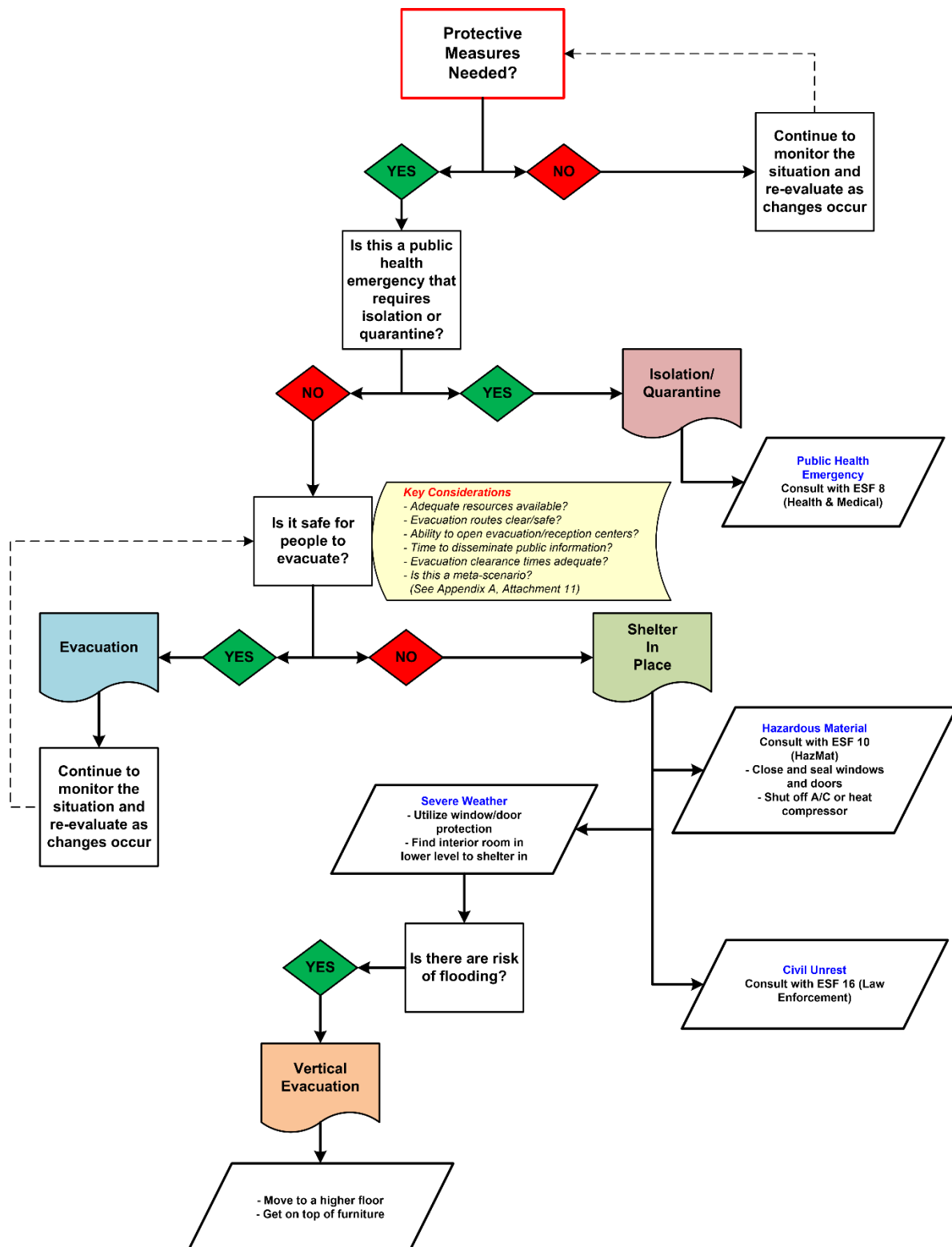
Figure 22.   Protective Measure Decision-Making Matrix (Repopulation/Restricted Entry)

MIAMI-DADE COUNTY
LMS
LOCAL MITIGATION STRATEGY

**Miami-Dade County Local Mitigation Strategy
Part 7: National Flood Insurance Program
and Community Rating System**

APPENDICES

Miami-Dade County Local Mitigation Strategy
Part 7: National Flood Insurance Program
and Community Rating System

