

**CITY OF MIRAMAR  
PROPOSED CITY COMMISSION AGENDA ITEM**

**Meeting Date:** July 8, 2026

**Presenter's Name and Title:** Sue-Ling Rosario, Assistant Director, on behalf of the Building, Planning and Zoning

**Prepared By:** Tekisha Jordan, Assistant Director, Building, Planning and Zoning

**Temp. Reso. Number:** 8626

**Item Description:** Temp. Reso. No. #R8626 RELATING TO FLOODPLAIN MANAGEMENT; ADOPTING THE CITY OF MIRAMAR FLOODPLAIN MANAGEMENT PLAN, ATTACHED AS EXHIBIT "A" AND THE CITY OF MIRAMAR PROGRAM FOR PUBLIC INFORMATION, ATTACHED AS EXHIBIT "B"; IDENTIFYING AND ASSESSING FLOOD HAZARDS, INFORMING THE PUBLIC OF FLOOD RISKS, ESTABLISHING A FRAMEWORK FOR REDUCING FLOOD RISKS AND VULNERABILITIES, AND SUPPORTING THE CITY'S PARTICIPATION IN THE COMMUNITY RATING SYSTEM; PROVIDING FOR SEVERABILITY; PROVIDING FOR REPEAL; PROVIDING FOR ADMINISTRATIVE CORRECTION OF SCRIVENER'S ERRORS; AND PROVIDING FOR AN EFFECTIVE DATE. *(Building, Planning, and Zoning Director Nixon Lebrun)*

Consent  Resolution  Ordinance  Quasi-Judicial  Public Hearing

**Instructions for the Office of the City Clerk: None**

**Public Notice** – As required by the Sec. \_\_\_\_ of the City Code and/or Sec. \_\_\_\_, Florida Statutes, public notice for this item was provided as follows: on \_\_\_\_\_ in a \_\_\_\_\_ ad in the \_\_\_\_\_; by the posting the property on \_\_\_\_\_ and/or by sending mailed notice to property owners within \_\_\_\_ feet of the property on \_\_\_\_\_  
(fill in all that apply)

Special Voting Requirement – As required by Sec. \_\_\_\_\_, of the City Code and/or Sec. \_\_\_\_, Florida Statutes, approval of this item requires a \_\_\_\_\_ (unanimous, 4/5ths etc.) vote by the City Commission.

**Fiscal Impact:** Yes  No

**REMARKS: None**


**Content:**

- **Agenda Item Memo from the City Manager to City Commission**
- **Resolution TR8626**
  - **Exhibit A: Floodplain Management Plan**
  - **Exhibit B: Program for Public Information (PPI)**



**CITY OF MIRAMAR  
INTEROFFICE MEMORANDUM**

**TO:** Mayor, Vice Mayor, & City Commissioners

**FROM:** Dr. Roy L. Virgin, City Manager 

**BY:** Nixon Lebrun, Director, Building, Planning and Zoning Department

**DATE:** July 2, 2026

**RE:** Temp. Reso. No. 8626 adopting the Floodplain Management Plan and Program for Public Information to identify and assess flood hazards, enhance public awareness of flood risks, support flood mitigation efforts, and strengthen participation in the Community Rating System

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**RECOMMENDATION:** The City Manager of the City of Miramar, Florida (the "City"), recommends that the City Commission pass and adopt the above-referenced Resolution adopting the Floodplain Management Plan ("FMP") and Program for Public Information ("PPI") to reduce flood risk to people and property, enhance public awareness of flood hazards and mitigation measures, support continued compliance with the National Flood Insurance Program ("NFIP"), and strengthen the City's participation in the Community Rating System ("CRS").

**ISSUE:** To maintain compliance with the NFIP, administered by the Federal Emergency Management Agency ("FEMA"), and to support continued participation and credit eligibility under the CRS, the City must formally adopt an FMP and a PPI. In accordance with Section 2-27 of the Code of the City of Miramar, the above-referenced Resolution is being presented to the City Commission for consideration and approval.

**BACKGROUND:** The NFIP, administered by the Federal Emergency Management Agency ("FEMA"), was established to provide flood insurance to property owners, reduce flood-related losses, and encourage sound floodplain management practices. The City of Miramar has participated in the NFIP in good standing since October 1, 1993. To further encourage proactive floodplain management, FEMA administers the CRS, a voluntary program that recognizes communities that implement floodplain management activities exceeding the minimum NFIP requirements. CRS participation provides direct financial

benefits to residents and businesses through reduced flood insurance premiums. Communities earn CRS credit points for implementing eligible activities related to public information, mapping and regulations, flood damage reduction, warning and response, and floodplain management planning.

The City currently participates in the CRS program and is classified as a Class 8 community with 1,000–1,499 points. Continued participation in the CRS requires ongoing implementation of qualifying activities and periodic adoption and maintenance of planning and outreach documents, including a FMP and a PPI in accordance with FEMA guidance and the 2025 CRS Coordinator's Manual.

**DISCUSSION:** In an effort to maximize CRS credits and identify opportunities to enhance its floodplain management program, the City retained WSP USA Inc. to assist in the preparation of the FMP and PPI in accordance with FEMA guidance and the 2025 CRS Coordinator's Manual.

The FMP was developed pursuant to CRS Activity 510 (Floodplain Management Planning) using FEMA's ten-step planning process. The planning effort was conducted under the direction of the Floodplain Management Planning Committee ("FMPC"), consisting of representatives from City departments, residents, community stakeholders, and technical advisors. The FMPC met on June 11, 2025, August 26, 2025, October 21, 2025, and January 20, 2026, to evaluate flood hazards, assess vulnerabilities, review existing mitigation capabilities, establish floodplain management goals, and develop mitigation actions designed to reduce flood risk throughout the community.

In conjunction with the FMP, the City developed a PPI consistent with CRS Activity 330 (Outreach Projects). The PPI was prepared using FEMA's four-step public information planning process, which includes organizing stakeholders, assessing existing outreach efforts, identifying target audiences and key messages, and developing a coordinated outreach strategy. The resulting PPI establishes a comprehensive public information program focused on increasing awareness of flood hazards, flood insurance, flood protection measures, flood warning systems, emergency preparedness, and the natural and beneficial functions of floodplains.

Development of both the FMP and PPI incorporated extensive public outreach and stakeholder engagement to ensure that the documents reflected local concerns, priorities, and flood risk reduction opportunities. Two public meetings were conducted during the planning process, and the City utilized multiple outreach methods, including website postings, social media announcements, outreach flyers, public surveys, draft plan reviews, and publication of meeting materials. A total of 167 survey responses were received and considered during development of the plans.

The City faces a variety of flood-related hazards, including general flooding, stormwater and localized flooding, levee failure, and tropical cyclone events. These hazards affect

residents, businesses, public infrastructure, and critical facilities and are influenced by the City's low-lying topography, canal systems, development patterns, and built environment. Through the planning process, the City evaluated these hazards and developed mitigation strategies intended to reduce risk, protect life and property, and improve long-term community resilience. The PPI identifies target audiences, key messages, outreach projects, responsible agencies, and evaluation measures designed to improve community understanding of flood risk and mitigation opportunities. Together, the FMP and PPI provide a coordinated framework for reducing flood risk, improving public awareness, supporting informed decision-making, and strengthening the City's continued participation in the CRS.

**ANALYSIS:** The City currently maintains a CRS Class 8 rating, which provides eligible NFIP policyholders with a ten percent (10%) reduction in flood insurance premiums. As part of its ongoing commitment to floodplain management and community resilience, the City continues to pursue additional CRS-creditable activities that may improve its CRS classification and increase premium discounts available to policyholders.

Adoption of the FMP and PPI supports the City's eligibility to receive and maintain CRS credit under Activity 510 (Floodplain Management Planning) and Activity 330 (Outreach Projects). Activity 510 provides a maximum of 622 CRS points, with a national average of 175 points, while Activity 330 provides a maximum of 350 CRS points, with a national average of 87 points. Collectively, these activities represent up to 972 CRS points and are among the most significant CRS credit opportunities available to participating communities.

In addition to supporting CRS credit, the FMP identifies fifteen (15) mitigation actions involving regulatory improvements, infrastructure projects, public education initiatives, property protection measures, and green infrastructure strategies designed to reduce flood risk and improve community resilience. The planning process also aligns with FEMA mitigation planning guidance and supports eligibility for various federal mitigation and resiliency funding opportunities.

The PPI complements the FMP by establishing a structured framework for public outreach and education. Through targeted messaging and outreach projects, the PPI will improve awareness of flood hazards, flood insurance requirements, property protection measures, emergency preparedness, and floodplain stewardship, thereby supporting informed decision-making and community resilience.

The City's long-term objective is to improve its CRS classification and increase flood insurance premium discounts available to eligible policyholders. Adoption and implementation of the FMP and PPI preserve the City's eligibility for CRS credit, position the City to pursue additional CRS points, and support long-term efforts to improve upon its current Class 8 rating. Higher CRS classifications provide greater premium discounts to policyholders while advancing the City's broader goals of protecting life, property, public infrastructure, and natural resources from flood hazards.

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**CITY OF MIRAMAR  
MIRAMAR, FLORIDA**

**RESOLUTION NO. \_\_\_\_\_**

**A RESOLUTION OF THE CITY COMMISSION OF THE CITY OF MIRAMAR, FLORIDA, RELATING TO FLOODPLAIN MANAGEMENT; ADOPTING THE CITY OF MIRAMAR FLOODPLAIN MANAGEMENT PLAN, ATTACHED AS EXHIBIT "A," AND THE CITY OF MIRAMAR PROGRAM FOR PUBLIC INFORMATION, ATTACHED AS EXHIBIT "B;" IDENTIFYING AND ASSESSING FLOOD HAZARDS, INFORMING THE PUBLIC OF FLOOD RISKS, ESTABLISHING A FRAMEWORK FOR REDUCING FLOOD RISKS AND VULNERABILITIES, AND SUPPORTING THE CITY'S PARTICIPATION IN THE COMMUNITY RATING SYSTEM; PROVIDING FOR SEVERABILITY; PROVIDING FOR REPEAL; PROVIDING FOR ADMINISTRATIVE CORRECTION OF SCRIVENER'S ERRORS; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, the Federal Emergency Management Agency ("FEMA") has identified Special Flood Hazard Areas ("SFHAs" or "flood zones") within the boundaries of the City of Miramar (the "City") and such areas may be subject to periodic inundation, which may result in loss of life and property, health and safety hazards, disruption of commerce and government services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety and general welfare; and

**WHEREAS**, these periodic inundations stem from multiple sources, including canal and riverine flooding, stormwater and localized flooding, compound flooding events, levee system vulnerabilities, groundwater rise, and tropical cyclone impacts; and

**WHEREAS**, historical data demonstrate that Broward County, including the City,

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has experienced numerous federally declared flood-related disasters and recurring severe rainfall events that threaten life safety, property, public infrastructure, and economic stability; and

**WHEREAS**, flood risk analyses prepared for the City identify approximately 92,700 people at risk from flooding, with thousands of residential, commercial, and critical structures located within high-risk and moderate-risk flood hazard areas; and

**WHEREAS**, estimated damages associated with a one-percent annual chance flood event exceed \$17.5 billion, affecting homes, businesses, transportation systems, utilities, and essential public facilities; and

**WHEREAS**, critical facilities essential to public safety and emergency response, including fire stations, police facilities, water and wastewater treatment plants, lift stations, schools, shelters, communications facilities, and transportation infrastructure, are located within flood-prone areas and are vulnerable to inundation during major flood events, requiring coordinated planning and ongoing floodplain management to protect public health, safety, and continuity of essential services; and

**WHEREAS**, climate change, sea level rise, groundwater rise, and increasingly intense rainfall events are projected to increase the frequency and severity of flooding throughout the City; and

**WHEREAS**, effective floodplain management requires ongoing evaluation of flood hazards, land use policies, capital improvement priorities, public education, and interdepartmental coordination; and

**WHEREAS**, the City has been, since October 1993, a participant in the National Flood Insurance Program's ("NFIP") Community Rating System ("CRS"), a voluntary

incentive point program administered by FEMA, which recognizes and encourages community floodplain management activities that exceed the minimum program requirements; and

**WHEREAS**, under the CRS, flood insurance premium rates are adjusted to reflect the reduced flood risk resulting from community activities that reduce flood losses, facilitate accurate insurance ratings, and promote the awareness of flood insurance; and

**WHEREAS**, the City is currently rated as a Class 8 in the CRS, which entitles policyholders to 10% or a 5% discount on their flood insurance premiums, depending on whether their properties are located inside or outside a flood zone; and

**WHEREAS**, the CRS strongly encourages locally designed programs to prevent and reduce flood losses, and credit local planning committees that design such programs and periodically evaluate their effectiveness; and

**WHEREAS**, CRS Activity 510 (Floodplain Management Planning) credits a committee that helps draft a Floodplain Management Plan (FMP”); and

**WHEREAS**, CRS Activity 330 (Outreach Projects) credits a committee that helps develop and evaluates a Program for Public Information (PPI”); and

**WHEREAS**, in support of its floodplain management objectives and continued participation in the CRS, the City retained WSP USA Inc., a professional planning and engineering consultant, to assist in evaluating flood hazards, assessing vulnerabilities, identifying mitigation opportunities, and preparing an FMP and PPI in accordance with FEMA guidance and CRS requirements; and

**WHEREAS**, the FMP, attached hereto as Exhibit “A,” was developed in accordance with the ten-step requirements of CRS Activity 510 (Floodplain Management

Planning), the four-phase hazard mitigation planning requirements of the Disaster Mitigation Act of 2000, and associated FEMA guidance; and

**WHEREAS**, the FMP evaluates flood risks and vulnerabilities, establishes mitigation goals and objectives, and identifies strategies to reduce flood-related risks to life, property, public infrastructure, and natural resources; and

**WHEREAS**, the FMP also supports the City's eligibility for federal hazard mitigation funding, including the Hazard Mitigation Grant Program ("HMGP"), Building Resilient Infrastructure and Communities ("BRIC"), and Flood Mitigation Assistance ("FMA") programs; and

**WHEREAS**, the PPI, attached hereto as Exhibit "B," was developed in accordance with CRS Activity 330 (Outreach Projects) to assess the City's flood-related information needs and coordinate outreach resources to improve public awareness and understanding of flood risks and mitigation measures; and

**WHEREAS**, the PPI identifies target audiences, key messages, and coordinated outreach strategies related to flood hazards, flood insurance, flood protection measures, emergency preparedness, and floodplain stewardship; and

**WHEREAS**, in accordance with the 2025 CRS Coordinator's Manual, the planning committees for the FMP and the PPI have similar membership criteria and in accordance therewith, the City established a 12-member interim Floodplain Management Planning Committee ("FMPC") to oversee and coordinate the preparation of both the FMP and the PPI; and

**WHEREAS**, the FMPC consisted of six (6) representatives from City departments, including staff from the Building, Planning and Zoning Department responsible for

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community planning in accordance with CRS requirements, and six (6) outside stakeholder representatives; and

**WHEREAS**, the FMPC met on June 11, 2025, August 26, 2025, October 21, 2025, and January 20, 2026, to evaluate flood risks, review existing mitigation capabilities, and develop coordinated planning strategies supporting the preparation of the FMP and PPI.

**WHEREAS**, the interim FMPC specifically included the following individuals: (1) Nixon Lebrun, City of Miramar Floodplain Administrator, Director of Building, Planning, & Zoning Department; (2) Debon Campbell II, City of Miramar Public Information Officer; (3) Tekisha Jordan, City of Miramar Assistant Director of Building, Planning, & Zoning Department; (4) Marilyn Markwei, City of Miramar Engineering Manager, Public Works Department; (5) Josh Green, City of Miramar Emergency Management Planner, Fire Rescue Department; (6) Leah DeRiel, City of Miramar Assistant City Engineer, Engineering Services Department; (7) Alison Adams, Resident; (8) Matthew Thompson, Resident and City of Miramar Planning & Zoning Board Member; (9) Anneline Carter, Real Estate Agent; (10) Rayon Angell, Angell's Insurance Specialist, Inc.; (11) Wendy Matos, Resident; and (12) Nari Tomlinson, Resident; and

**WHEREAS**, adoption and implementation of the FMP and PPI will support the City's continued participation in the CRS, maintain and enhance eligibility for CRS credit under Activities 510 and 330, preserve and potentially increase flood insurance premium discounts available to eligible policyholders, improve public awareness of flood risks and mitigation opportunities, and advance the public health, safety, and welfare of the City's residents; and

**WHEREAS**, the City Manager recommends adopting the FMP and PPI; and

**WHEREAS**, the City Commission finds that adoption of the FMP and PPI serves a valid public purpose, is in the best interests of the City and its residents, and promotes the long-term protection of life, property, public infrastructure, and natural resources from the impacts of flooding.

**NOW, THEREFORE, BE IT RESOLVED BY THE CITY COMMISSION OF THE CITY OF MIRAMAR, FLORIDA AS FOLLOWS:**

**Section 1:** That the foregoing **Whereas** clauses are hereby ratified and confirmed as true and correct and are incorporated herein as findings of the City Commission.

**Section 2:** That the City Commission of the City of Miramar, Florida, hereby adopts the Floodplain Management Plan and Program for Public Information, attached hereto and incorporated herein as Exhibits "A" and Exhibit "B," respectively.

**Section 3:** The City Commission of the City of Miramar, Florida, hereby affirms that it will enact as necessary, and maintain in force in those areas having flood or flood-related hazards, adequate land use and floodplain regulations with effective enforcement provisions necessary to implement the Floodplain Management Plan and the Program for Public Information, and to ensure strict adherence with the National Flood Insurance Program and the Community Rating System, and ultimately .

**Section 4:** That the City Commission of the City of Miramar, Florida vests the City's floodplain administrator and his/her associates with the responsibility, authority and means to implement, among other things, the strategies outlined in the Flood Management Plan and Program for Public Information, as summarized below:

- (a) Continue public outreach and education efforts regarding flood hazards, flood insurance, flood protection measures, emergency preparedness, and the natural and beneficial functions of floodplains.
- (b) Evaluate and implement flood mitigation projects and stormwater management improvements designed to reduce flood risk to residents, businesses, public infrastructure, and critical facilities.
- (c) Maintain and enhance floodplain management regulations, policies, and programs consistent with the NFIP and CRS requirements.
- (d) Promote property protection measures, resiliency initiatives, and best management practices that reduce vulnerability to flooding and support long-term community resilience.
- (e) Coordinate with City departments, regional agencies, community stakeholders, and residents to monitor floodplain conditions, evaluate progress on mitigation actions, and periodically update the FMP and PPI in accordance with FEMA and CRS requirements.

**Section 5: Severability:** If any word, clause, phrase, sentence, paragraph or section of this Resolution is held to be unconstitutional or invalid by any court of competent jurisdiction, such unconstitutional or invalid part or application shall be considered as eliminated and shall not affect the validity of the remaining portions or applications which shall remain in full force and effect.

**Section 6: Repeal.** All resolutions or parts of resolutions in conflict with this Resolution are hereby repealed to the extent of such conflict.

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**Section 7: Scrivener's Error:** The City Attorney is hereby authorized to correct scrivener's errors in this resolution by filing a corrected copy with the City Clerk.

**Section 8:** That the City agrees to take such other official actions as may be reasonably necessary to carry out the objectives of the NFIP and CRS programs and to implement the Floodplain Management Plan and Program for Public Information.

**Section 9:** That this Resolution shall become effective immediately upon its adoption.

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**PASSED AND ADOPTED** this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

\_\_\_\_\_  
Mayor, Wayne M. Messam

\_\_\_\_\_  
Vice Mayor, Carson "Eddy" Edwards

ATTEST:

\_\_\_\_\_  
City Clerk, Denise A. Gibbs

I HEREBY CERTIFY that I have approved  
this RESOLUTION as to form:

\_\_\_\_\_  
City Attorney,  
Austin Pamies Norris Weeks Powell, PLLC

<u>Requested by Administration</u>	<u>Voted</u>
Commissioner Maxwell B. Chambers	_____
Commissioner Avril Cherasard	_____
Commissioner Yvette Colbourne	_____
Vice Mayor Carson "Eddy" Edwards	_____
Mayor Wayne M. Messam	_____



2026



City of Miramar, FL

# FLOODPLAIN MANAGEMENT PLAN



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# EXECUTIVE SUMMARY

The purpose of this Floodplain Management Plan (FMP) is to reduce or eliminate risk to people and property from flood hazards. Every community faces different hazards and has different resources to draw upon in combating problems along with unique interests that influence the solutions to those problems. Because there are many ways to deal with flood hazards and many agencies that can help, there is no one solution for managing or mitigating their effects. Planning is one of the best ways to develop a customized program that will mitigate the impacts of flood hazards while accounting for the unique character of a community.

A well-prepared FMP provides a framework for all interested parties to work together and reach consensus on identifying priority risks and selecting the preferred activities to mitigate those risks. The FMP planning process supports a comprehensive review of all possible activities so that problems are addressed by the most appropriate and efficient solutions. It can also ensure that activities are coordinated with each other and with other local goals and activities, preventing conflicts and reducing the costs of implementing each individual activity.

The City of Miramar followed the planning process prescribed by the Federal Emergency Management Agency (FEMA) and the 2025 Community Rating System (CRS) Coordinator's Manual. This plan was developed under the guidance of a Floodplain Management Planning Committee (FMPC) comprised of representatives of City Departments, local residents, and other stakeholders. The FMPC conducted a risk assessment that identified and profiled flood hazards that pose a risk to the city, assessed the city's vulnerability to these hazards, and examined the capabilities in place to mitigate them. The flood hazards profiled in this plan are:

- Flood
- Levee Failure
- Stormwater and Localized Flooding
- Tropical Cyclones

This plan identifies activities that can be implemented for flood hazard reduction to protect the health and safety of the people of Miramar and reduce property damage caused by floods. To guide the review and selection of mitigation actions, the FMPC identified the following goals for flood risk and vulnerability reduction:

- **Goal 1:** Continue outreach and public awareness on flood risk, preparedness, and mitigation to encourage people to responsibly protect their property and ensure public health and safety.
- **Goal 2:** Improve stormwater management to protect existing property, critical facilities, and infrastructure from current and future flood risk.
- **Goal 3:** Prioritize the use of green infrastructure and seek to integrate such techniques into future development projects to expand greenspace and manage stormwater.

To meet these goals, this plan recommends 15 mitigation actions which are summarized in the table that follows. Note: Action number does not indicate an order of priority. Prioritization is discussed in Section 6 Mitigation Strategy.

Per CRS implementation and maintenance requirements, this plan will continue to be updated every five years.

Action No.	Action	Related to Goal	Addresses Current Development	Addresses Future Development	Continued Compliance with NFIP	Mitigation Category
1	Historic Miramar Infrastructure Improvement Project - Phases 5 and 6	2	✓	✓		Structural Projects
2	C-9 Canal outfall pipe plug removal. This will reduce the time it takes for water to recede in the lakes. Will include modeling and permitting. Location: 25°57'57.40"N/ 80°13'17.52"W	2	✓	✓		Structural Projects
3	Acapulco drainage improvement	2	✓	✓		Structural Projects
4	SW 33rd St. drainage improvement	2	✓	✓		Structural Projects
5	Tarpon pipe collapse replacements	2	✓	✓		Structural Projects
6	Implement CIP projects identified in the City's Stormwater Master Plan	2	✓	✓	✓	Structural Projects
7	Drainage improvements - Miramar Parkway from Canal Road to University Drive. This segment of Miramar parkway was originally intended to have swale drainage, but water has difficulty getting to the intended swale due to curb, driveway improvements, and swale regrading. Add inlets with connection to nearby canal or French drain to eliminate the problem of water retention in the curblines and ponding in the travel lanes.	2	✓	✓		Structural Projects
8	Develop a voluntary property acquisition plan and program for repetitive loss areas and other high risk flood locations	1		✓		Property Protection; Prevention
9	Create a public information program for the public on the benefits of onsite retention. Highlight examples of LID techniques, the establishment of rain gardens, and the use of rain barrels to reduce flash flooding impacts.	1, 3	✓			Public Information
10	Promote and publicize the City's public flood risk website that allows property owners to access flood risk data for their individual properties. Prioritize Historical Miramar.	1			✓	Public Information
11	City staff provide advice and assistance to homeowners who want to flood proof their home or business. Publicize technical assistance for Activity 360 Flood Protection	1	✓		✓	Property Protection; Public Information

Action No.	Action	Related to Goal	Addresses Current Development	Addresses Future Development	Continued Compliance with NFIP	Mitigation Category
	Assistance. Maintain records of assistance given to receive CRS credit.					
12	Create plan for improved vegetative management around canals/lake to improve water quality. Include a public outreach educational component that describes benefits of increased vegetation around these waterways	3	✓	✓		Natural Resource Protection
13	Coordinate open space opportunities with flood control needs for new developments, repetitive loss areas, or other localized flooding locations. Establish coordination between Parks and Recreation Department, Public Works, and Building, Planning and Zoning	3	✓			Natural Resource Protection
14	Increase protection of residential areas and neighborhoods through the support of green design guidelines and LID requirements for new development and major renovation residential areas, historic neighborhoods, and areas vulnerable to flooding. Could provide development incentives and variances for participation.	1,3	✓	✓		Prevention; Property Protection
15	Seek additional funding for the Embankment Restoration Program. Promote and publicize program to residents in high risk areas.	2, 3	✓			Structural Projects; Natural Resource Protection; Public Information

The following table provides the 10-step CRS planning credit activity checklist and the section/page number within this plan that describes the completion of each planning step in more detail.

### CRS Planning Credit Activity Checklist

CRS Step	Section/Page
<b>1. Organize to prepare the plan.</b>	
a. Involvement of office responsible for community planning	Section 2.1 / p. 8-10
b. Planning committee of department staff	Section 2.1 / p. 8-10
c. Process formally created by the community's governing board	--
<b>2. Involve the public.</b>	
a. Planning process conducted through a planning committee	Section 2.2.1 / p. 11-12 Appendix A / p.A1-A21
b. Public meetings held at the beginning of the planning process	Section 2.2.1 / p. 12 Appendix A / p.A22-A37
c. Public meeting held on draft plan	Section 2.2.1 / p. 11 Appendix A / p.A30
d. Other public information activities to encourage input	Section 2.2.1 / p. 12 Appendix A / p.A38-A56
<b>3. Coordinate with other agencies.</b>	
a. Review of existing studies and plans	Section 2.2.1 / p. 15 Section 5.1 / p.120-124
b. Coordinating with communities and other agencies	Section 2.2.1 / p. 13-14 Appendix A / p.A66-A68
<b>4. Assess the hazard.</b>	
a. Plan includes an assessment of the flood hazard with:	
(1) A map of known flood hazards	Figure 4.5 / p. 58 Figure 4.7 / p. 61 Figure 4.8 / p.62 Figure 4.9 / p.63 Figure 4.18 / p.91 Figure 4.20 / p. 96
(2) A description of known flood hazards	Section 4.1 / p. 36-40 Section 4.4 / p. 56-119
(3) A discussion of past floods	Section 4.1.2 / p. 36-37 Section 4.1.3 / p.37 Section 4.1.4 / p.38-40 Section 4.4 / p. 56-109
b. Plan includes assessment of less frequent floods	Section 4.4.2 / p. 89-94
c. Plan includes assessment of areas likely to flood	Section 4.5.2 / p. 110-116
d. The plan describes other natural hazards	N/A
<b>5. Assess the problem.</b>	
a. Summary of each hazard identified in the hazard assessment and their community impact	Section 4.4.1 / p.57-59 Section 4.4.2 / p.89 Section 4.4.3 / p. 95-97 Section 4.4.4 / p. 100-101
b. Description of the impact of the hazards on:	
(1) Life, safety, health, procedures for warning and evacuation	Sections 4.5.3 / p.117-119
(2) Public health including health hazards to floodwaters/mold	Sections 4.5.3 / p.117-119
(3) Critical facilities and infrastructure	Section 4.3.3 / p.45-55
(4) The community's economy and tax base	Section 3.2 / p. 25
(5) Number and type of affected buildings	Section 4.3 / p. 44-55 Section 4.4

<b>CRS Step</b>	<b>Section/Page</b>
c. Review of all damaged buildings/flood insurance claims	Section 4.4.1 / p.87-88
d. Areas that provide natural floodplain functions	Section 3.1 / p. 17-24
e. Development/Redevelopment/Population Trends	Sections 3.6 / p. 30-34
f. Impact of future flooding conditions outlined in Step 4, item c	Sections 4.5.2 / p. 110-116
<b>6. Set goals.</b>	Section 6.2 / p. 129-130
<b>7. Review possible activities.</b>	
a. Preventive activities	Section 6.3 / p.131-136 Appendix B.1.1 / p.B1-B5
b. Floodplain Management Regulatory/current & future conditions	Section 6.3 / p.131-136 Appendix B.1.1 / p.B3-B4
c. Property protection activities	Section 6.3 / p.131-136 Appendix B.1.2 / p.B5-B9
d. Natural resource protection activities	Section 6.3 / p.131-136 Appendix B.1.3 / p.B9-B12
e. Emergency services activities	Section 6.3 / p.131-136 Appendix B.1.4 / p.B12-B16
f. Structural projects	Section 6.3 / p.131-136 Appendix B.1.5 / p. B16-B18
g. Public information activities	Section 6.3 / p.131-136 Appendix B.1.6 / p.B18-B20
<b>8. Draft an action plan.</b>	
a. Actions must be prioritized	
(1) Recommendations for activities from two of the six categories	Section 6.3.1 / p.131-136 Appendix B / p. B21
(2) Recommendations for activities from three of the six categories	Section 6.3.1 / p.131-136 Appendix B / p. B21
(3) Recommendations for activities from four of the six categories	Section 6.3.1 / p.131-136 Appendix B / p. B21
(4) Recommendations for activities from five of the six categories	Section 6.4 / p.132-136 Appendix B / p. B1-B20
b. Post-disaster mitigation policies and procedures	Sections 5.1.1 / p.123-124
c. Action items for mitigation of other hazards	----
<b>9. Adopt the plan.</b>	Section 7 / p155
<b>10. Implement, evaluate and revise.</b>	
a. Procedures to monitor and recommend revisions	Section 8.1-8.3 / p.158-162
b. Same planning committee or successor committee that qualifies under Section 511.a.2 (a) does the evaluation	Section 8.1 / p.158

## GLOSSARY

ACS – American Community Survey  
BFE – Base Flood Elevation  
BRIC – Building Resilient Infrastructure and Communities  
CDC – Centers for Disease Control and Prevention  
CFR – Code of Federal Regulations  
CIP – Capital Improvement Program  
CRS – Community Rating System  
DFIRM – Digital Insurance Rate Map  
DMA – Disaster Mitigation Act  
EOP – Emergency Operation Plan  
ESC – Erosion and Sediment Control  
FBC – Florida Building Code  
FDEP – Florida Department of Environmental Protection  
FDOT – Florida Department of Transportation  
FEMA – Federal Emergency Management Agency  
ESF – Emergency Support Function  
FIRM – Flood Insurance Rate Map  
FIS – Flood Insurance Study  
FMA – Flood Mitigation Assistance Program  
FMP – Floodplain Management Plan  
FMPC – Floodplain Management Planning Committee  
GIS – Geographic Information Systems  
HIRA – Hazard Identification and Risk Assessment  
HMGP – Flood Mitigation Grant Program  
HUC (HUC-12) – Hydrologic Unit Code  
IPCC – Intergovernmental Panel on Climate Change  
ISO – Insurance Services Office  
LMS – Local Mitigation Strategy  
NCEI – National Centers for Environmental Information  
NFIP – National Flood Insurance Program  
NOAA – National Oceanic and Atmospheric Administration  
NWS – National Weather Service  
PRI – Priority Risk Index

SBA – Small Business Administration

SFHA – Special Flood Hazard Area

SFWMD – South Florida Water Management District

SVI – Social Vulnerability Index

USDA – United State Department of Agriculture

USGS – United States Geological Survey

# 1 INTRODUCTION

Section 1 provides a general overview of hazard mitigation and floodplain management and an introduction to the Miramar, FL Floodplain Management Plan. This section contains the following subsections:

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

## 1.1 PURPOSE AND AUTHORITY

As defined by the Federal Emergency Management Agency (FEMA), “hazard mitigation” means any sustained action taken to reduce or eliminate the long-term risk to life and property from a hazard event. Hazard mitigation planning is the process through which hazards are identified, likely impacts determined, mitigation goals set, and appropriate mitigation strategies determined, prioritized, and implemented. Floodplain management is a community-based effort to prevent or reduce the risk of flooding. The purpose of this plan is to identify, assess and mitigate flood risk to better protect the people and property of the City of Miramar from the effects of flood hazards. This plan documents Miramar’s floodplain management planning process and identifies relevant flood hazards and vulnerabilities and strategies the City will use to decrease vulnerability and increase resiliency and sustainability.

This plan was developed in a joint and cooperative venture by members of a Floodplain Management Planning Committee (FMPC) which included representatives of City departments as well as local citizens and stakeholders. This plan will ensure the City of Miramar’s continued eligibility for federal disaster assistance including FEMA’s Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC), and the Flood Mitigation Assistance Program (FMA). This plan has been prepared in compliance with Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act or the Act), 42 U.S.C. 5165, enacted under Section 104 of the Disaster Mitigation Act of 2000, (DMA 2000) Public Law 106-390 of October 30, 2000, as implemented at Code of Federal Regulations (CFR) 201.6 and 201.7 dated October 2007.

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## 1.2 BACKGROUND

The City of Miramar currently participates in the National Flood Insurance Program’s (NFIP) Community Rating System (CRS) and qualifies for a Class 8 Rating. The CRS recognizes and encourages community floodplain management activities that exceed the minimum standards. Under the CRS, flood insurance premium rates are adjusted to reflect the reduced flood risk resulting from community activities that (1) reduce flood losses, (2) facilitate accurate insurance ratings, and (3) promote the awareness of flood insurance.

It is the goal of the FMPC to continue to work to make improvements to this plan so as to better serve the citizens of Miramar, and to strive to maintain or improve the Class 8 rating for the City, so that the highest reduction in flood insurance premium rates can be available for its citizens who buy flood insurance. Through the City’s participation in the NFIP and Class 8 rating with the CRS, policyholders are currently entitled to a 10% discount on their flood insurance premiums.

## 1.3 SCOPE

This document comprises a Floodplain Management Plan for the City of Miramar, Florida.

Due to the small geographic scope of Miramar and the larger regional extent of many hazard events, many of the hazard profiles are prepared on a county level. This was done to ensure an accurate estimation of risk for the city. The subsequent vulnerability assessment and mitigation actions are specific to Miramar.

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## 1.4 REFERENCES

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

- FEMA 386-1: Getting Started. September 2002.
- FEMA 386-2: Understanding Your Risks: Identifying Hazards and Estimating Losses. August 2001.
- FEMA 386-3: Developing the Mitigation Plan. April 2003.
- FEMA 386-4: Bringing the Plan to Life. August 2003.
- FEMA 386-5: Using Benefit-Cost Review in Mitigation Planning. May 2007.
- FEMA 386-6: Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning. May 2005.
- FEMA 386-7: Integrating Manmade Hazards into Mitigation Planning. September 2003.
- FEMA 386-9: Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects. August 2008.
- FEMA. Local Mitigation Planning Handbook. June 2025.
- FEMA. Local Mitigation Plan Review Guide. October 1, 2011.
- FEMA. Local Mitigation Planning Policy Guide. April 11, 2025.
- FEMA Hazard Mitigation Assistance Program and Policy Guide. January 20, 2025.
- FEMA. Integrating Hazard Mitigation into Local Planning: Case Studies and Tools for Community Officials. March 1, 2013.
- FEMA. Mitigation Ideas. A Resource for Reducing Risk to Natural Hazards. January 2013.

Additionally, specific Disaster Mitigation Act requirements are referenced under each section heading, where applicable.

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## 1.5 PLAN ORGANIZATION

- Section 2: Planning Process
- Section 3: Community Profile
- Section 4: Flood Risk Assessment
- Section 5: Capability Assessment
- Section 6: Mitigation Strategy
- Section 7: Plan Adoption
- Section 8: Plan Implementation and Maintenance
- Appendix A: Planning Process Documentation
- Appendix B: Mitigation Strategy
- Appendix C: References

## 2 PLANNING PROCESS

**Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan. To develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:**

- 1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- 2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and
- 3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

**Requirement §201.6(c)(1): The plan shall include the following:**

- 1) Documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

This section reviews the process that was followed to develop this plan. It contains the following subsections:

- 2.1 Local Government Participation
- 2.2 The 10-Step Planning Process

This Floodplain Management Plan was developed in accordance with DMA and CRS planning process requirements under the guidance of the FMPC. The Committee included representatives of City Departments as well as local citizens and stakeholders. As a result of this process and the collective input of City staff, stakeholders, and the public, this plan analyzes flood risks and vulnerabilities, sets goals and objectives for mitigation, and identifies activities that can be undertaken by both public and private entities to reduce safety hazards, health hazards, and property damage caused by floods.

Appendix A provides additional information and documentation of the planning process that was implemented for the development of this FMP.

### 2.1 LOCAL GOVERNMENT PARTICIPATION

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

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

These participation requirements were fulfilled by the FMPC, which included City staff representatives. For the City of Miramar FMPC, “participation” included the following:

- Providing facilities for meetings;
- Attending and participating in the FMPC meetings;
- Collecting and providing requested data (as available);
- Managing administrative details;
- Making decisions on plan process and content;
- Identifying mitigation actions for the plan;
- Reviewing and providing comments on plan drafts;
- Informing the public, local officials, and other interested parties about the planning process and providing opportunity for them to comment on the plan;
- Coordinating, and participating in the public input process; and

- Coordinating the formal adoption of the plan by the City Commission.

Through the planning process, the FMPC met the above participation requirements. The FMPC included 7 representatives from City departments as well as 6 outside stakeholder representatives. The members comprising the City of Miramar FMPC are listed in Table 2-1. In keeping with CRS requirements, staff representation included the Building, Planning, and Zoning Department, which is responsible for community planning.

**Table 2-1 - Floodplain Management Planning Committee Members**

Name	Title/Position	Department/Organization
Leah DeRiel	Assistant City Engineer	City of Miramar, Engineering Services
Debon Campbell	Public Information Officer	City of Miramar, Marketing & Communications
Josh Green	Emergency Management Planner	City of Miramar, Fire Rescue
Tekisha Jordan	Assistant Director	City of Miramar, Building, Planning, & Zoning
Marilyn Markwei	Senior Engineering Manager	City of Miramar, Public Works Department
Nixon Lebrun	Floodplain Administrator, Director	City of Miramar, Building, Planning, & Zoning
Matt Thompson	Board Member	Planning & Zoning Board
Alison Adams	Resident of Miramar	Stakeholder
Anneline Carter	Real Estate Agent	Stakeholder (Real Estate Agent)
Nari Tomlinson	Resident of Miramar	Stakeholder
Wendy Matos	Insurance Agent	Stakeholder (Insurance Agent)
Rayon Angell	President	Angell's Insurance Specialist Inc.

\*Shaun Gayle was replaced with Debon Campbell after FMPC Meeting 1

Meeting agendas, minutes, and attendance records have been included in Appendix A.

Table 2-2 demonstrates the city staff's capabilities in the six mitigation categories (Prevention, Property Protection, Natural Resource Protection, Emergency Services, Structural Flood Control Projects, and Public Information) based on the areas of expertise of each department represented on the FMPC.

**Table 2-2 - City of Miramar Staff Capability with Six Mitigation Categories**

Community Department/Office	Prevention	Property Protection	Natural Resource Protection	Emergency Services	Structural Flood Control	Public Information
Engineering Services	✓	✓	✓		✓	
Building, Planning, & Zoning	✓	✓	✓			✓
Marketing & Communications						✓
Fire Rescue	✓			✓		✓

## 2.2 THE 10-STEP PLANNING PROCESS

The planning process for preparing the City of Miramar Floodplain Management Plan was based on CRS Activity 510 Floodplain Management Planning requirements as well as Disaster Mitigation Act of 2000 planning requirements and FEMA's associated guidance. FEMA's guidance is structured around a four-phase process:

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

This four-phase process dovetails with the more robust 10-Step planning process established under CRS Activity 510. By integrating and following both of these planning processes, the City’s modified 10-step process used for this plan meets the requirements of six major programs: FEMA’s HMGP; BRIC Program; CRS Program; FMA Program; Severe Repetitive Loss Program; and new flood control projects authorized by the U.S. Army Corps of Engineers.

Table 2-3 shows how the 10-step CRS planning process aligns with the four phases of hazard mitigation planning pursuant to DMA 2000.

**Table 2-3 - Mitigation Planning and CRS 10-Step Process Reference Table**

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

## 2.2.1 PHASE I - PLANNING PROCESS

### PLANNING STEP 1: ORGANIZE TO PREPARE THE PLAN

With the City of Miramar’s commitment to participate in this CRS and DMA planning process, City officials worked to establish the framework and organization for development of the plan. An initial meeting was held with key community representatives to discuss the organizational aspects of the plan development process. Membership of the committee was expanded to incorporate additional stakeholder involvement.

Committee meetings were organized to familiarize the FMPC with the planning process and facilitate discussion on CRS Steps 4 through 8. The FMPC kickoff was held on June 11, 2025, at 10:00 a.m. on Microsoft Teams. The meeting reviewed the CRS program and covered the scope of work and an introduction to CRS. The committee discussed CRS Activity 510 and CRS Activity 330 in detail. The next two FMPC meetings, which took place on August 26, 2025 and October 21, 2025, were virtual meetings held via Microsoft Teams. At these meetings, the FMPC discussed the plan goals and objectives, local capability, mitigation action updates, new mitigation actions, and hazard risk and vulnerability assessment findings. The last FMPC meeting, held on January 20, 2026 via Microsoft Teams, provided the FMPC the opportunity to finalize the action plan and review the draft plan.

During the planning process, the FMPC communicated through in-person meetings, virtual meetings, email, and phone conversations. Draft documents were posted on the City’s website so that the FMPC members could easily access and review them. The formal FMPC meetings followed the CRS Planning Steps. Agendas, minutes, and sign-in sheets for the FMPC meetings are included in Appendix A. The meeting dates and topics discussed are summarized below in Table 2-4. All FMPC meetings were open to the public; however, separate public meetings were also held and are described below.

**Table 2-4 - Summary of FMPC Meeting Dates and Topics**

Meeting Title	Meeting Topic	Meeting Date	Meeting Location
FMPC Mtg #1 - Project Kickoff	<ol style="list-style-type: none"> <li>1) Introduction to DMA, CRS requirements and the planning process</li> <li>2) Trends in disasters and justification for planning</li> <li>3) Review of FMPC responsibilities and the project schedule</li> <li>4) Preliminary hazard identification</li> </ol>	June 11, 2025 10 a.m.	Microsoft Teams Meeting
FMPC Mtg. #2	<ol style="list-style-type: none"> <li>1) Review draft Hazard Identification &amp; Risk Assessment (HIRA)</li> <li>2) Discuss asset inventory, risk, and vulnerability</li> </ol>	August 26, 2025 2:30 p.m.	Microsoft Teams Meeting
FMPC Mtg. #3	<ol style="list-style-type: none"> <li>1) Discuss goals &amp; objectives</li> <li>2) Review mitigation action plan requirements</li> <li>3) Discuss local capability</li> <li>4) Discuss new mitigation action alternatives</li> </ol>	October 21, 2025 2:00 p.m.	Microsoft Teams Meeting
FMPC Mtg. #4	<ol style="list-style-type: none"> <li>1) Review the draft Floodplain Management Plan</li> <li>2) Finalize the mitigation action plan</li> <li>3) Solicit comments and feedback</li> </ol>	January 20, 2026 11:00 a.m.	Microsoft Teams Meeting

## PLANNING STEP 2: INVOLVE THE PUBLIC

Two public meetings were held during the planning process, one at the beginning of the process to introduce the plan update and gather public input, and another at the end of the planning process to share the draft plan and solicit feedback. Meetings were publicized in a variety of ways, including on the City website and social media, through various local news outlets, and through in-person outreach events. Documentation of public outreach efforts is provided in Appendix A. The formal public meetings held during the planning process are summarized in Table 2-5.

**Table 2-5 - Summary of Public Meeting Dates and Topics**

Meeting Type	Meeting Topic	Meeting Date	Meeting Locations
Public Meeting #1	<ol style="list-style-type: none"> <li>1) Introduction to DMA, CRS and the planning process</li> <li>2) Introduction to hazard identification</li> <li>3) Discussion on integrating FMP with existing city projects</li> </ol>	July 17, 2025 6:00 - 7:00 p.m.	City Commission Chambers, 2300 Civic Center Place, Miramar, FL
Public Meeting #2	<ol style="list-style-type: none"> <li>1) Review draft Floodplain Management Plan</li> <li>2) Solicit comments and feedback from the public</li> </ol>	TBD	TBD

## INVOLVING THE PUBLIC BEYOND ATTENDING PUBLIC MEETINGS

Early discussions with the FMPC established the initial plan for public involvement. The FMPC agreed to an approach using established public information mechanisms and resources within the community. Public involvement activities for this plan update included a City webpage, social media outreach, stakeholder and public meetings, an outreach flyer, a public survey, and the collection of public and stakeholder comments on the draft plan.