MIAMI-DADE COUNTY
LMS
LOCAL MITIGATION STRATEGY
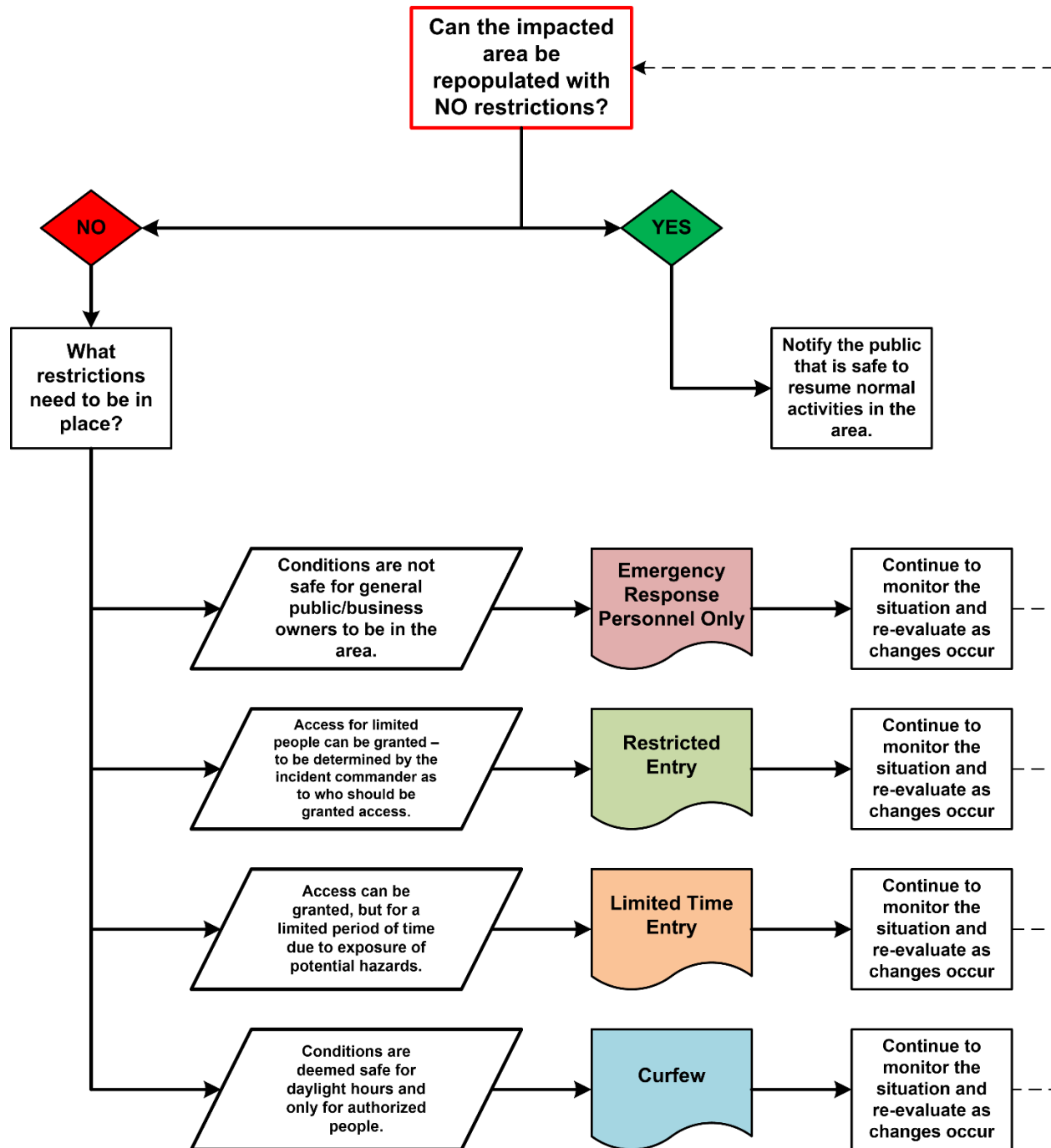
Appendix A: Do You Know Your Flood Zone? Brochure

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 canal 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 any 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 305-372-6466, 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 6:30 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 33136 305-372-6529	701 NW 1 Court, Suite 200 Miami, FL 33136 305-372-6899	11805 SW 26 Street Miami, FL 33175 786-315-2800

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 305-372-6466 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 305-372-6466 o envíe un correo electrónico a Ana.Jiron@miamidade.gov.

Pou jwenn yon kopi bwochi sa an kreyòl oubyen nan fòma aksesib, rele 305-372-6466 oubyen lèt elektwonik 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 construction, 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, would 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. Grading 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 house, 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 permit, 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 house. 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 street 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 305-372-6688.

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: 2020 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

CONTENTS

ⓔ ÍNDICE
ⓚ *TABDÈMATYÈ*

TO LEARN MORE, VISIT MIAMIDADE.GOV/HURRICANE.

PARA MÁS INFORMACIÓN, VISITE MIAMIDADE.GOV/HURRICANE.
POU PLIS ENFÒMASYON, VIZITE MIAMIDADE.GOV/HURRICANE.

Language Legend
ⓔ Español
ⓚ Kreyòl

BEFORE

FLOODING, TORNADOES AND STORM SURGE

FLOODING
Flooding is a major threat during a hurricane or tropical storm. Whether you live on the coast or inland, they can produce widespread, torrential rain that may result in deadly and destructive floods.

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 Miami-Dade mobile app or call 311.