The FMPC found 11 different ways to involve the public beyond attending public meetings. Documentation to support the additional public outreach efforts can be found in Appendix A. The public outreach activities beyond the formal public meetings are summarized below in Table 2-6.

**Table 2-6 - Public Outreach Efforts**

Location		Event/Message	Date
1	City website	Webpage created on City website to announce the Floodplain Management Plan and explain the planning process and ways to participate.	June 2025
2	City social media	Public meeting announcement posted online to encourage participation and comment.	June 2025
3	Outreach flyer	A flyer was created to describe CRS, the FMP planning process, and the public survey.	June 2025
4	City website	Public survey responses requested with announcement and link to online version of the survey.	June 2025
5	City social media	Public survey responses requested with announcement and link to online version of the survey.	June 2025
6	City website	Presentation slides and meeting minutes from Committee and public meetings posted on City website for public review.	April-August 2023
7	City website	Draft Hazard Identification and Risk Assessment posted on City website with request for public review/comment	November 2025
8	City website	Draft plan posted on City website for public review and comment.	February 2026
9	City website	Public meeting announcement posted online to encourage participation in meeting and comment on final plan	February 2026
10	City social media	Public meeting announcement posted online to encourage participation in meeting and comment on final plan	February 2026
11	City website	City's Flood Protection Brochure with flood messages and topics posted on the website for residents to view	February 2026

The public survey which requested public input into the Floodplain Management Plan planning process and the identification of mitigation activities to lessen the risk and impact of future flood hazard events is shown in Figure 2.1. The City of Miramar website was updated to include a link to the survey. There were 167 responses received. A summary of the survey results is presented in Appendix A.

**Figure 2.1 – Public Survey**

**City of Miramar, FL Floodplain Management Plan Public Survey**

The City of Miramar is preparing a Floodplain Management Plan to identify and assess our community's flood hazard risks and determine how to best minimize or manage those risks.

This survey is an opportunity for you to share your opinions and participate in the mitigation planning process. The

1. What is your affiliation with the City of Miramar?

I live in Miramar

I work in Miramar

I visit Miramar for shopping/recreation

Other

2. Have you ever experienced or been impacted by high water or flooding in Miramar?

Yes

No

3. If you answered "Yes" to question 2, please explain your experience with flooding and provide the location of the incident:

4. How concerned are you about the possibility of your community being impacted by flooding?

Very concerned

Somewhat concerned

Not concerned

5. Is your home located in a Federal Emergency Management Agency (FEMA) mapped floodplain?

Yes

No

I don't know

6. Do you have flood insurance for your home and/or personal property?

Yes

No

I don't know

7. If you do NOT have flood insurance, what is the reason?

It's too expensive

I never really considered it

I don't need it because my home is elevated or otherwise protected

Other

8. Have you taken any actions to protect your home from flood damage?

Yes

No

9. If you answered "Yes" to question 8, what actions have you implemented?

10. Do you know what government agency/office to contact regarding the risks associated with flooding?

Yes

No

11. What is the best way for you to receive information about how to make your home or neighborhood more resistant to flood damage? Please check all that apply.

Newspaper

TV Ads/Programming

Radio Ads/Programming

Public library

Public workshops/meetings

School meetings

Mail

Email

Text message

City website

City social media

Other

12. What are some steps the City could take to reduce the risk of flooding in your neighborhood?

13. Please provide your email below in case City of Miramar staff have further questions to understand your flood concerns (optional)

This content is neither created nor endorsed by Microsoft. The data you submit will be sent to the form owner.

Microsoft Forms

### PLANNING STEP 3: COORDINATE

Early in the planning process, the FMPC determined that the risk assessment, mitigation strategy development, and plan approval would be greatly enhanced by inviting outside agencies and organizations to participate in the process. Invitations to support the FMPC and the planning process were extended to federal, state, and local stakeholders that might have an interest in the City of Miramar’s floodplain management efforts. The following stakeholder agencies and organizations were invited to provide data and technical information, review draft documents, and otherwise support the FMPC in the plan’s development:

#### **Neighboring Communities**

- Broward County
- City of Pembroke Pines
- Miami-Dade County
- Palm Beach County

#### **State and Federal Government**

- FEMA Region 4
- Florida Department of Emergency Management
- Florida Department of Environmental Protection
- ISO/CRS
- United States Geological Survey

#### **Educational Institutions**

- Broward College
- Broward County Public Schools

#### **Other Stakeholders**

- American Red Cross
- Broward County Black Chamber of Commerce
- Broward County Sierra Club
- Community Foundation of Broward County
- Florida Ocean Alliance
- Miramar Pembroke Pines Regional Chamber of Commerce
- Residents for Resilience
- United Way of Broward County
- Urban League of Broward

A detailed list of stakeholders that were invited to participate is included in Appendix A.

Coordination began with notifying these agencies and organizations via email of the City’s floodplain management planning process. These stakeholders were informed of opportunities to participate in the planning process and were asked for their assistance in the form of data or input on the plan’s development. A sample coordination letter is provided in Appendix A. Further coordination with interested stakeholders included email correspondence to provide opportunities to review the draft HIRA, attend committee and public meetings, and offer input to the FMPC.

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### *COORDINATION WITH OTHER COMMUNITY PLANNING EFFORTS AND HAZARD MITIGATION ACTIVITIES*

Coordination with other community planning efforts is also paramount to the success of this plan. Mitigation planning involves identifying existing policies, tools, and actions that will reduce a community’s risk and vulnerability to hazards. The City of Miramar uses a variety of planning mechanisms, such as a Comprehensive Plan, Building Code and Unified Design Guidelines, zoning, land & site, and stormwater ordinances, and other plans, policies, and ordinances to guide growth and development. Other regional and

state plans and programs also influence planning and floodplain management in Miramar. Integrating existing planning efforts and policies into this plan establishes a credible and inclusive plan that ties into and supports other community programs. The development of this plan incorporated information from the plans, studies, reports, and other relevant data listed in Table 2-7.

**Table 2-7 – Summary of Coordination with Other Community Planning Efforts**

<b>Resource Referenced</b>	<b>Use in this Plan</b>
City of Miramar Comprehensive Plan	Used to develop the Community Profile and incorporated into the assessment of growth and development trends in Section 3 and used to evaluate the impact of future conditions on flood risk in Section 4.
City of Miramar Land Development Code	Used to evaluate mitigation capabilities in Section 5 and to inform the review of mitigation action alternatives in Section 6 and Appendix B.
City of Miramar Stormwater Management Ordinance	Used to evaluate mitigation capabilities in Section 5 and to inform the review of mitigation action alternatives in Section 6 and Appendix B.
Broward County Hazard Mitigation Plan, 2025	Used to develop the hazard identification and hazard profiles in Section 4 and to develop mitigation action alternatives in Section 6 and Appendix B.
Broward County Emergency Management Plan, 2025	Used to evaluate mitigation capabilities in Section 5.
City of Miramar Vulnerability Assessment – Sensitivity Analysis, 2025	Used to develop flood risk and vulnerability in section 4 and to identify mitigation alternatives in Section 6 and Appendix B.
Broward County Resiliency Plan, 2025	Used to develop flood risk and vulnerability conclusions in Section 4 and to identify mitigation alternatives in Section 6 and Appendix B.
State of Florida Enhanced State Hazard Mitigation Plan, 2023	Used to develop the hazard identification and hazard profiles in Section 4.

These and other documents were reviewed and considered, as appropriate, during the collection of data to support Planning Steps 4 and 5, which include the hazard identification, risk and vulnerability assessment, and capability assessment. The data was also used in Planning Steps 6, 7, and 8 to develop the mitigation strategy. Each source document is referenced where its data is used in this plan.

## 2.2.2 PHASE II – RISK ASSESSMENT

### PLANNING STEPS 4 AND 5: IDENTIFY/ASSESS THE HAZARD AND ASSESS THE PROBLEM

The FMPC completed a comprehensive effort to identify, document, and profile all flood hazards that have, or could have, an impact on the planning area. Geographic information systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities. A draft of the risk and vulnerability assessment was posted on the City’s website for FMPC and public review and comment. A detailed description of the risk assessment process and the results are included in Section 4 Flood Risk Assessment.

The FMPC also conducted a capability assessment to review and document the City’s current capabilities to mitigate flood risk and vulnerability. By collecting information about existing government programs, policies, regulations, ordinances, and emergency plans, the FMPC could assess those activities and measures already in place that contribute to mitigating identified risks or that could be expanded or integrated with new efforts to support mitigation. These findings are summarized in Section 5 Capability Assessment.

### **2.2.3 PHASE III – MITIGATION STRATEGY**

#### **PLANNING STEPS 6 AND 7: SET GOALS AND REVIEW POSSIBLE ACTIVITIES**

WSP facilitated brainstorming and discussion sessions with the FMPC that described the purpose and process of developing planning goals and objectives, a comprehensive range of mitigation alternatives, and a method of selecting and defending recommended mitigation actions using a series of selection criteria. This information is included in Section 6 Mitigation Strategy. Additional documentation on the process the FMPC used to set goals and develop the mitigation strategy has been included in Appendix B.

#### **PLANNING STEP 8: DRAFT AN ACTION PLAN**

A complete first draft of the plan was prepared based on input from the FMPC regarding the draft risk assessment and the goals, objectives, and actions identified in Planning Steps 6 and 7. This draft was posted for FMPC and public review and comment on the City’s website. Outside stakeholders were also invited to comment on this draft. FMPC, public, and stakeholder comments were integrated into the final draft for the Insurance Services Office (ISO) to review and approve, contingent upon final adoption by the City.

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### **2.2.4 PHASE IV – PLAN MAINTENANCE**

#### **PLANNING STEP 9: ADOPT THE PLAN**

To secure public and political buy-in and officially implement the plan, the plan was reviewed and adopted by City Commission, as documented in the resolution in Section 7 Plan Adoption.

#### **PLANNING STEP 10: IMPLEMENT, EVALUATE AND REVISE THE PLAN**

Implementation and maintenance of the plan is critical to the overall success of floodplain management planning. Up to this point in the planning process, the FMPC’s efforts have been directed at researching data, coordinating input from participating entities, and developing appropriate mitigation actions. Section 8 Plan Implementation and Maintenance provides an overview of the approach to be followed for plan implementation and maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. Section 8 also discusses integration of the plan into existing planning mechanisms and how to address continued public involvement.

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## 3 COMMUNITY PROFILE

This section provides an overview of past and current conditions in the planning area. It contains the following subsections:

- 3.1 Geography and Environment
- 3.3 Cultural, Historic, and Natural Resources
- 3.4 History
- 3.5 Economy
- 3.6 Housing
- 3.7 Population
- 3.8 Social Vulnerability
- 3.9 Growth and Development Trends

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### 3.1 GEOGRAPHY & ENVIRONMENT

The City of Miramar is located in southeast Florida and is part of the Miami-Fort Lauderdale-West Palm Beach Metropolitan Statistical Area (MSA). The City is located in southern Broward County and borders Miami-Dade County. It is 14 miles length from east to west and 2.5 miles in width. Miramar is the 3<sup>rd</sup> largest city in Broward County in terms of land size and the 5<sup>th</sup> largest city in Broward in terms of population. Miramar has a total land area of 31 square miles.

The City is served by several major metropolitan areas that are easily accessible from the City of Miramar. Fort Lauderdale is located 22 miles northeast, Miami 22 miles southeast, and Hollywood 12 miles east. While it is close to several large cities, Miramar is about .5 miles west of the Everglades Conservation Area. I-75 crosses central Miramar, and the Florida Turnpike runs north to south in eastern Miramar.

Figure 3.1 reflects the City of Miramar's location within Broward County and in relation to the surrounding counties, cities, and towns. Figure 3.2 provides a base map for the city showing the City's limits.

Figure 3.1 - Location Map

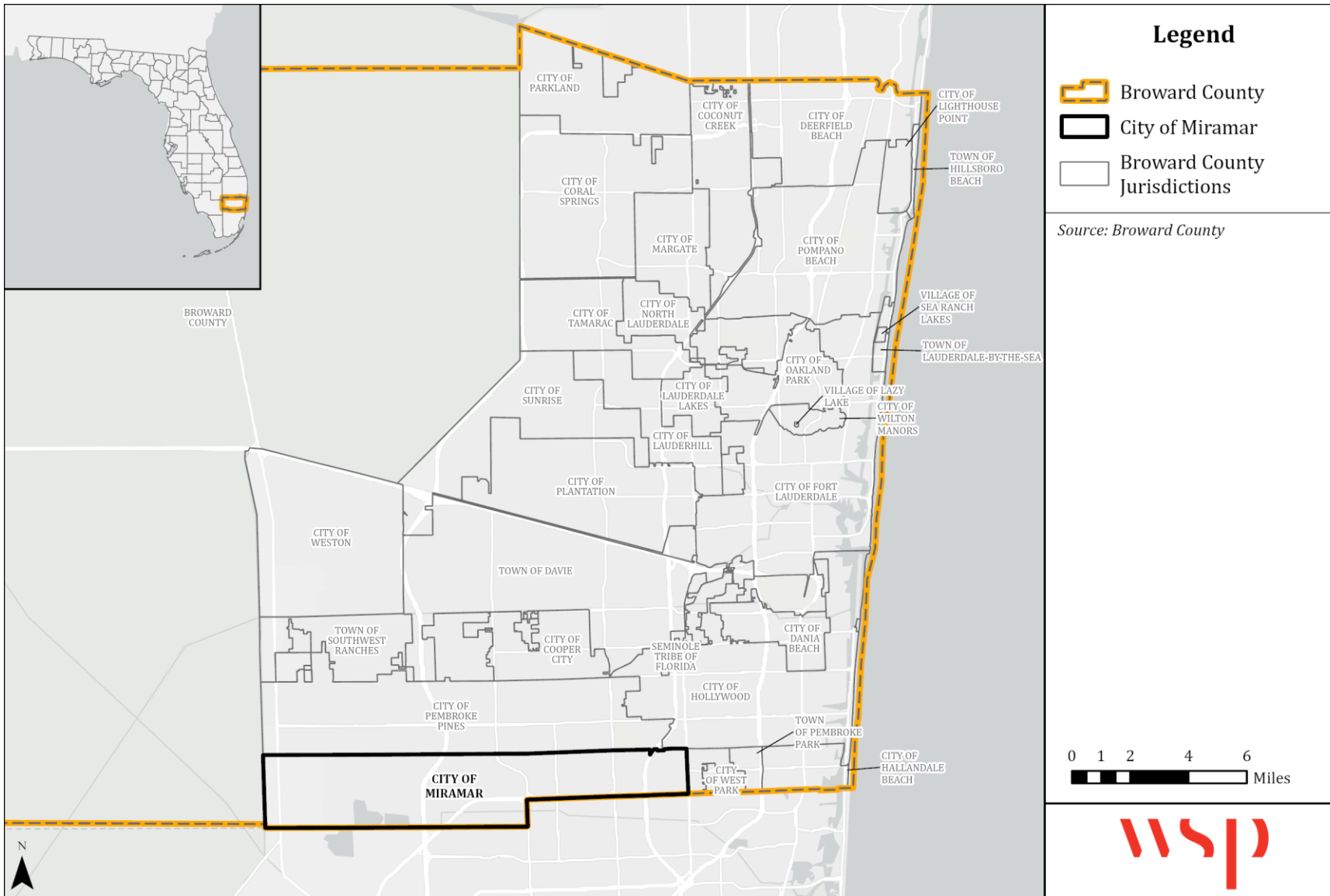
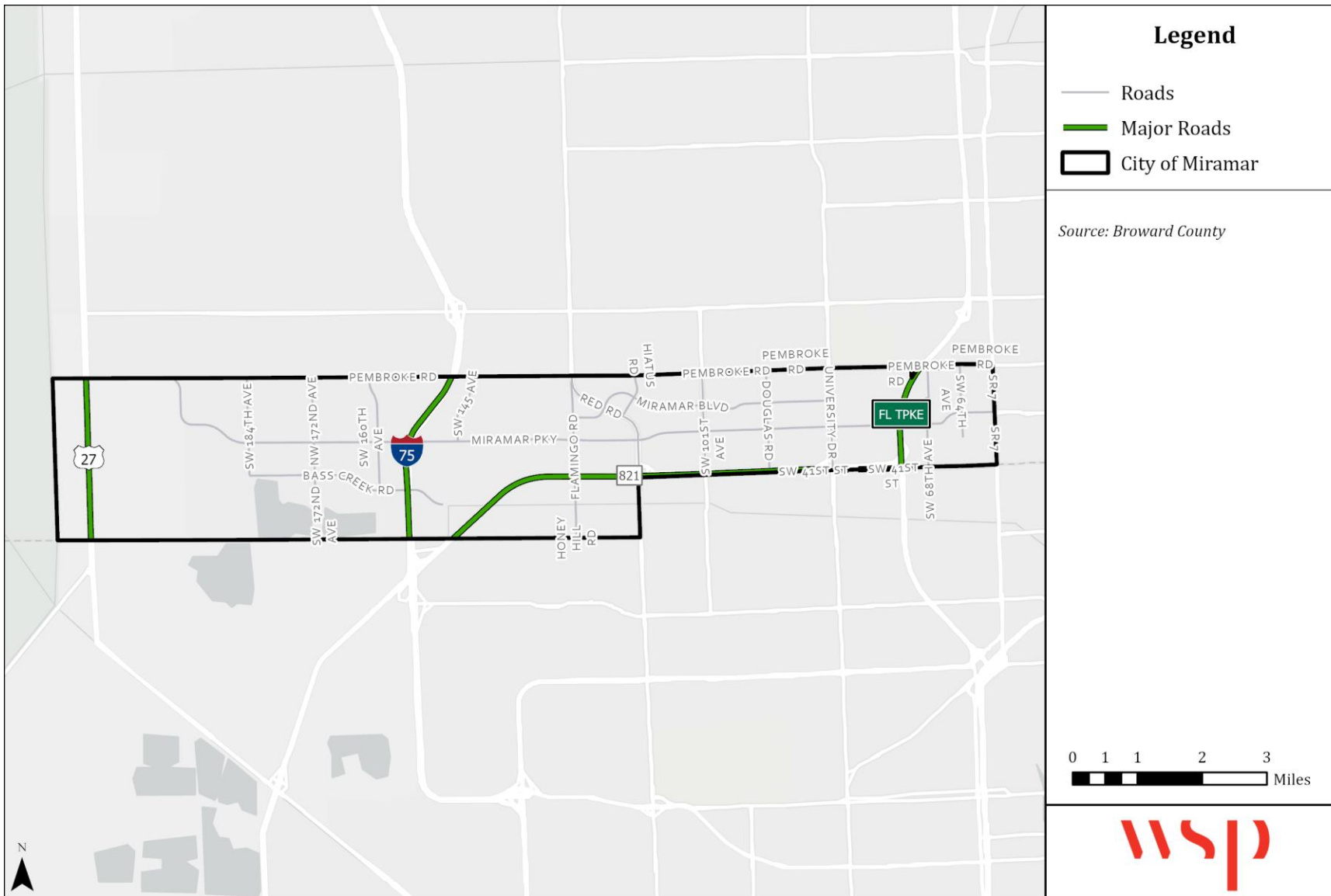
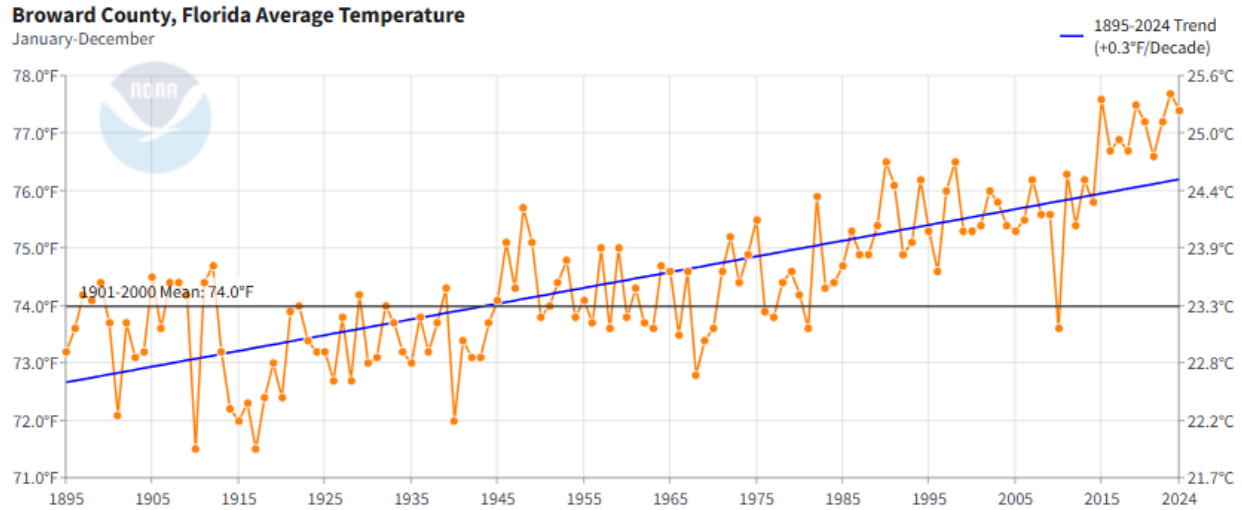


Figure 3.2 – Base Map, Miramar, FL



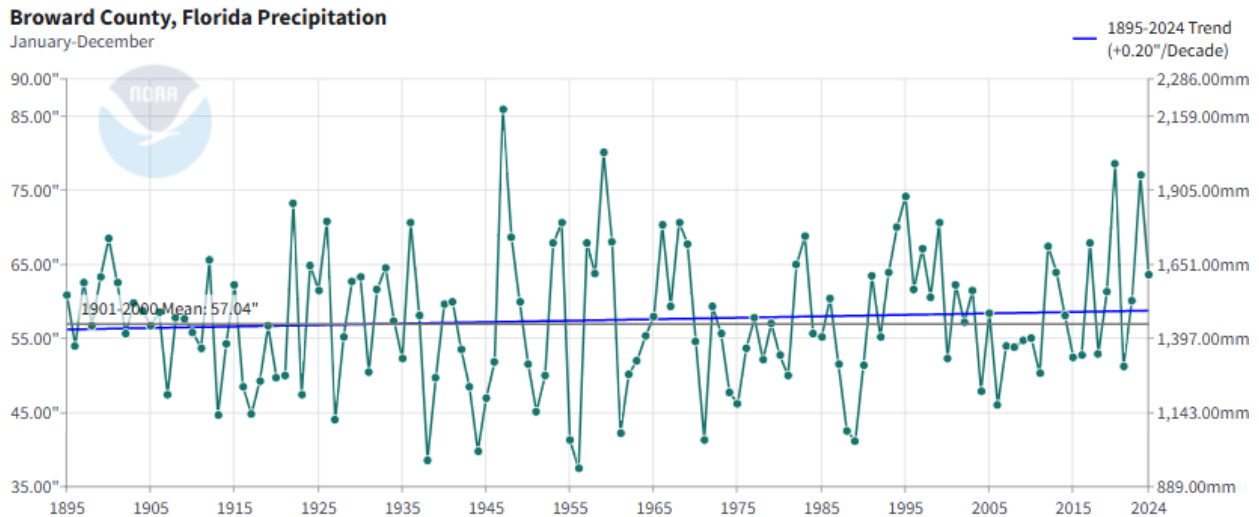
According to the Köppen climate classification system, Miramar has a tropical savannah climate, characterized by consistent high temperatures (at or near sea level) with a pronounced dry season in the winter. Broward County's average annual temperature is 74.4 Fahrenheit, and average annual precipitation is approximately 57.5 inches, as measured by the National Oceanic and Atmospheric Administration (NOAA) data and shown in Figure 3.3 and Figure 3.4 below.

**Figure 3.3 – Average Annual Temperature, Broward County, Florida**



Source: NOAA Climate at a Glance

**Figure 3.4 – Annual Precipitation, Broward County, Florida**



Source: NOAA Climate at a Glance

## WATERSHEDS

As shown in the map of HUC-12 watersheds in Figure 3.5, Miramar is split between 2 HUC-12 watersheds – Snake Creek Canal and Royal Glades Canal.

## WETLANDS

The benefits of wetlands are hard to overestimate. They provide critical habitat for many plant and animal species that could not survive in other habitats. They are also critical for water management as they absorb

and store vast quantities of storm water, helping reduce floods and recharge aquifers. Not only do wetlands store water like sponges, but they also filter and clean water as well, absorbing toxins and other pollutants.

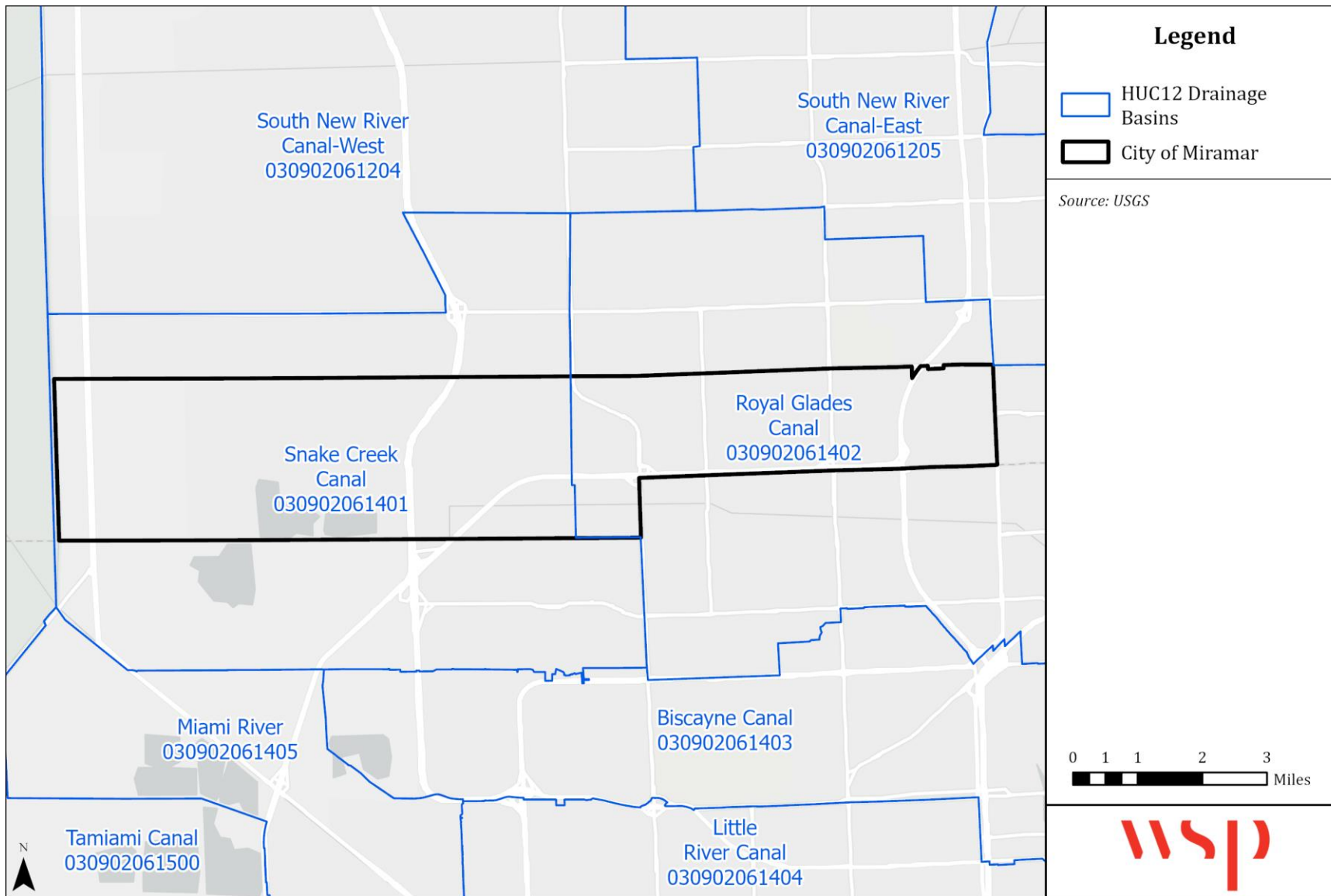
Figure 3.6 shows the location of wetlands in the City of Miramar.

### PARKS, PRESERVE, AND CONSERVATION

The City of Miramar is home to several parks and natural areas including:

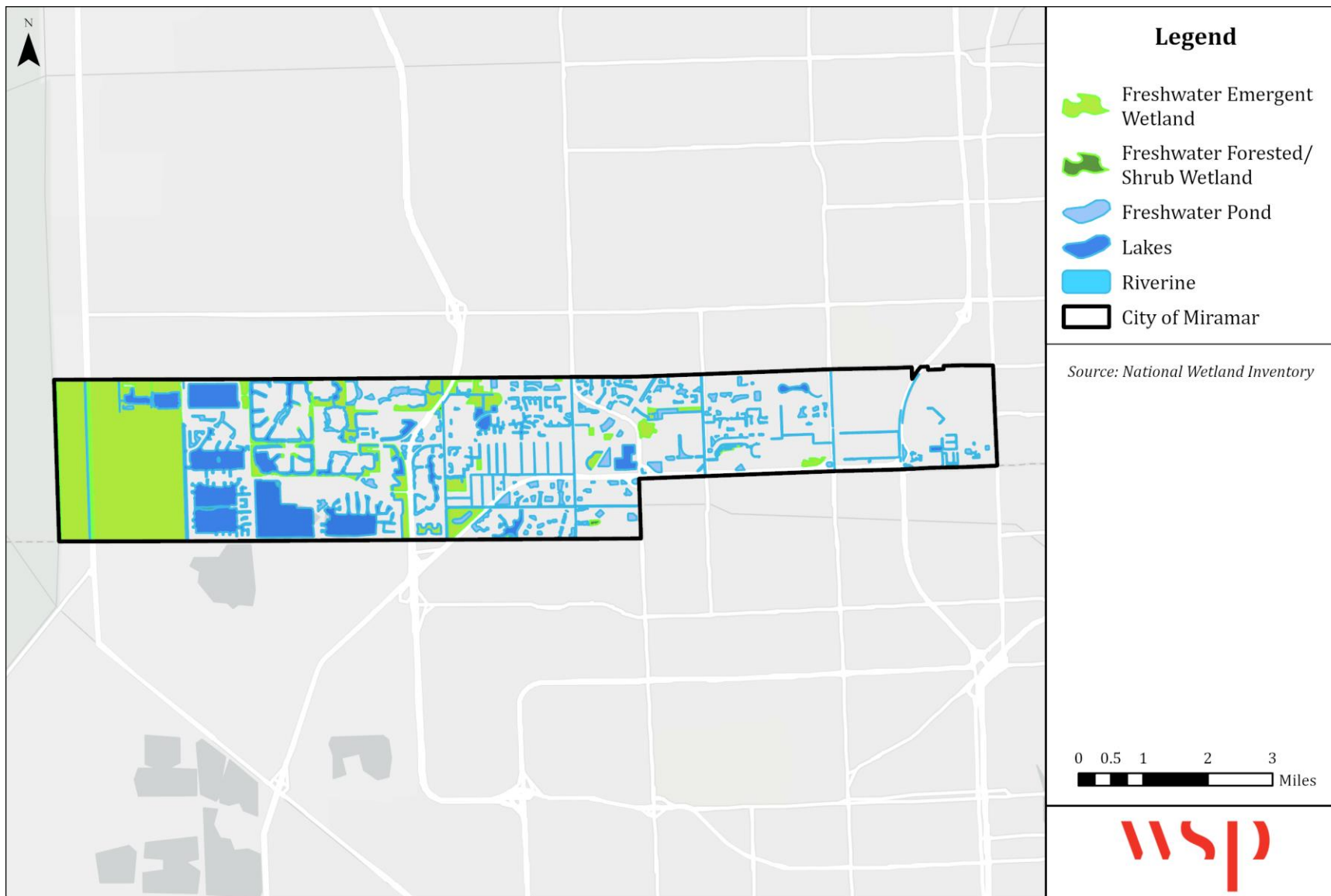
- 19<sup>th</sup> Street Park
- Ansin Sports Complex
- Beauty Park
- Beekman Park
- Bernard Park
- Civic Center Park
- Country Club Ranches
- Fairway Park
- Flamingo Estate Park
- Forcina Field
- Forzano Field
- Harbour Lakes Park
- Henry D Perry Park
- Huntington Park
- Island Park
- Lakeshore Park
- Linear Park
- Miramar Athletic Park
- Miramar Isles Park
- Miramar Regional Park
- Monarch Lake Park
- Paw Central Dog Park
- Progress Park
- River Run Park
- Sawyer Park
- Sheraton Park
- Shirley Branca Park
- Silver Lakes Sports Complex
- Silver Shores Park
- Veteran’s Memorial Park
- Vizcaya Park

**Figure 3.5 - HUC-12 Sub-Watersheds**



Source: USGS NH

Figure 3.6 - Wetlands in Miramar



## THREATENED AND ENDANGERED SPECIES

The U.S. Fish and Wildlife Service maintains a regular listing of threatened species, endangered species, species of concern, and candidate species for counties across the United States. Broward County has 29 species that are listed with the U.S. Fish and Wildlife Services. Table 3-1 below shows the species identified as threatened, endangered, or other classification in Broward County.

**Table 3-1 - Threatened and Endangered Species**

Group	Common Name	Scientific Name	Federal Status
Birds	Black-capped Petrel	<i>Pterodroma hasitata</i>	Endangered
Birds	Crested caracara (Audubon's) [FL DPS]	<i>Caracara plancus audubonii</i>	Threatened
Birds	Eastern Black rail	<i>Laterallus jamaicensis ssp. jamaicensis</i>	Threatened
Birds	Everglade snail kite	<i>Rostrhamus sociabilis plumbeus</i>	Endangered
Birds	Florida scrub-jay	<i>Aphelocoma coerulescens</i>	Threatened
Birds	Piping Plover	<i>Charadrius melodus</i>	Threatened
Birds	Red-cockaded woodpecker	<i>Dryobates borealis</i>	Threatened
Birds	Rufa red knot	<i>Calidris canutus rufa</i>	Threatened
Birds	Wood stork	<i>Mycteria americana</i>	Threatened
Fishes	Gulf sturgeon	<i>Acipenser oxyrinchus (=oxyrhynchus) desotoi</i>	Threatened
Flowering Plants	Tiny polygala	<i>Polygala smallii</i>	Endangered
Flowering Plants	Beach jacquemontia	<i>Jacquemontia reclinata</i>	Endangered
Flowering Plants	Ghost orchid	<i>Dendrophyllax lindenii</i>	Proposed Endangered
Insects	Monarch butterfly	<i>Danaus plexippus</i>	Proposed Threatened
Mammals	Tricolored bat	<i>Perimyotis subflavus</i>	Proposed Endangered
Mammals	Southeastern beach mouse	<i>Peromyscus polionotus niveiventris</i>	Threatened
Mammals	Puma (=mountain lion)	<i>Puma (=Felis) concolor (all subsp. except coryi)</i>	Similarity of Appearance (Threatened)
Mammals	Florida bonneted bat	<i>Eumops floridanus</i>	Endangered
Mammals	Florida panther	<i>Puma (=Felis) concolor coryi</i>	Endangered
Mammals	West Indian Manatee	<i>Trichechus manatus</i>	Threatened
Reptiles	Hawksbill sea turtle	<i>Eretmochelys imbricata</i>	Endangered
Reptiles	American alligator	<i>Alligator mississippiensis</i>	Similarity of Appearance (Threatened)
Reptiles	Gopher tortoise	<i>Gopherus polyphemus</i>	Resolved Taxon
Reptiles	Leatherback sea turtle	<i>Dermochelys coriacea</i>	Endangered
Reptiles	Eastern diamondback rattlesnake	<i>Crotalus adamanteus</i>	Under Review
Reptiles	American crocodile	<i>Crocodylus acutus</i>	Threatened
Reptiles	Eastern indigo snake	<i>Drymarchon couperi</i>	Threatened
Reptiles	Loggerhead sea turtle	<i>Caretta caretta</i>	Threatened
Reptiles	Green sea turtle	<i>Chelonia mydas</i>	Threatened

Source: U.S. Fish & Wildlife Service (<https://ecos.fws.gov/ecp/report/species-listings-by-current-range-county?fips=48041>)

## 3.2 ECONOMY

Per the 2019-2023 American Community Survey 5-Year Estimates, the median household income for the City of Miramar is \$86,109. An estimated 9.3% of the population is considered to be living below the poverty level. Table 3-2 shows employment and unemployment rates along with industry employment by major classification for the city.

**Table 3-2 - Employment and Occupation Statistics for City of Miramar, FL**

Employment Status	Percentage
In labor force	71.8
Employed	68.5
Unemployed	3.3
Armed Forces	0.1
Not in labor force	28.2
Occupation	
Management, business, science and arts	44.0
Service	15.9
Sales and office	24.1
Natural resources, construction and maintenance	6.6
Production, transportation and material moving	9.5

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

Major employers for the City of Miramar, as identified by the City's Financial Services Department in the FY2025 Annual Budget, are listed in Table 3-3. Per 2023 American Community Survey estimates, approximately 34% of workers who live in Miramar work outside of the Broward County.

**Table 3-3 - Major Employers in the City of Miramar, FL**

Corporation/Organization	Number of Employees	Type of Service
Royal Caribbean Cruises, Ltd.	1,400	Cruises
Southern Glazer's Wine and	1,130	Retail
Memorial Hospital Miramar	1,110	Healthcare
Spirit Airlines, Inc.	976	Transportation
Comcast of South Florida	949	Technology
Publix Super Markets, Inc.	940	Retail
Walgreens	769	Retail Pharmacy
Carnival Corporation	750	Cruises
Interactive Response	707	Technology
Comcast Cable Communications LLC	642	Technology
Premier Beverage dba Breakthru	570	Retail
Quest Diagnostic Inc	570	Healthcare
JL Audio Inc	514	Technology

Source: City of Miramar FY2025 Annual Budget

Permitting data was provided by Miramar's Building Planning and Zoning Department. The number of approved permits drastically increased from 2020 to 2021 and has slightly decreased over the subsequent five years. Permit approvals are one indicator of both development and economic trends for the City.

**Table 3-4 - Approved Building Permits 2020 - 2025**

Year	Number of Permits
2020	6,922
2021*	13,516

Year	Number of Permits
2022*	10,284
2023	7,890
2024	7,090
2025	6,856

Source: Miramar Building Planning and Zoning

\*Covid years

### 3.3 HOUSING

According to the 2019-2023 American Community Survey 5-Year Estimates, there are 46,639 housing units in Miramar, 96.1% of which are occupied. Approximately 29.6% of occupied units are renter-occupied. Renter-occupied households experience a higher level of pre- and post-disaster vulnerability.

Median home value in Miramar is \$521,300. Of the City's owner-occupied housing units, 67.2% have a mortgage.

The majority of householders moved into their current homes since 2010; 27.7% moved in between 2010 and 2017, 16.5% moved in between 2018 and 2020, and 24.7% moved in in 2021 or later. About 3.1% of households have no vehicle available to them, which suggests these residents may have difficulty in the event of an evacuation.

## 3.4 POPULATION

The City of Miramar had 134,721 residents at the time of the 2020 U.S. Census and an estimated population of 138,330 in 2023. Table 3-5 provides demographic profile data from the 2019-2023 American Community Survey 5-Year Estimates (ACS). Population projections for Florida and Broward County are provided by the University of Florida Bureau of Economic and Business Research (BEBR) and shown in Table 3-6.

**Table 3-5 - City of Miramar Demographic Profile Data, 2023**

Demographic	City of Miramar	Broward County	Florida
<b>Gender/Age</b>			
Male	49.0%	49.0%	49.1%
Female	51.0%	51.0%	50.9%
Median Age (years)	39.5	41.3	42.6
Under 5 Years	5.3%	5.5%	5.1%
65 Years and Over	12.5%	17.6%	21.1%
<b>Race/Ethnicity (One Race)</b>			
White	25.7%	42.6%	59.9%
Black or African American	44.6%	28.3%	15.3%
Asian	4.6%	3.7%	2.9%
American Indian/Alaska Native	0.2%	0.2%	0.3%
Other Race	5.2%	5.3%	5.6%
Two or more Races	19.6%	19.9%	16.0%
Hispanic or Latino	38.3%	31.9%	26.7%
<b>Education</b>			
High School Graduate or Higher*	91.7%	90.3%	89.6%
Bachelor's Degree or Higher*	34.8%	35.8%	33.2%

Source: U.S. Census Bureau, 2017-2021 American Community Survey 5-Year Estimates

\*Hispanic or Latino individuals may be of any race, so also are included in applicable race categories.

\*Based on population 25 years and older

**Table 3-6 - Population Projections**

	2030	2035	2040	2045	2050
Broward County	2,065,900	2,112,900	2,145,800	2,169,700	2,189,100
Florida	24,836,000	25,980,800	26,870,200	27,568,800	28,174,900

Source: University of Florida Bureau of Economic and Business Research

## 3.5 SOCIAL VULNERABILITY

Social vulnerability refers to the factors that may weaken a community's capacity to prepare for and respond to hazard events. Understanding where social vulnerability is higher and what factors are contributing to it can enable the community to mitigate that vulnerability and improve local resilience.

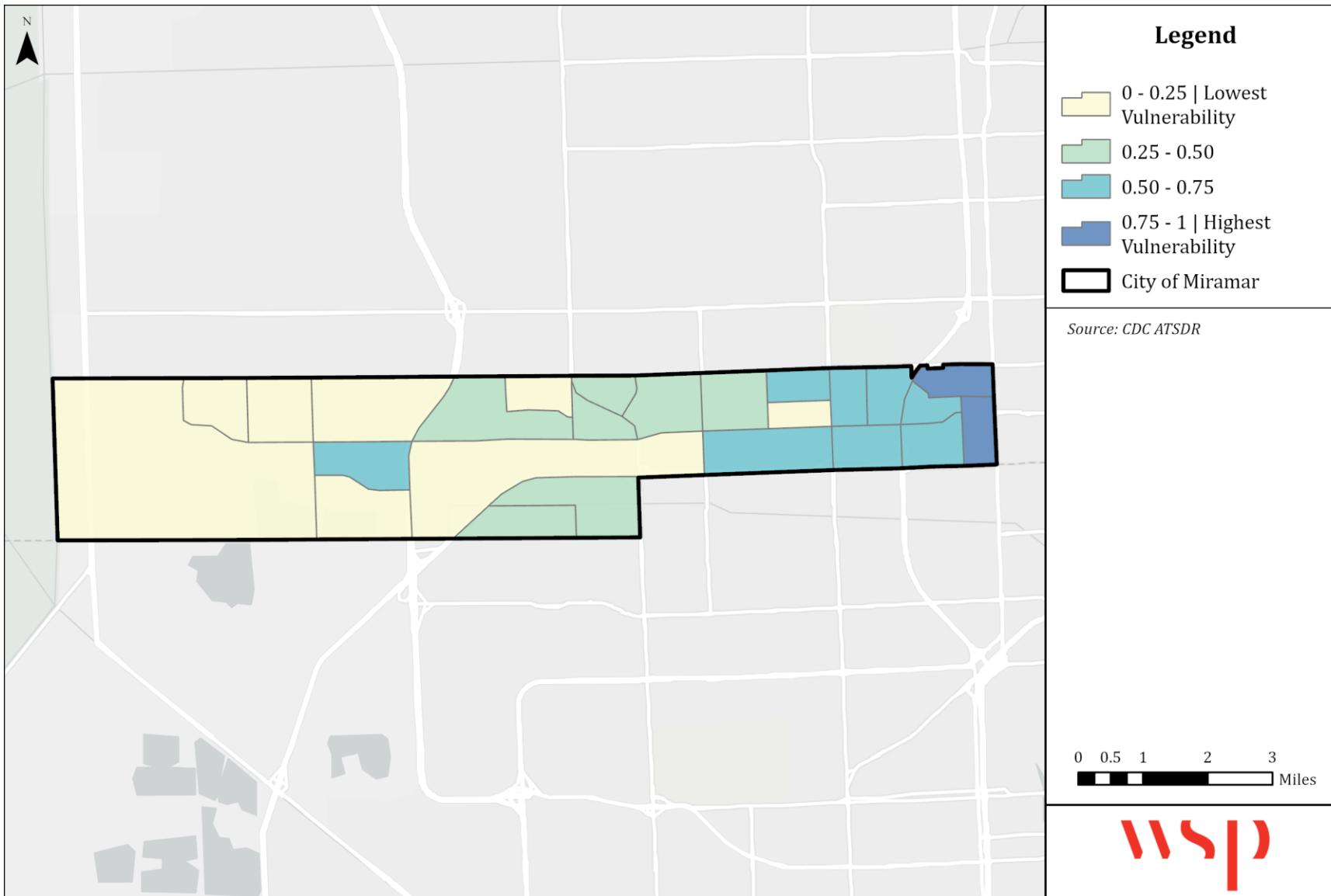
The Center for Disease Control and Prevention (CDC) has developed a social vulnerability index (SVI) to measure the resilience of communities when confronted by external stresses such as natural hazards. The SVI indicates the relative vulnerability within Census tracts based on 15 social factors: poverty, unemployment, income, education, age, disability, household composition, minority status, language, housing type, and transportation access. These factors are summarized into four themes: socioeconomic status, household composition/disability, race/ethnicity/language, and housing type/transportation. Using

this SVI information can help the Village to prioritize pre-disaster aid, allocate emergency preparedness and response resources, and plan for the provision of recovery support.