> A Storm Surge Planning Zone is an area that could be affected by a storm surge of 1 ½ feet or higher during a hurricane. These planning zones are not to be confused with your flood zone.

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.

Know Your Zone

| ■ Zone A is at greatest risk for storm surge from a Category 1 hurricane and higher. | ■ Zone B is at risk for storm surge from a Category 2 hurricane and higher. | ■ Zone C is at risk for storm surge from a Category 3 hurricane and higher. | ■ Zone D is at risk for storm surge from a Category 4 hurricane and higher. | ■ Zone E is at 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.

6

Appendix C: News Release Samples

https://www.miamidade.gov/releases/2020-05-29-mayor-hurricane-presser.asp

Media Contact:

Patty Abril
patricia.abril@miamidade.gov

Miami-Dade County Mayor Carlos A. Gimenez to hold annual hurricane season press conference

MIAMI (May 29, 2020) — Miami-Dade County Mayor Carlos A. Gimenez will hold the annual hurricane preparedness press conference Monday, June 1, 2020, at 2 p.m., at the Miami-Dade County Emergency Operations Center, located at Miami-Dade Fire Rescue Headquarters, 9300 NW 41 St., Doral, Florida.

Mayor Gimenez will remind residents of the importance of being ready to protect themselves, their families and their property before, during and after a storm, as well as the additional challenges the community faces during hurricane season as a result of the COVID-19 pandemic.

Television stations are asked to work together to arrange for a pool camera, so as to establish a good shot for everyone and maintain social distancing. Media should continue to observe the social distancing guidelines of six feet of separation, and everyone should be wearing facial coverings.

Who: Miami-Dade County Mayor Carlos A. Gimenez, Members of the Board of County
                Commissioners, Director of Emergency Management Frank Rollason

What: Hurricane Preparedness Press Conference

When: June 01, 2020 — 02:00 p.m.

Where: Miami-Dade County Emergency Operations Center, located at Miami-Dade Fire Rescue
                Headquarters, 9300 NW 41 St., Doral, Florida

# # #

To request materials in accessible format, sign language interpreters, and/or any accommodation to participate in any County-sponsored program or meeting, please call Office of Communications, 305-375-1545 or email, comminfo@miamidade.gov, five days in advance to initiate your request. TTY users may also call 711 (Florida Relay Service).

Office of the Mayor
111 NW 1st Street, Suite 2910
Miami, FL 33128

https://www.miamidade.gov/fire/releases/2019-08-28-ready-dorian-advisory-1.asp

NEWS RELEASE

miamidade.gov

For Immediate Release:
August 28, 2019

Media Contact:
Erika Benitez
eocpio@miamidade.gov

Residents advised to be in the "Ready" phase for Hurricane Dorian

Miami-Dade Office of Emergency Management (OEM) is closely monitoring the movement of Hurricane Dorian. At this time, all Miami-Dade County services continue normal operations.

While Miami-Dade County is not in immediate danger, all residents and businesses should check their disaster kits, review their hurricane plans and remain alert to new information and instruction about the developing storm. Specifically, residents are urged to:

- Make sure that emergency equipment, such as hurricane shutters and battery-powered radios, are in good working order;
- Ensure that sufficient emergency supplies (e.g., non-perishable food and water) are on hand for each person in the home to last at least three days;
- Obtain and store materials necessary to properly secure your home;
- Secure yard and construction debris so they do not pose a hazard during a storm;
- Take tree trimmings to a local trash & recycling center;
- Find out if you live in an evacuation zone; and
- If you live in a surge planning zone determine, in advance, where you will stay, how you will get there, and what supplies you will take if you are ordered to evacuate. Also, plan your departure time so ample time is allowed to get to a safe area. Miami-Dade surge planning zone maps are available on the website www.miamidade.gov/oem.

The 3-1-1 Contact Center hours of operation are Monday through Friday from 7 a.m. to 7 p.m. and Saturday 8 a.m. to 5 p.m. Closed on Sundays and holidays. To reach the 3-1-1 Contact Center, residents can dial 3-1-1 in Miami-Dade or (305) 468-5900 outside of Miami-Dade County, TDD: (305) 468-5402. Specialists are taking calls in English, Spanish, and Creole. Residents can access disaster-related information 24 hours a day on the OEM web site located at www.miamidade.gov/oem.

OEM is committed to working with its partners and the community to lessen the impact of disasters and potentially catastrophic incidents. OEM accomplishes its mission through planning, response, and coordination of information and resources.

It is the policy of Miami-Dade County to comply with all of the requirements of the Americans with Disabilities Act. The facility is accessible. For sign language interpreters, assistive listening devices or materials in an accessible format, please call in advance 305-468-5400.

# # #

OEM
9300 N.W. 41str Street Miami, Florida 33178
(786) 331-5000

Appendix D: Emergency and Evacuation Assistance Program

Information available online:
https://www.miamidade.gov/global/service.page?Mduid_service=ser1470238193996672

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