Figure 3.7 shows the relative social vulnerability for Miramar Census tracts according to SVI data.

Per the CDC SVI information, social vulnerability is highest in the eastern portion of the City, particularly the census blocks closest to Miramar's eastern border.

**Figure 3.7 - Social Vulnerability Index by Census Tract**



Source: Centers for Disease Control and Prevention (CDC)

## 3.6 GROWTH AND DEVELOPMENT TRENDS

The City of Miramar is ranked 13<sup>th</sup> in size (population) among Florida's 400-plus municipalities. From 2010 to 2020, the City grew at a rate of 10.4%. Additionally, the University of Florida Bureau of Economic Business Research estimates that Miramar had a population of 139,500 in 2024, which is a 3.5 percent increase from the Census Count in 2020. Miramar has very little undeveloped land remaining, and therefore, redevelopment is the most likely avenue for growth.

### 3.6.1 FUTURE GROWTH AND DEVELOPMENT

A land use plan is intended to provide a framework that will guide local government officials and private citizens as they make day-to-day and long-term decisions affecting growth and development. The 2016 Comprehensive Plan includes a Land Use Plan chapter that serves as an overall "blueprint" for the development of Miramar that when implemented results in the most suitable and appropriate use of the land and ensures efficient and orderly growth.

#### EXISTING LAND USE

The National Land Cover Database summarizes existing land cover across the U.S. and is a useful resource to distinguish between developed and undeveloped land. Table 3-7 summarizes the acreage in each land cover category. Approximately 70.8% of the land in the City is developed or is open water. Medium density development dominates the city except for the far east quadrant. Dense development often equates to a concentration of impervious surface, which means stormwater runoff is more likely to contribute to flooding issues.

**Table 3-7 – Land Cover in Miramar, FL**

NLCD Category	Acreage	Percent of Total (%)
Open Water	1,902.8	9.5
Developed, Open Space	433.9	2.2
Developed, Low Intensity	4,265.1	21.4
Developed, Medium Intensity	8,740.3	43.8
Developed, High Intensity	678.5	3.4
Barren Land (Rock/Sand/Clay)	12.5	0.1
Evergreen Forest	315.4	1.6
Mixed Forest	4.7	0.0
Shrub/Scrub	4.9	0.0
Herbaceous	87.2	0.4
Pasture/Hay	212.8	1.1
Woody Wetlands	925.6	4.6
Emergent Herbaceous Wetlands	2,374.5	11.9
<b>Total</b>	<b>19,958.1</b>	<b>100</b>

Source: National Land Cover Database 2025

According to the NLCD data, vacant or undeveloped land, including open water, makes up approximately 29.2% of the total area within the Miramar planning jurisdiction. The City's zoning, summarized by acreage in Table 3-8, provides an estimate of existing land use. Table 3-8 shows that approximately 43.0% of land within the Miramar planning jurisdiction is zoned for residential use. Commercial and mixed uses represent approximately 7.5% of existing land use. Rural land use and open space represent approximately 21.6% of existing land use. Planned development represents 15.9% and office and industrial make up about 7.0% of

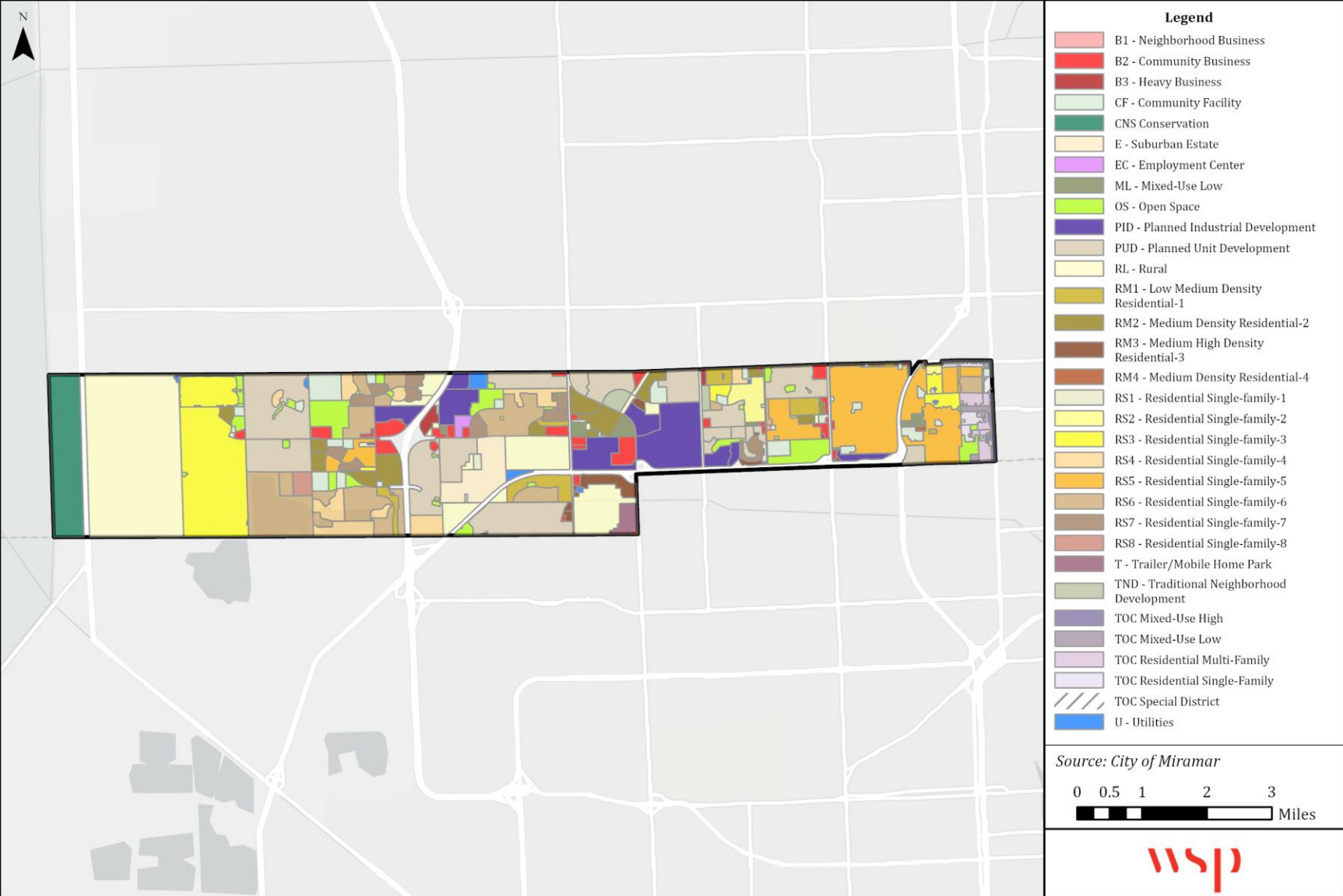
the planning area. On the following page, Figure 3.8 shows the current zoning for each parcel in the planning area.

**Table 3-8 - Existing Zoning (Acreage)**

<b>Existing Land Use Category</b>	<b>Acreage</b>	<b>Percent of Total (%)</b>
B1 - Neighborhood Business	3.1	0.0%
B2 - Community Business	530.7	2.8%
B3 - Heavy Business	67.9	0.4%
CF - Community Facility	578.9	3.1%
CNS Conservation	749.9	4.0%
E - Suburban Estate	380.3	2.0%
EC - Employment Center	40.6	0.2%
ML - Mixed-Use Low	139.0	0.7%
OS - Open Space	779.5	4.1%
PID - Planned Industrial Development	1,288.4	6.8%
PUD - Planned Unit Development	3,010.5	15.9%
RL - Rural	3,323.8	17.5%
RM1 - Low Medium Density Residential-1	391.0	2.1%
RM2 - Medium Density Residential-2	653.6	3.4%
RM3 - Medium High Density Residential-3	168.8	0.9%
RM4 - Medium Density Residential-4	7.8	0.0%
RS1 - Residential Single-family-1	18.4	0.1%
RS2 - Residential Single-family-2	195.7	1.0%
RS3 - Residential Single-family-3	1,612.9	8.5%
RS4 - Residential Single-family-4	574.0	3.0%
RS5 - Residential Single-family-5	1,743.1	9.2%
RS6 - Residential Single-family-6	1,618.3	8.5%
RS7 - Residential Single-family-7	383.8	2.0%
RS8 - Residential Single-family-8	69.4	0.4%
T - Trailer/Mobile Home Park	90.0	0.5%
TND - Traditional Neighborhood Development	94.0	0.5%
TOC Mixed-Use High	48.0	0.3%
TOC Mixed-Use Low	49.2	0.3%
TOC Residential Multi-Family	161.9	0.9%
TOC Residential Single-Family	82.3	0.4%
TOC Special District	20.8	0.1%
U - Utilities	91.3	0.5%
<b>Total</b>	<b>18,966.6</b>	<b>100.0%</b>

Source: City of Miramar, FL

Figure 3.8 - Zoning Map



## FUTURE LAND USE

The purpose of the Future Land Use Map is to graphically depict Miramar’s policies for growth and land development and the proposed patterns of future land use. The Future Land Use Map was prepared with consideration given to land development objectives and policies, natural constraints and limitations, overall land suitability, and the ability to provide the infrastructure to support growth and development. The City's current Future Land Use Map and classifications are shown in Figure 3.9.

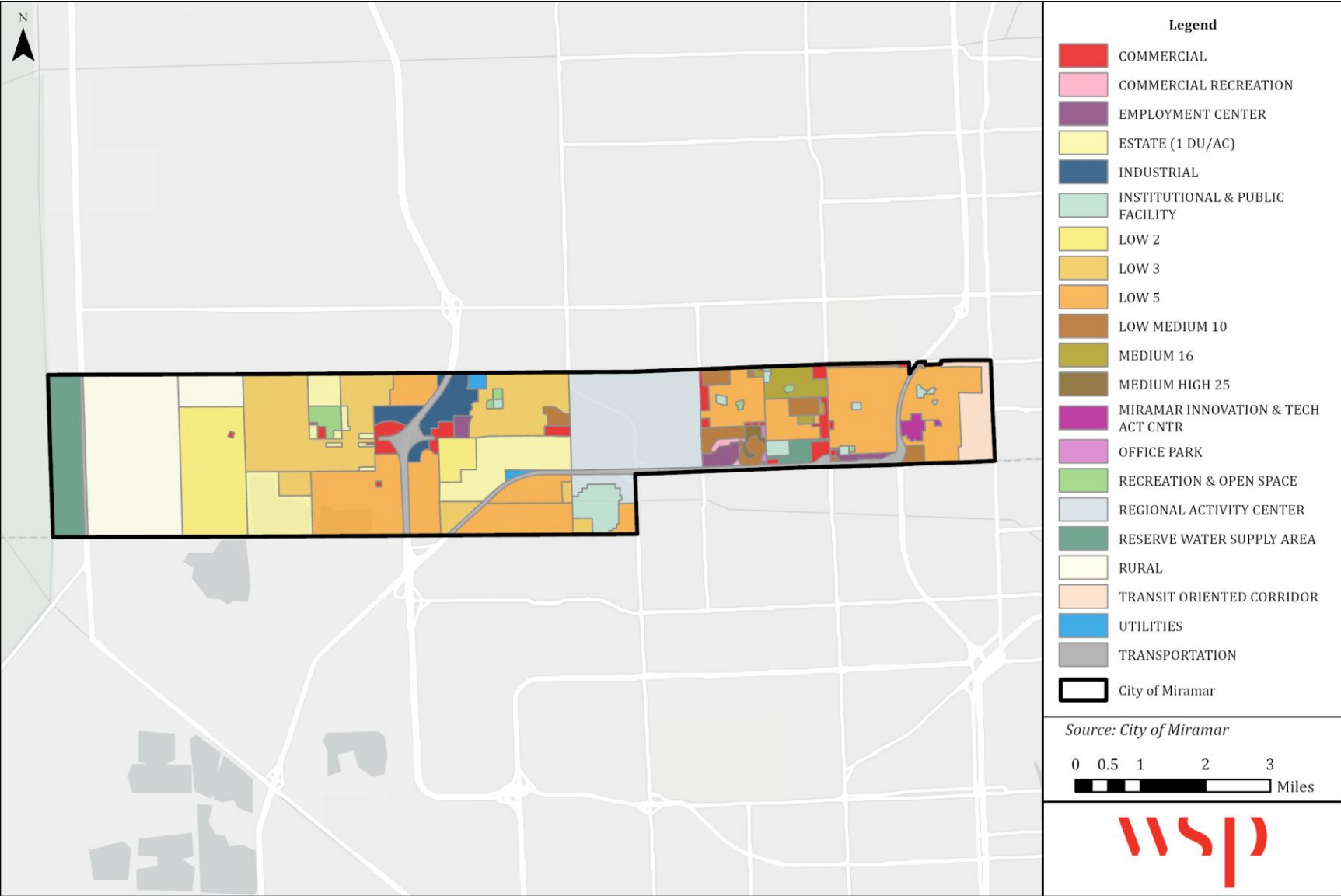
In terms of the location of future growth, new development is most likely to take the form of urban infill and redevelopment, and the City uses Smart Growth principles to guide these decisions. Additionally, the Comprehensive Plan includes policies supporting the City’s Concurrency Monitoring System, which helps ensure that necessary facilities and services are available concurrently with the impacts of development. Essentially, the City reviews City grants development permits when adequate level(s) of service for several factors, including flood protection, are met.

An updated 2045 Comprehensive Plan was underway during the development of this plan. Future land use categories and land use designations defined in the updated plan are similar to the current designations shown in Figure 3.9. Table 3-9 displays the future land use categories included in the 2045 Future Land Use Maps.

**Table 3-9 - 2045 Comprehensive Plan Future Land Use Categories**

<b>Residential</b>	<b>Non-residential</b>	<b>Activity Center</b>
Rural Estate 1 (E1)	Commerce (C)	Miramar Regional
Estate 2 (E-2)	Recreation and Open Space (ROS)	Activity Center (RAC)
Residential Low 2 (RL-2)	Institutional (IN)	Miramar Transit
Residential Low 3 (RL-3)	Utilities (U)	Oriented Corridor (TOC)
Residential Low 5 (RL-5)	Conservation (CO)	Miramar Innovation and Technology Center (MITAC)
Residential Medium-Low 10 (RM-10)	City Areas of Particular Concern (CAPC)	
Residential Medium 16 (RM-16)		
Residential Medium High 25 (RM-25)		
Irregular Density (ID)		

Figure 3.9 - Future Land Use



## 4 FLOOD RISK ASSESSMENT

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

This section describes the Hazard Identification and Risk Assessment process for the development of the City of Miramar Floodplain Management Plan. It describes how the City met the following requirements from the 10-step planning process:

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

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

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



Data collected through this process has been incorporated into the following subsections of this section:

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

### 4.1 HAZARD IDENTIFICATION

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

### 4.1.1 METHODOLOGY

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

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

**Table 4-1 - Summary of Flood Hazard Evaluation**

Flood Hazard	Included in 2023 State HMP?	Included in 2023 Broward County LMS?
Flood	✓	✓
Levee Failure	✓	
Stormwater and Localized Flooding		✓
Tropical Cyclones	✓	✓

All hazards listed above were evaluated for this plan. Flood hazard data from the 2023 Broward County Local Mitigation Strategy, the State of Florida Hazard Mitigation Plan, the Florida Department of Emergency Management (FDEM), FEMA, NOAA's National Centers for Environmental Information (NCEI), and other sources were examined to assess the significance of these hazards to the planning area. For the purpose of hazard identification, significance was measured in general terms and focused on key criteria such as frequency and resulting damage, which includes deaths and injuries, as well as property and economic damage.

### 4.1.2 DISASTER DECLARATION HISTORY

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

Details on flood-related federal disaster declarations were obtained from FEMA and are summarized in Table 4.2. This list contains all major disaster declarations that included Broward County, and thus the City of Miramar, as a designated area. This table reflects the historic patterns of flood hazards for the planning area. Broward County first received a flood-related major disaster declaration in 1965. Since then, Broward County has received 18 flood-related major disaster declarations and 13 emergency declarations.

**Table 4-2 - FEMA Emergency and Major Disaster Declarations for Broward County since 1953**

Disaster #	Hazard Type	Declaration Title	Declaration Date
DR-209-FL	Hurricane	Hurricane Betsy	9-14-1965
DR-955-FL	Hurricane	Hurricane Andrew	8-24-1992
DR-1195-FL	Severe Storm	Severe Storms, High Winds, Tornadoes, & Flooding	1-6-1998
DR-1204-FL	Severe Storm	Severe Storms, High Winds, Tornadoes, & Flooding	2-12-1998
EM-3131-FL	Hurricane	Hurricane Georges	9-25-1998
EM-3143-FL	Hurricane	Hurricane Floyd	9-14-1999
EM-3150-FL	Hurricane	Tropical Storm Irene	10-15-1999

Disaster #	Hazard Type	Declaration Title	Declaration Date
DR-1306-FL	Hurricane	Hurricane Irene	10-20-1999
DR-1345-FL	Severe Storm	Severe Storms and Flooding	10-04-2000
DR-1539-FL	Hurricane	Tropical Storm Bonnie and Hurricane Charley	8-13-2004
DR-1545-FL	Hurricane	Hurricane Frances	9-04-2004
DR-1561-FL	Hurricane	Hurricane Jeanne	9-26-2004
DR-1602-FL	Hurricane	Hurricane Katrina	8-28-2005
EM-3220-FL	Hurricane	Hurricane Katrina Evacuation	9-05-2005
EM-3259-FL	Hurricane	Tropical Storm Rita	9-20-2005
DR-1609-FL	Hurricane	Hurricane Wilma	10-24-2005
EM-3288-FL	Severe Storm	Tropical Storm Fay	8-21-2008
EM-3377-FL	Hurricane	Hurricane Matthew	10-06-2016
DR-4283-FL	Hurricane	Hurricane Matthew	10-08-2016
EM-3385-FL	Hurricane	Hurricane Irma	9-05-2017
DR-4337-FL	Hurricane	Hurricane Irma	9-10-2017
EM-3419-FL	Hurricane	Hurricane Dorian	08-30-2019
DR-4468-FL	Hurricane	Hurricane Dorian	10-21-2019
EM-3533-FL	Hurricane	Hurricane Isaias	8-01-2020
EM-3584-FL	Hurricane	Tropical Storm Ian	9-24-2022
DR-4673-FL	Hurricane	Hurricane Ian	9-29-2022
EM-3587-FL	Tropical Storm	Tropical Storm Nicole	11-08-2022
DR-4680-FL	Hurricane	Hurricane Nicole	12-13-2022
DR-4709-FL	Flood	Severe Storms, Tornadoes, and Flooding	4-27-2023
EM-3622-FL	Hurricane	Hurricane Milton	10-07-2024
DR-4834-FL	Hurricane	Hurricane Milton	10-11-2024

Source: FEMA Disaster Declaration Summaries; July 31, 2025

Note: Declaration date may not coincide with the actual date of the event.

### 4.1.3 FLOOD EVENT HISTORY

NOAA's NCEI database has been tracking various types of severe weather since 1950. Flood-related events have been tracked since 1996. The NCEI Storm Events Database contains an archive of destructive storm or weather data and information which includes local, intense and damaging events. NCEI receives storm data from the National Weather Service (NWS), which compiles information from a variety of sources, including but not limited to: city, county, state and federal emergency management officials, local law enforcement officials, SkyWarn spotters, NWS damage surveys, newspaper clipping services, the insurance industry and the general public. This database contains 150 flood related events that occurred in Broward County from January 1999 through December 2024. Table 4.3 summarizes these events.

**Table 4-3 - NCEI Severe Weather Reports for Broward County, January 1999 - December 2024**

Type	# of Events	Property Damage	Crop Damage	Deaths	Injuries
Flash Flood	32	\$82,838,000	\$25,000,000	0	0
Flood	64	\$10,086,100	\$0	0	0
Heavy Rain	22	\$307,000	\$0	0	2
Hurricane	8	\$220,030,000	\$33,000,000	2	4
Tropical Storm	24	\$365,000	\$0	1	1
<b>Total</b>	<b>150</b>	<b>\$313,626,100</b>	<b>\$58,000,000</b>	<b>3</b>	<b>7</b>

Source: NCEI Storm Events Database, July 2025

Note: Losses reflect totals for all impacted areas.

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#### 4.1.4 CLIMATE CHANGE

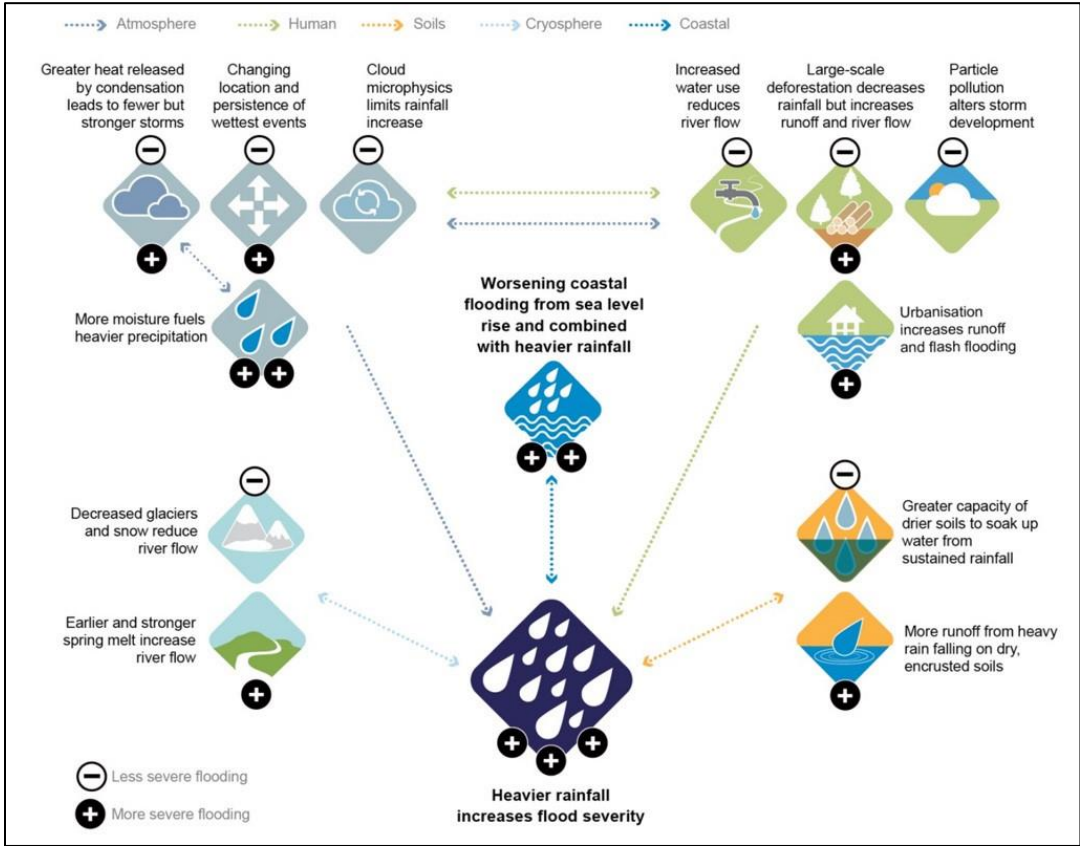
Climate change refers to long-term shifts in temperature and weather patterns. Climate change can be due to natural internal processes or external forces such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use (IPCC, 2023). However, the recent and rapid warming of the earth that has been observed over the past century has been cause for concern, as this warming is due to the accumulation of human-caused greenhouse gases, such as CO<sub>2</sub>, in the atmosphere (IPCC, 2023). Global average temperature is estimated to have increased by about 1 degree Celsius since the pre-industrial period, and it is currently increasing by about 0.2 degrees Celsius per decade. This global increase in temperatures is having broad range of effects on global, regional and local climates. According to the IPCC, the extent of climate change effects on individual regions will vary over time and with the ability of different societal and environmental systems to mitigate or adapt to change.

The Fifth National Climate Assessment provides a summary of trends and predictions for the Southeast. The Southeastern region, including Florida, experience a range of extreme weather that can have severe impacts, like hurricanes, flooding, severe storms with large hail and tornadoes, blizzards, ice storms, relentless winds, heat waves, and drought. The people and economies in the region are often at the mercy of some of the most diverse and extreme weather hazards on the planet. According to the US Government Accountability Office, national storm losses from changing frequency and intensity of storms is projected to increase anywhere from \$4-6 billion in the near future.

Within the Southeast region, the role of climate change in altering the frequency of the types of severe weather are most typically associated with extreme heat events, extreme precipitation events, drought persistence, sea level change, and tropical storms. Climate change is expected to lead to an increase in average temperatures as well as frequency, duration, and intensity of extreme heat events, and tropical storms. However, changes are unlikely to be uniform across the Southeast region.

The Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report notes that in recent years tropical storms and hurricanes have been responsible for some of the Southeast's biggest and most damaging flooding events. Figure 4.1 below illustrates how climate change may affect flooding.

**Figure 4.1 - Climate Change Impacts on Flooding**

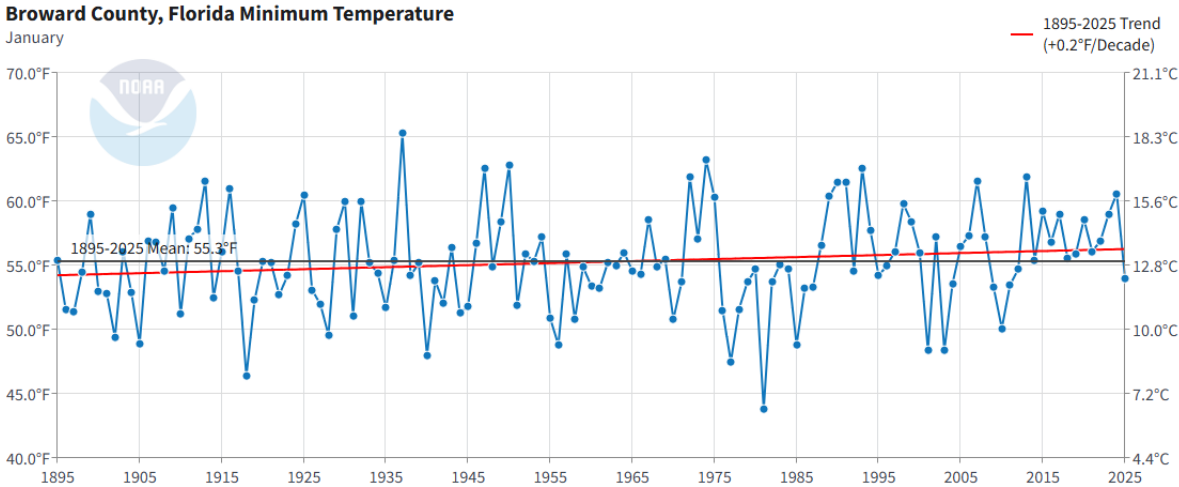


Source: IPCC 6<sup>th</sup> Assessment Report, 2023

**TEMPERATURE**

Records of minimum annual temperature show a small increasing annual trend across the state of Florida by less than one-half a degree (F) in the past century. In Broward County, average minimum annual temperature has increased at a rate of 0.2 degrees Fahrenheit per decade, as shown in Figure 4.2.

**Figure 4.2 - Broward County Minimum Annual Temperature, 1895-2025**

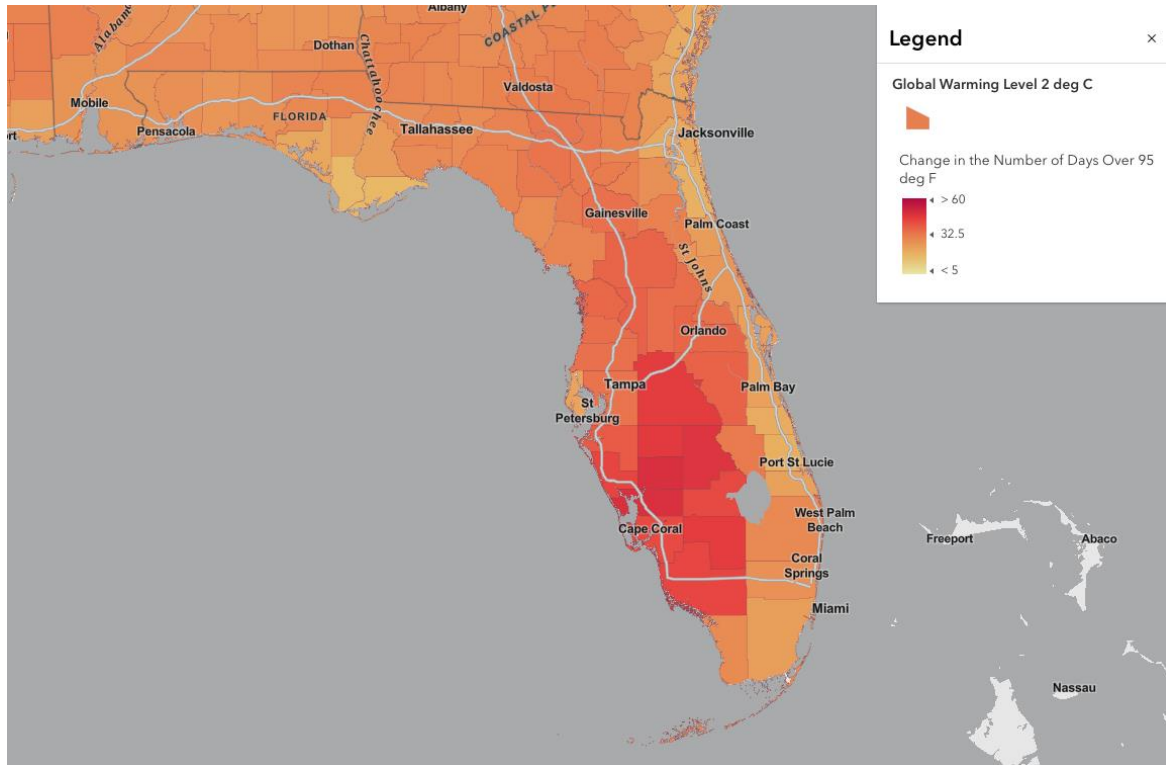


Source: NOAA Climate at a Glance

Research shows that average temperatures will continue to rise in the Southeast United States and globally, directly affecting the City of Miramar in Florida. Per the Fifth National Climate Assessment, “The number of extreme warm days (above 95°F) is expected to continue increasing with every increment of global warming,” and that “heatwaves in the Southeast are happening more frequently and are occurring during a longer heat season, with some cities also showing increasing trends in their duration and intensity.” The number of days over 95°F in the Southeastern region of Florida is expected to increase by between 10 and 20 days annually, as shown in Figure 4.3.

The Fifth National Climate Assessment also notes that warm nights (minimum temperatures at or above 70°F) in the Southeast have increased the most compared to all other continental U.S. regions.

**Figure 4.3 - Projected Change in Number of Days Over 95°F**



Source: Florida State University Climate Center

## PRECIPITATION

The Fourth National Climate Assessment reports that average annual precipitation is decreasing in the Southeast. Research suggests that extreme precipitation amounts across the Southeast will increase and may lead to rain events of 3 inches or more in 24 hours. As heavy precipitation events become more frequent, there will likely be an increase in the average number of consecutive dry days. As temperature is projected to continue rising, evaporation rates are expected to increase, resulting in decreased surface soil moisture levels. Together, these factors suggest that drought will increase in intensity and duration in the Southeast.

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

### 4.1.5 IDENTIFIED HAZARDS

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

- Flood
- Levee Failure
- Stormwater and Localized Flooding
- Tropical Cyclones

## 4.2 RISK ASSESSMENT METHODOLOGY

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

Each hazard is profiled in the following format:

### HAZARD DESCRIPTION

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

### LOCATION

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

### EXTENT

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

### PAST OCCURRENCES

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

### PROBABILITY OF FUTURE OCCURRENCE

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

### CLIMATE CHANGE AND FUTURE CONDITIONS

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

### PRIORITY RISK INDEX

The findings from the above sections of the hazard profiles are summarized using the Priority Risk Index (PRI) to score and rank each hazard's significance to the planning area. The PRI provides a standardized numerical value so that hazards can be compared against one another (the higher the PRI value, the greater the hazard risk). PRI values are obtained by assigning varying degrees of risk in five categories (probability,

impact, spatial extent, warning time, and duration). Each degree of risk is assigned a value (1 to 4) and a weighting factor as summarized in Table 4.4.

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

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

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

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

**Table 4-4 - Priority Risk Index**

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

## VULNERABILITY ASSESSMENT

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

Vulnerability assessments followed the methodology described in the FEMA publication *Understanding Your Risks—Identifying Hazards and Estimating Losses*. Total exposure and values at risk are summarized

in the Asset Inventory in Section 4.3. An evaluation of vulnerability by hazard, based on this asset inventory, is provided in each relevant hazard profile.

Data used to support this assessment included the following:

- Broward County Property Appraiser parcel data
- City of Miramar building footprints
- County and City GIS data (hazard layers, base layers, critical facility points, and other data)
- Hazard layer GIS datasets from federal agencies
- Written descriptions of risks and vulnerability provided by the 2023 Broward County Local Mitigation Strategy and 2023 State of Florida Hazard Mitigation Plan
- Other existing plans and studies provided by the City of Miramar

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

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

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

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## 4.3 ASSET INVENTORY

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

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### 4.3.1 PROPERTY

Building footprint data and parcel data retrieved in August 2025 were used to identify all improved properties in the City of Miramar. Property exposure is summarized by occupancy in Table 4.5.

**Table 4-5 - Summary of Improved Property**

Occupancy Type	Building Count	Structure Value	Estimated Content Value	Total Value
Agriculture	25	\$30,086,800	\$30,086,800	\$60,173,600
Commercial	891	\$1,809,940,110	\$1,809,940,110	\$3,619,880,220
Education	148	\$2,907,017,460	\$2,907,017,460	\$5,814,034,920
Government	148	\$1,516,456,880	\$1,516,456,880	\$3,032,913,760
Industrial	154	\$1,552,233,710	\$2,328,350,565	\$3,880,584,275
Religious	62	\$244,083,600	\$244,083,600	\$488,167,200
Residential	29,243	\$39,334,529,490	\$19,667,264,745	\$59,001,794,235
<b>Total</b>	<b>30,671</b>	<b>\$47,394,348,050</b>	<b>\$28,503,200,160</b>	<b>\$75,897,548,210</b>

Source: City of Miramar tax roll parcel data, 2025; Broward County building footprints, 2025

Note that in some cases, building footprints were located on parcels that did not have improved values in the parcel data. Building footprints less than or equal to 600 square feet or that existed on vacant parcels, new development parcels, or other parcels without associated improvement values were removed from the vulnerability assessment and not included in the Hazus analysis, as they did not have a building value which is required for Hazus loss estimates. As a result, the total building and content values in the property inventory are likely an underestimate of actual exposure.

Unimproved parcels, those with no associated values, were evaluated with a spatial overlay in GIS to consider the potential for future flood risk and exposure. See Section 0 for more information.

Content value estimations are based on the FEMA Hazus methodology of estimating value as a percentage of improved structure values by property type. The residential property type assumes a content replacement value equal to 50% of the building's value. Agricultural, commercial, education, government, and religious property types assume a content replacement value equal to 100% of the building value. The industrial property type assumes a content replacement value equal to 150% of the building value.

### 4.3.2 PEOPLE

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

**Table 4-6 - Estimated People at Risk**

Residential Property Count	Average Household Size	People at Risk
29,243	3.17	92,700

Source: American Community Survey 2019-2023 5-Year Estimates; City of Miramar parcel data, 2025

### 4.3.3 CRITICAL FACILITIES AND INFRASTRUCTURE

Of significant concern with respect to any disaster event is the location of critical facilities and infrastructure in the planning area. Critical facilities are often defined as those essential services and facilities in a major emergency which, if damaged, would result in severe consequences to public health and safety or a facility which, if unusable or unreachable because of a major emergency, would seriously and adversely affect the health, safety, and welfare of the public. Critical facilities are summarized by FEMA lifeline and total structure value in Table 4.7. A full inventory of identified critical facilities and infrastructure is provided in Table 4.8 and their locations are shown Figure 4.4.

**Table 4-7 - Summary of Critical Facilities and Infrastructure**

FEMA Lifeline	Count	Structure Value
Communications	19	\$96,624,120
Energy	5	\$181,220
Food, Hydration, Shelter	126	\$2,266,939,350
Health and Medical	6	\$154,710,110
Safety and Security	9	\$46,890,430
Transportation*	26	\$0
Water Systems	182	\$1,067,310,590
<b>Total</b>	<b>373</b>	<b>\$3,632,655,820</b>

Source: City of Miramar Vulnerability Assessment, 2025; City of Miramar parcel data, 2025

\*All transportation assets are bridges, no available structure value

**Table 4-8 - Inventory of Critical Facilities and Infrastructure**

FEMA Lifeline	Facility Type	Facility Name
Communications	Communication Facilities	Gas station (Pembroke Rd & SW 68 Ave)
Communications	Communication Facilities	Tropical Valley (SW 100 Ter) - 1901 VENTURES LLC
Communications	Communication Facilities	Tropical Valley (SW 100 Ter) - C & S INVESTMENTS OF BROWARD LLC
Communications	Communication Facilities	FDOT Red Rd/HEFT Interchange
Communications	Communication Facilities	FPL Easement (W of Red Rd)
Communications	Communication Facilities	Coconut Palm Elementary
Communications	Communication Facilities	New Park Towers
Communications	Communication Facilities	City Water Tower
Communications	Communication Facilities	Multi Service Center
Communications	Communication Facilities	Flamingo POC
Communications	Communication Facilities	Vizcaya Park - Communication Facilities1
Communications	Communication Facilities	Forzano Park
Communications	Communication Facilities	Dolphin Bay Elementary
Communications	Communication Facilities	Glades Middle
Communications	Communication Facilities	Miramar Regional Park - Communication Facilities
Communications	Communication Facilities	Silver Shores Park
Communications	Communication Facilities	Vizcaya Park - Communication Facilities2
Communications	Communication Facilities	7950 RIVIERA BLVD
Communications	Communication Facilities	8910 Miramar Pkwy
Energy	Substation	120074
Energy	Substation	120099
Energy	Substation	120111
Energy	Substation	PERRY
Energy	Substation	BASSCREEK
Food, Hydration, Shelter	University	FIU @ I-75
Food, Hydration, Shelter	University	DeVry University
Food, Hydration, Shelter	University	Universal Technical Institute
Food, Hydration, Shelter	Community Center	Miramar Multi-Service Complex
Food, Hydration, Shelter	Community Center	Miramar Cultural Center
Food, Hydration, Shelter	Community Center	Sunset Lakes Elementary School
Food, Hydration, Shelter	Community Center	Miramar Educational Center
Food, Hydration, Shelter	Risk Shelter Inventory	Silver Shores Elementary School - PE Bldg - Risk Shelter Inventory
Food, Hydration, Shelter	Risk Shelter Inventory	Coral Cove Elementary School - Main Bldg - Risk Shelter Inventory

<b>FEMA Lifeline</b>	<b>Facility Type</b>	<b>Facility Name</b>
Food, Hydration, Shelter	Risk Shelter Inventory	Coral Cove Elementary School - PE Bldg - Risk Shelter Inventory
Food, Hydration, Shelter	Risk Shelter Inventory	Coconut Palm Elementary School - Bldg 3 - Risk Shelter Inventory
Food, Hydration, Shelter	Risk Shelter Inventory	Silver Lakes Elementary - Main Bldg - Risk Shelter Inventory
Food, Hydration, Shelter	Risk Shelter Inventory	Silver Shores Elementary School - Main Bldg - Risk Shelter Inventory
Food, Hydration, Shelter	Risk Shelter Inventory	Dolphin Bay Elementary School - Main Bldg - Risk Shelter Inventory
Food, Hydration, Shelter	Risk Shelter Inventory	Silver Lakes Elementary School - Bldg 2
Food, Hydration, Shelter	Risk Shelter Inventory	New Renaissance Middle School - Bldg 4 - Risk Shelter Inventory
Food, Hydration, Shelter	Risk Shelter Inventory	New Renaissance Middle School - Bldg 1 & 2 - Risk Shelter Inventory
Food, Hydration, Shelter	Risk Shelter Inventory	Coconut Palm Elementary School - Bldg 1 - Risk Shelter Inventory
Food, Hydration, Shelter	Risk Shelter Inventory	New Renaissance Middle School - Bldg 3 - Risk Shelter Inventory
Food, Hydration, Shelter	Risk Shelter Inventory	Coconut Palm Elementary School - Bldg 4 - Risk Shelter Inventory
Food, Hydration, Shelter	Risk Shelter Inventory	Dolphin Bay Elementary School - PE Bldg - Risk Shelter Inventory
Food, Hydration, Shelter	Risk Shelter Inventory	Coconut Palm Elementary School - Main Bldg
Food, Hydration, Shelter	Risk Shelter Inventory	Sunset Lakes Elementary School - Main Bldg - Risk Shelter Inventory
Food, Hydration, Shelter	Risk Shelter Inventory	Sunset Lakes Elementary School - Bldg 2 - Risk Shelter Inventory
Food, Hydration, Shelter	Risk Shelter Inventory	Coconut Palm Elementary School - Bldg 2 - Risk Shelter Inventory
Food, Hydration, Shelter	Risk Shelter Inventory	Silver Lakes Elementary School - Bldg 1
Food, Hydration, Shelter	School	Sea Castle Elementary School - Bldg 2
Food, Hydration, Shelter	School	Fairway Elementary School - Bldg 6
Food, Hydration, Shelter	School	A.C. Perry Elementary School - Portable 8
Food, Hydration, Shelter	School	Miramar High School - Bldg 1 - School
Food, Hydration, Shelter	School	Silver Shores Elementary School - PE Bldg - School
Food, Hydration, Shelter	School	Coral Cove Elementary School - Main Bldg - School
Food, Hydration, Shelter	School	Coral Cove Elementary School - PE Bldg - School
Food, Hydration, Shelter	School	Fairway Elementary School - Bldg 3
Food, Hydration, Shelter	School	A.C. Perry Elementary School - Bldg 8
Food, Hydration, Shelter	School	Coconut Palm Elementary School - Bldg 3 - School
Food, Hydration, Shelter	School	Silver Lakes Elementary - Main Bldg - School
Food, Hydration, Shelter	School	Somerset Academy Miramar South
Food, Hydration, Shelter	School	Miramar Elementary School - Bldg 2
Food, Hydration, Shelter	School	A.C. Perry Elementary School - Portable 4
Food, Hydration, Shelter	School	Fairway Elementary School - Bldg 7
Food, Hydration, Shelter	School	Miramar Elementary School - Main Bldg
Food, Hydration, Shelter	School	Henry D. Perry Education Center - Main Bldg
Food, Hydration, Shelter	School	Henry D. Perry Education Center - Bldg 1
Food, Hydration, Shelter	School	A.C. Perry Elementary School - Portable 7

<b>FEMA Lifeline</b>	<b>Facility Type</b>	<b>Facility Name</b>
Food, Hydration, Shelter	School	Silver Shores Elementary School - Main Bldg - School
Food, Hydration, Shelter	School	Miramar High School - Bldg 5
Food, Hydration, Shelter	School	A.C. Perry Elementary School - Portable 5
Food, Hydration, Shelter	School	Fairway Elementary School - Bldg 4
Food, Hydration, Shelter	School	Dolphin Bay Elementary School - Main Bldg - School
Food, Hydration, Shelter	School	Sunshine Elementary School - Bldg 4
Food, Hydration, Shelter	School	Miramar Elementary School - Bldg 3
Food, Hydration, Shelter	School	A.C. Perry Elementary School - Bldg 9
Food, Hydration, Shelter	School	Miramar High School - Bldg 6
Food, Hydration, Shelter	School	Henry D. Perry Education Center - Bldg 2
Food, Hydration, Shelter	School	Miramar High School - Bldg 7
Food, Hydration, Shelter	School	Sea Castle Elementary School - Bldg 3
Food, Hydration, Shelter	School	Silver Lakes Elementary - Bldg 2
Food, Hydration, Shelter	School	Miramar High School - Bldg 8
Food, Hydration, Shelter	School	Miramar Elementary School - Bldg 4
Food, Hydration, Shelter	School	Sunshine Elementary School - Bldg 1
Food, Hydration, Shelter	School	Somerset Academy Miramar
Food, Hydration, Shelter	School	Sea Castle Elementary School - Bldg 6
Food, Hydration, Shelter	School	Everglades High School - Bldg 9
Food, Hydration, Shelter	School	New Renaissance Middle School - Bldg 4 - School
Food, Hydration, Shelter	School	Sunshine Elementary School - Bldg 5
Food, Hydration, Shelter	School	Sea Castle Elementary School - Bldg 1
Food, Hydration, Shelter	School	Sea Castle Elementary School - Bldg 7
Food, Hydration, Shelter	School	Sunshine Elementary School - Bldg 2
Food, Hydration, Shelter	School	New Renaissance Middle School - Bldg 1 & 2 - School
Food, Hydration, Shelter	School	Henry D. Perry Education Center - Bldg 3
Food, Hydration, Shelter	School	Sea Castle Elementary School - Bldg 4
Food, Hydration, Shelter	School	A.C. Perry Elementary School - Bldg 10
Food, Hydration, Shelter	School	Miramar High School - Bldg 1A - School
Food, Hydration, Shelter	School	Coconut Palm Elementary School - Bldg 1 - School
Food, Hydration, Shelter	School	Fairway Elementary School - Bldg 2
Food, Hydration, Shelter	School	Sea Castle Elementary School - Bldg 8
Food, Hydration, Shelter	School	A.C. Perry Elementary School - Bldg 5
Food, Hydration, Shelter	School	New Renaissance Middle School - Bldg 3 - School
Food, Hydration, Shelter	School	Coconut Palm Elementary School - Bldg 4 - School
Food, Hydration, Shelter	School	Dolphin Bay Elementary School - PE Bldg - School
Food, Hydration, Shelter	School	Coconut Palm Elementary School - Main
Food, Hydration, Shelter	School	Miramar High School - Bldg 9
Food, Hydration, Shelter	School	Sunset Lakes Elementary School - Main Bldg - School
Food, Hydration, Shelter	School	Miramar High School - Bldg 10
Food, Hydration, Shelter	School	Fairway Elementary School - Bldg 1
Food, Hydration, Shelter	School	Sunshine Elementary School - Bldg 3
Food, Hydration, Shelter	School	Sea Castle Elementary School - Bldg 9
Food, Hydration, Shelter	School	A.C. Perry Elementary School - Portable 3
Food, Hydration, Shelter	School	Sunshine Elementary School - Bldg 6
Food, Hydration, Shelter	School	A.C. Perry Elementary School - Portable 6

<b>FEMA Lifeline</b>	<b>Facility Type</b>	<b>Facility Name</b>
Food, Hydration, Shelter	School	A.C. Perry Elementary School - Portable 1
Food, Hydration, Shelter	School	Sea Castle Elementary School - Bldg 80
Food, Hydration, Shelter	School	Miramar High School - Bldg 11
Food, Hydration, Shelter	School	A.C. Perry Elementary School - Portable 2
Food, Hydration, Shelter	School	A.C. Perry Elementary School - Bldg 1
Food, Hydration, Shelter	School	Sunset Lakes Elementary School - Bldg 2 - School
Food, Hydration, Shelter	School	Coconut Palm Elementary School - Bldg 2 - School
Food, Hydration, Shelter	School	Miramar High School - Bldg 12
Food, Hydration, Shelter	School	A.C. Perry Elementary School - Bldg 6
Food, Hydration, Shelter	School	Silver Lakes Elementary - Bldg 1
Food, Hydration, Shelter	School	A.C. Perry Elementary School - Bldg 4
Food, Hydration, Shelter	School	A.C. Perry Elementary School - Bldg 3
Food, Hydration, Shelter	School	Sea Castle Elementary School - Bldg 5
Food, Hydration, Shelter	School	Miramar High School - Bldg 13
Food, Hydration, Shelter	School	Miramar High School - Bldg 14
Food, Hydration, Shelter	School	Fairway Elementary School - Bldg 5
Food, Hydration, Shelter	School	Miramar High School - Bldg 3
Food, Hydration, Shelter	School	Miramar High School - Bldg 2
Food, Hydration, Shelter	School	Miramar High School - Bldg 4
Food, Hydration, Shelter	School	A.C. Perry Elementary School - Bldg 2
Food, Hydration, Shelter	School	A.C. Perry Elementary School - Bldg 7
Food, Hydration, Shelter	School	Everglades High School - Bldg 1
Food, Hydration, Shelter	School	Everglades High School - Bldg 3
Food, Hydration, Shelter	School	Everglades High School - Bldg 2
Food, Hydration, Shelter	School	Everglades High School - Bldg 4
Food, Hydration, Shelter	School	Everglades High School - Bldg 5
Food, Hydration, Shelter	School	Everglades High School - Bldg 6
Food, Hydration, Shelter	School	Everglades High School - Bldg 7
Food, Hydration, Shelter	School	Everglades High School - Bldg 8
Food, Hydration, Shelter	School	Glades Middle School - Bldg 6
Food, Hydration, Shelter	School	Glades Middle School - Bldg 1
Food, Hydration, Shelter	School	Glades Middle School - Bldg 2
Food, Hydration, Shelter	School	Glades Middle School - Bldg 3
Food, Hydration, Shelter	School	Glades Middle School - Bldg 4
Food, Hydration, Shelter	School	Glades Middle School - Bldg 5
Health and Medical	Health Care Facility	Memorial Healthcare System
Health and Medical	Hospital	Memorial Hospital Miramar
Health and Medical	Emergency Medical Service Facility	Miramar Fire Rescue Station 19 - Emergency Medical Service Facility
Health and Medical	Emergency Medical Service Facility	Miramar Fire Rescue Station 100 - Emergency Medical Service Facility
Health and Medical	Emergency Medical Service Facility	Miramar Fire Rescue Station 100 - West
Health and Medical	Emergency Medical Service Facility	Miramar Fire Rescue Station 70 - Emergency Medical Service Facility
Safety and Security	City Hall	City Hall
Safety and Security	Fire Station	Miramar Fire Rescue Station 19 - Fire Station
Safety and Security	Fire Station	Miramar Fire Rescue Station 100 - Fire Station
Safety and Security	Fire Station	Miramar Fire Rescue Station 100 Tower
Safety and Security	Fire Station	Miramar Fire Rescue Station 70 - Fire Station

<b>FEMA Lifeline</b>	<b>Facility Type</b>	<b>Facility Name</b>
Safety and Security	Fire Station	Miramar Fire Rescue Station 84
Safety and Security	Fire Station	Miramar Fire Rescue Station 107
Safety and Security	Law Enforcement Facility	Miramar Police Headquarter
Safety and Security	Law Enforcement Facility	Miramar Police West District Station
Transportation	Bridge	860320
Transportation	Bridge	860672
Transportation	Bridge	860395
Transportation	Bridge	860678 - Bridge1
Transportation	Bridge	860680
Transportation	Bridge	860678 - Bridge2
Transportation	Bridge	860679
Transportation	Bridge	860328
Transportation	Bridge	860327
Transportation	Bridge	864120
Transportation	Bridge	860191
Transportation	Bridge	860394
Transportation	Bridge	860091
Transportation	Bridge	860089
Transportation	Bridge	860192
Transportation	Bridge	860550
Transportation	Bridge	860092 - Bridge1
Transportation	Bridge	860188
Transportation	Bridge	860090
Transportation	Bridge	860093
Transportation	Bridge	860088
Transportation	Bridge	860189
Transportation	Bridge	860149
Transportation	Bridge	860092 - Bridge2
Transportation	Bridge	860190
Transportation	Bridge	860361
Water Systems	Drinking Water Facilities/ Water Treatment Plant	West WTP - Storage Tank
Water Systems	Drinking Water Facilities/ Water Treatment Plant	West WTP - Building
Water Systems	Drinking Water Facilities/ Water Treatment Plant	East WTP - Process Building
Water Systems	Drinking Water Facilities/ Water Treatment Plant	East WTP - Electrical Building
Water Systems	Drinking Water Facilities/ Water Treatment Plant	East WTP - High Service Pump Building
Water Systems	Drinking Water Facilities/ Water Treatment Plant	East WTP - Clear Well
Water Systems	Drinking Water Facilities/ Water Treatment Plant	East WTP - Maintenance Building
Water Systems	Drinking Water Facilities/ Water Treatment Plant	East WTP - Admin Building
Water Systems	Drinking Water Facilities/ Water Treatment Plant	East WTP - Ground Storage Tank
Water Systems	Water Well	WWTP-W4
Water Systems	Water Well	WWTP-W1

<b>FEMA Lifeline</b>	<b>Facility Type</b>	<b>Facility Name</b>
Water Systems	Water Well	WWTP-F1
Water Systems	Water Well	WWTP-F2
Water Systems	Water Well	WWTP-INJ-1
Water Systems	Water Well	WWTP-INJ-2
Water Systems	Water Well	DUALZONE MONITORING WELL
Water Systems	Water Well	E-4N
Water Systems	Water Well	E-3N
Water Systems	Wastewater Treatment	Building 1
Water Systems	Wastewater Treatment	Maintenance Facility 1
Water Systems	Wastewater Treatment	Slued Pump Station
Water Systems	Wastewater Treatment	Building 2
Water Systems	Wastewater Treatment	Building 3
Water Systems	Wastewater Treatment	Blower Building
Water Systems	Wastewater Treatment	Administration Building
Water Systems	Wastewater Treatment	Solids Processing Building
Water Systems	Wastewater Treatment	Building 4
Water Systems	Wastewater Treatment	Reuse Pump Station
Water Systems	Wastewater Treatment	Emergency Generation Facility and FPL Vault
Water Systems	Wastewater Treatment	Aeration Tank
Water Systems	Wastewater Treatment	Maintenance Facility 2
Water Systems	Wastewater Treatment	Anaerobic Digester
Water Systems	Wastewater Treatment	Building 5
Water Systems	Wastewater Treatment	Pre Treatment Building
Water Systems	Wastewater Treatment	Building 6
Water Systems	Lift Station	BPS
Water Systems	Lift Station	LS-0047
Water Systems	Lift Station	LS-0046
Water Systems	Lift Station	LS-0085
Water Systems	Lift Station	LS-0026
Water Systems	Lift Station	LS-0023
Water Systems	Lift Station	LS-0052
Water Systems	Lift Station	LS-0034
Water Systems	Lift Station	LS-0009
Water Systems	Lift Station	LS-0048
Water Systems	Lift Station	LS-0091
Water Systems	Lift Station	LS-0057
Water Systems	Lift Station	LS-0094
Water Systems	Lift Station	LS-0095
Water Systems	Lift Station	LS-0096
Water Systems	Lift Station	LS-0071
Water Systems	Lift Station	LS-0081
Water Systems	Lift Station	LS-0037
Water Systems	Lift Station	LS-0036
Water Systems	Lift Station	LS-0035
Water Systems	Lift Station	LS-0054
Water Systems	Lift Station	LS-0053
Water Systems	Lift Station	LS-0058
Water Systems	Lift Station	LS-0064
Water Systems	Lift Station	LS-0056
Water Systems	Lift Station	LS-0077

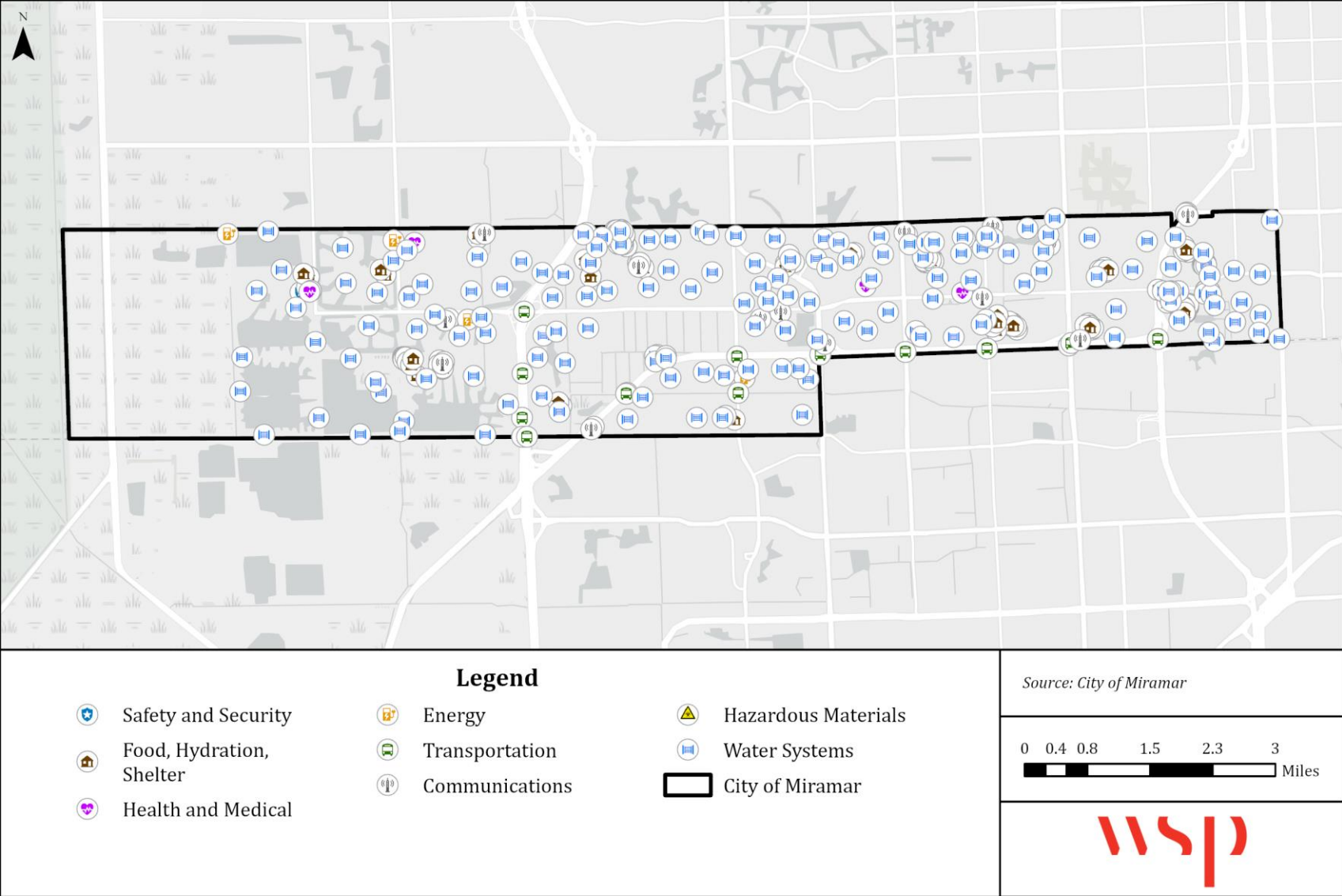
<b>FEMA Lifeline</b>	<b>Facility Type</b>	<b>Facility Name</b>
Water Systems	Lift Station	LS-0070
Water Systems	Lift Station	LS-0069
Water Systems	Lift Station	LS-0041
Water Systems	Lift Station	LS-0049
Water Systems	Lift Station	LS-0050
Water Systems	Lift Station	LS-0038
Water Systems	Lift Station	LS-0030
Water Systems	Lift Station	LS-0032
Water Systems	Lift Station	LS-0031
Water Systems	Lift Station	LS-0042
Water Systems	Lift Station	LS-0072
Water Systems	Lift Station	LS-0063
Water Systems	Lift Station	LS-0062
Water Systems	Lift Station	LS-0086
Water Systems	Lift Station	LS-0067
Water Systems	Lift Station	LS-0075
Water Systems	Lift Station	LS-0076
Water Systems	Lift Station	LS-0082
Water Systems	Lift Station	LS-0088
Water Systems	Lift Station	LS-0090
Water Systems	Lift Station	LS-0068
Water Systems	Lift Station	LS-0065
Water Systems	Lift Station	LS-0044
Water Systems	Lift Station	LS-0093
Water Systems	Lift Station	LS-0043
Water Systems	Lift Station	LS-0040
Water Systems	Lift Station	LS-0039
Water Systems	Lift Station	LS-0051
Water Systems	Lift Station	LS-0078
Water Systems	Lift Station	LS-0079
Water Systems	Lift Station	LS-0059
Water Systems	Lift Station	LS-0061
Water Systems	Lift Station	LS-0060
Water Systems	Lift Station	LS-0080
Water Systems	Lift Station	LS-0092
Water Systems	Lift Station	LS-0098
Water Systems	Lift Station	LS-0083
Water Systems	Lift Station	LS-0029
Water Systems	Lift Station	LS-0033
Water Systems	Lift Station	LS-0022
Water Systems	Lift Station	LS-0020
Water Systems	Lift Station	LS-0014
Water Systems	Lift Station	LS-0024
Water Systems	Lift Station	LS-0025
Water Systems	Lift Station	LS-0074
Water Systems	Lift Station	LS-0021
Water Systems	Lift Station	LS-0027
Water Systems	Lift Station	LS-0045
Water Systems	Lift Station	LS-0055
Water Systems	Lift Station	LS-0066

<b>FEMA Lifeline</b>	<b>Facility Type</b>	<b>Facility Name</b>
Water Systems	Lift Station	LS-0084
Water Systems	Lift Station	LS-0010
Water Systems	Lift Station	LS-0015
Water Systems	Lift Station	LS-0011
Water Systems	Lift Station	LS-0013
Water Systems	Lift Station	LS-0012
Water Systems	Lift Station	LS-0016
Water Systems	Lift Station	LS-0019
Water Systems	Lift Station	LS-0018
Water Systems	Lift Station	LS-0017
Water Systems	Lift Station	LS-0028
Water Systems	Lift Station	LS-0089
Water Systems	Lift Station	LS-0099
Water Systems	Lift Station	LS-0097
Water Systems	Lift Station	LS-0073
Water Systems	Lift Station	LS-00B
Water Systems	Lift Station	LS-00A
Water Systems	Lift Station	LS-00C
Water Systems	Lift Station	LS-00H
Water Systems	Lift Station	LS-00F
Water Systems	Lift Station	LS-00G
Water Systems	Lift Station	LS-00E
Water Systems	Lift Station	LS-00D
Water Systems	Lift Station	LS-00I
Water Systems	Lift Station	LS-00L
Water Systems	Lift Station	LS-00K
Water Systems	Lift Station	LS-00J
Water Systems	Lift Station	LS-00M
Water Systems	Lift Station	LS-0100
Water Systems	Lift Station	LS-0101
Water Systems	Lift Station	LS-0104
Water Systems	Lift Station	LS-0105
Water Systems	Lift Station	LS-0107
Water Systems	Lift Station	LS-0106
Water Systems	Lift Station	LS-0102
Water Systems	Lift Station	LS-0103
Water Systems	Lift Station	LS-0109
Water Systems	Lift Station	LS-0108
Water Systems	Lift Station	LS-0110
Water Systems	Lift Station	LS-0111
Water Systems	Lift Station	LS-0113
Water Systems	Lift Station	LS-0112
Water Systems	Lift Station	LS-0114
Water Systems	Lift Station	LS-0115
Water Systems	Lift Station	LS-0116
Water Systems	Lift Station	LS-0117
Water Systems	Lift Station	LS-MPS
Water Systems	Lift Station	LS-PAL
Water Systems	Lift Station	LS-PRO8
Water Systems	Lift Station	LS-PRO6

<b>FEMA Lifeline</b>	<b>Facility Type</b>	<b>Facility Name</b>
Water Systems	Lift Station	LS-PR09
Water Systems	Lift Station	LS-PR03
Water Systems	Lift Station	LS-PR02
Water Systems	Lift Station	LS-PR01
Water Systems	Lift Station	LS-PR04
Water Systems	Lift Station	LS-PR05
Water Systems	Lift Station	LS-PR07
Water Systems	Lift Station	LS-0001
Water Systems	Lift Station	LS-0003
Water Systems	Lift Station	LS-0002
Water Systems	Lift Station	LS-0004
Water Systems	Lift Station	LS-0005
Water Systems	Lift Station	LS-0006
Water Systems	Lift Station	LS-0007
Water Systems	Lift Station	LS-0118
Water Systems	Lift Station	LS-0119
Water Systems	Lift Station	LS-0120
Water Systems	Lift Station	LS-0121
Water Systems	Water Storage Tank	East Water Storage Tank
Water Systems	Water Storage Tank	West Remote Storage Tank
Water Systems	Water Storage Tank	East Remote Storage Tank

Source: City of Miramar

Figure 4.4 – Critical Facilities, City of Miramar



## 4.4 HAZARD PROFILES, ANALYSIS, AND VULNERABILITY

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

**44 CFR Subsection D §201.6(c)(2)(ii):** [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. Plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods. The plan should describe vulnerability in terms of:

- A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;
- (B): An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate; and
- (C): Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

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

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

Section	Hazard	PRI Score	PRI Rating
<b>4.4.1</b>	Flood	3.0	High
<b>4.4.2</b>	Levee Failure	2.2	Medium
<b>4.4.3</b>	Stormwater/Localized Flooding	2.9	Medium
<b>4.4.4</b>	Tropical Cyclones	3.3	High

### 4.4.1 FLOOD

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Flood	Likely	Critical	Moderate	6 to 12 hours	Less than 1 week	3.0

#### HAZARD DESCRIPTION

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

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

#### TYPES AND SOURCES OF FLOODING

Three types of flooding generally occur in Miramar, described below.

**Riverine/Canal Flooding:** Red Road/NW 57<sup>th</sup> Ave Canal and the Snake Creek Canal are Miramar’s primary sources of flooding. These canals are shown on Figure 4.5. Flooding within the City of Miramar associated with these systems was evaluated using the Effective Flood Insurance Study (FIS) Report for Broward County and its incorporated areas, revised July 31, 2024.

**Localized or Flash Flooding:** Flash flooding is the result of heavy, localized rainfall, possibly from slow-moving intense thunderstorms that cause small streams and drainage systems to overflow within six hours or less of the beginning of the rainfall. Flash flooding can happen in Special Flood Hazard Areas (SFHAs) as delineated by FEMA and can also happen in areas not associated with floodplains. Flash flood hazards are generally associated with surface water runoff in steep terrain, which is not a concern in Miramar. However, this rapid flooding can also occur in urbanized areas, where greater population density generally equates to more impervious surface (e.g., pavement and buildings) which reduces infiltration and increases the amount of surface water generated. In this case, flash flooding occurs when the capacity of the stormwater system is exceeded or if conveyance is obstructed by debris, sediment and other materials that limit the volume of drainage. This type of localized flooding is discussed in more detail in 4.4.3 Stormwater and Localized Flooding.

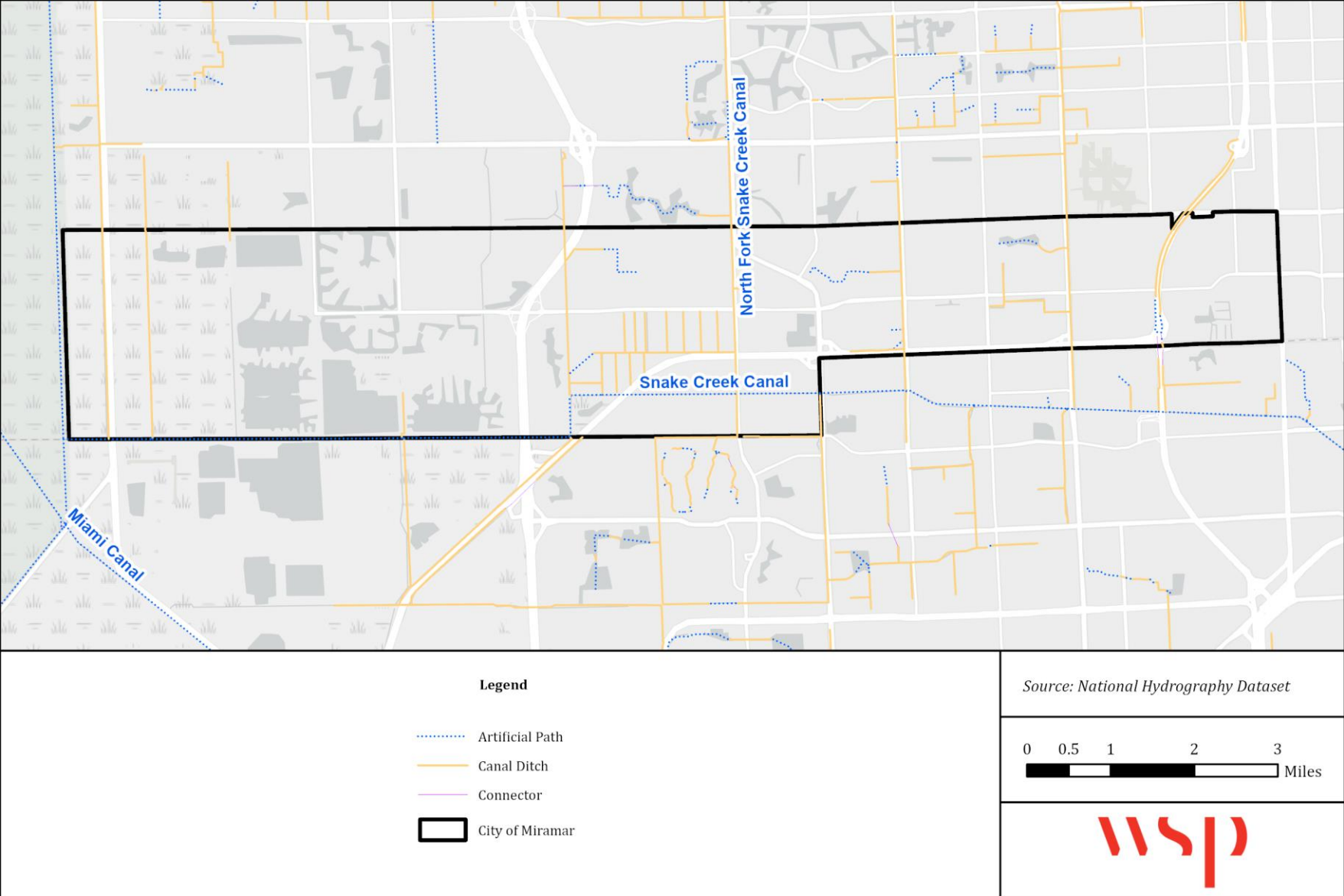
**Compound Flooding:** Compound flooding is flooding caused by complex interactions between two or more oceanographic, hydrological, or meteorological processes such as the combination of pluvial (rainfall-induced flooding, such as flash, surface water, drain, and sewer floods), fluvial (riverine floods), coastal (sea level rise, tides, waves, storm surge, and nuisance floods), or groundwater flooding. In Miramar, compound flooding occurs when King Tides coincide with heavy rainfall. The areas in Miramar impacted by compound flooding are generally the same as those impacted by heavy rainfall scenarios but with deeper flooding.

Warning time can vary significantly depending on the source and type of flooding but can be as little as six hours in the case of flash flooding. Flooding can often last longer than 24 hours but is typically cleared in less than 1 week.

**Warning Time: 3 – 6 to 12 hours**

**Duration: 3 – Less than 1 week**

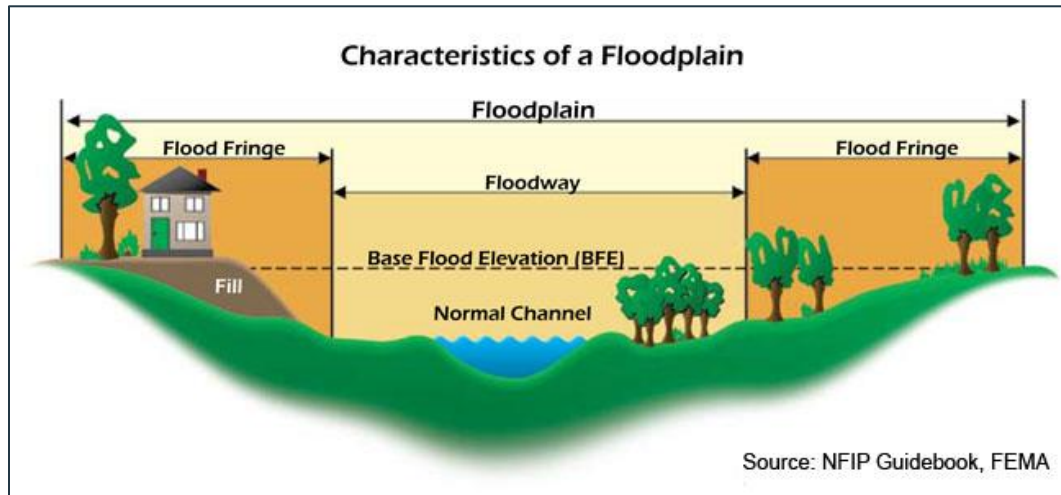
Figure 4.5 - Primary Flood Sources



### FLOODING AND FLOODPLAINS

In the case of riverine/canal flooding, the area adjacent to a channel is the floodplain, as shown in Figure 4.6. A floodplain is flat or nearly flat land adjacent to a stream or river that experiences occasional or periodic flooding. It includes the floodway, which consists of the stream channel and adjacent areas that carry flood flows, and the flood fringe, which are areas covered by the flood, but which do not experience a strong current. Floodplains are made when floodwater exceeds the capacity of the main channel or escape the channel by eroding its banks. When this occurs, sediments (including rocks and debris) are deposited that gradually build up over time to create the floor of the floodplain. Floodplains generally contain unconsolidated sediments, often extending below the bed of the stream.

**Figure 4.6 – Characteristics of a Riverine Floodplain**



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

The 1-percent-annual-chance flood, which is the minimum standard used by most federal and state agencies, is used by the NFIP as the standard for floodplain management and to determine the need for flood insurance. Participation in the NFIP requires adoption and enforcement of a local floodplain management ordinance which is intended to prevent unsafe development in the floodplain, thereby reducing future flood damage. Participation in the NFIP allows the federal government to make flood insurance available within the community as a financial protection against flood losses. Since floods have an annual probability of occurrence, have a known magnitude, depth and velocity for each event, and in most cases, have a map indicating where they will occur, they are in many ways the most predictable and manageable hazard.

### LOCATION

Regulated floodplains are illustrated on inundation maps called Flood Insurance Rate Maps (FIRMs). The FIRM is the official map for a community on which FEMA has delineated both the SFHAs and the risk premium zones applicable to the community. SFHAs represent the areas subject to inundation by the 1-percent-annual-chance flood event. Structures located within the SFHA have a 26-percent chance of

flooding during the life of a standard 30-year mortgage. Flood prone areas were identified within Miramar using the Effective FIS and FIRMs revised July 31, 2024. Table 4-10 summarizes the flood insurance zones identified by the Digital Flood Insurance Rate Maps (DFIRMs).

**Table 4-10 – Mapped Flood Insurance Zones within Miramar, FL**

Zone	Description
AE	Corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS report by detailed methods. Whole-foot base flood elevations (BFEs) derived from the detailed hydraulic analyses are shown at selected intervals within this zone. This zone includes the “regulatory floodway,” which is defined as the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height
AH	Areas with a 1-percent-annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
Zone X (Shaded)	Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by a levee. No BFEs or base flood depths are shown within these zones. (Zone X (shaded) is used on new and revised maps in place of Zone B.)
Zone X (Unshaded)	Minimal risk areas outside the 1-percent and 0.2-percent-annual-chance floodplains. No BFEs or base flood depths are shown within these zones. (Zone X (unshaded) is used on new and revised maps in place of Zone C.)

Source: FEMA

Figure 4.7 reflect the effective mapped flood insurance zones for the City of Miramar. Approximately 82.8% of the City of Miramar falls within the 1-percent-annual-chance floodplain in the Effective FIRMs. Table 4-11 summarizes the City’s acreage by flood zone according to the FIRM.

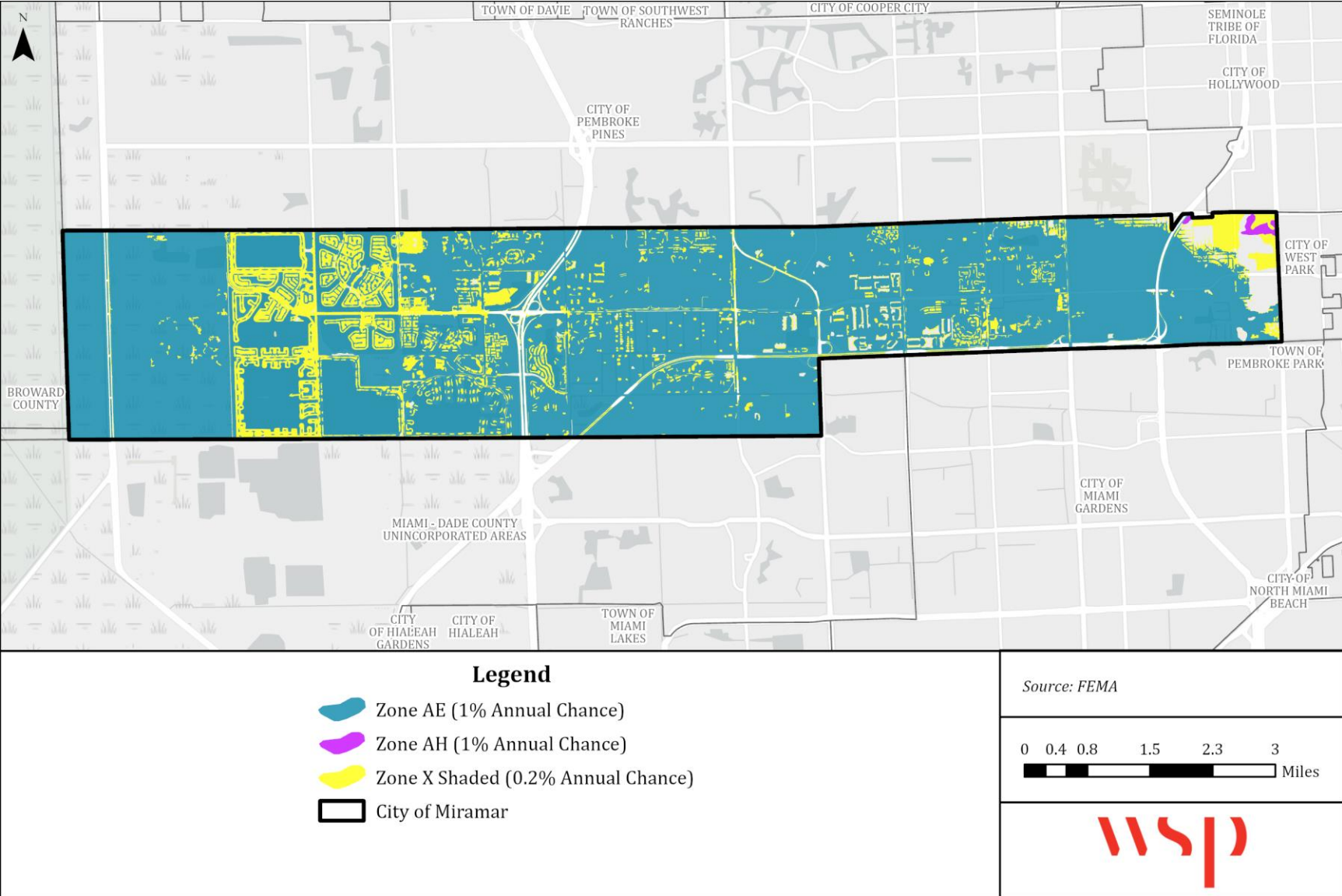
***Spatial Extent: 4 – Large***

**Table 4-11 – Flood Zone Acreage, 2024 Effective FIRM**

Flood Zone	Acreage	Percent of Total
AE	16,505.2	82.8%
AH	42.2	0.2%
X SHADED	2,654.0	13.3%
X UNSHADED	734.8	3.7%
<b>Total</b>	<b>19,936.1</b>	<b>100.0%</b>
<b>SFHA Total</b>	<b>16,547.4</b>	<b>83.0%</b>

Source: FEMA 2024 Effective DFIRM

Figure 4.7 - City of Miramar 2024 Effective DFIRM Flood Zones



**EXTENT**

The severity of a flood can be measured by its depth and velocity. The depth of flooding that impacts a property is correlated with the resulting property damage, where greater depths cause more substantial damage.

Figure 4.9 shows the flood depths throughout the City of Miramar for the 1-percent-annual-chance flood event, as derived from the Effective FIRMs and base flood elevation data for the City. Based on this methodology, flood extent is 6-10 feet in eastern and central Miramar. The western portion of Miramar is more likely to experience flood depth of 5-6 feet – except for the far western portion close to the Everglades.

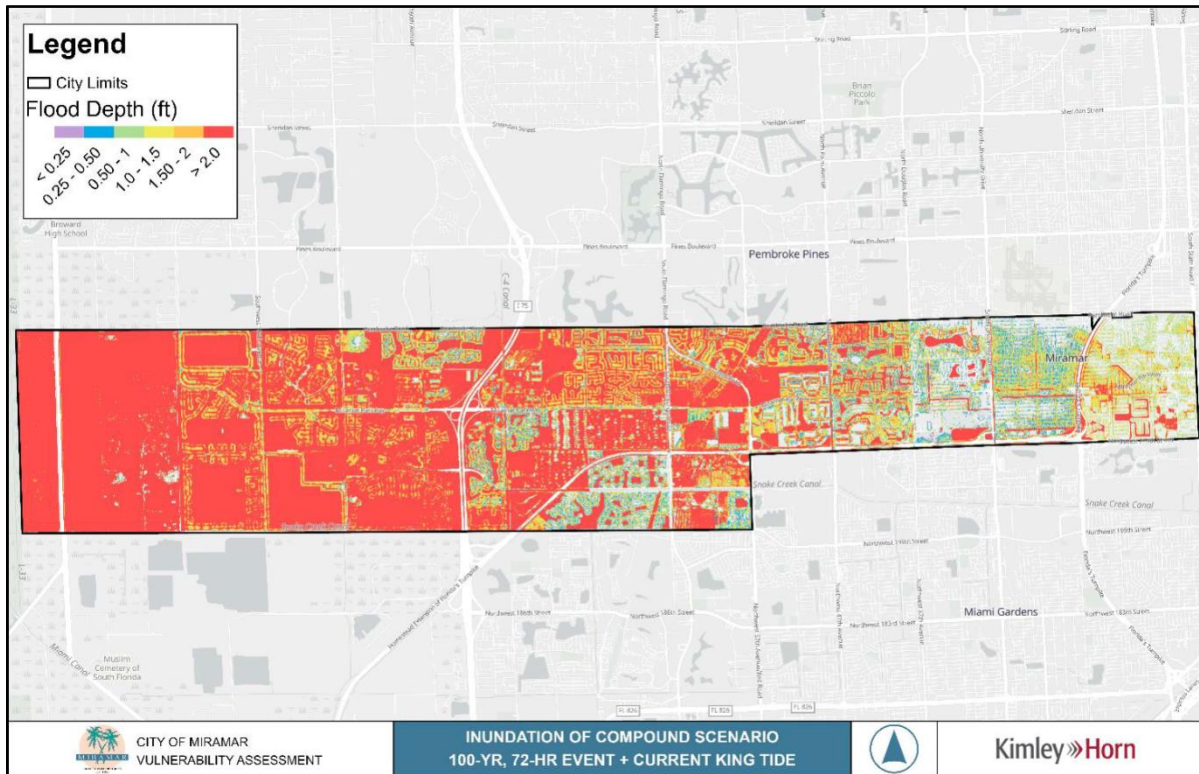
Figure 4.9 shows the depths of flooding during a 100-yr, 72-hour rainfall event and current king tide scenario. This analysis was included in the City of Miramar Vulnerability Assessment. The results of the compound flooding scenario indicate extensive flooding across the entire City, with the most severe flooding occurring in the western portion of the city (flood depth greater than 2ft), which varies from what is shown in the 1%-annual-chance flood depth map in Figure 4.9.

The compound flooding analysis from the vulnerability assessment utilized models obtained from the South Broward Drainage District (SBDD). This model factors in elements that represent the City’s drainage infrastructure, including canal systems and stormwater management infrastructure, as opposed to Figure 4.9 which displays the results from a static flood analysis that applies a consistent flood elevation using the base flood elevation provided by the effective FIRM.

Overall flooding impacts can be critical, with the potential for severe damage and destruction of property and the possibility of injuries and deaths.

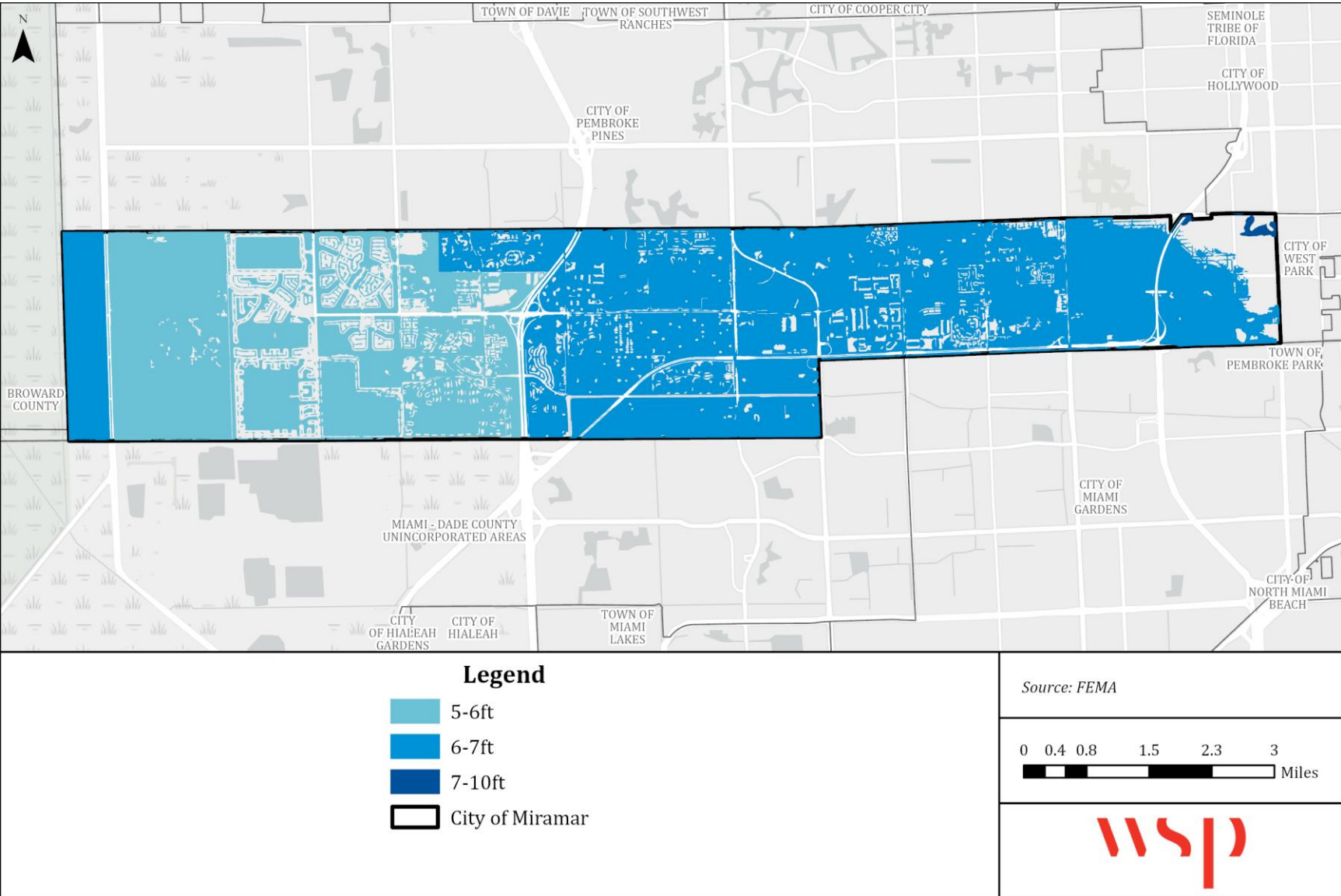
**Impact: 3 – Critical**

**Figure 4.8 – Compound Flooding: 100-yr/72-hour Rainfall and Current King Tide Flood Depth**



Source: City of Miramar Vulnerability Assessment

Figure 4.9 - 1%-Annual-Chance Flood Depth



## PAST OCCURRENCES

Table 4-12 summarizes the 13 flash flooding and 13 flooding events reported in the NCEI Storm Events Database since 1997 for Broward County. While 17 flash flood events occurred during this period, a review of event narratives indicates that 4 of the reported flash flood events reflect small scale, localized street flooding; these events are reported in Section 4.4.4 Stormwater/Localized Flooding. The remaining 13 events are associated with larger scale events flooding impacts beyond street flooding. Table 4.15 lists these events by location and date of occurrence.

It should be noted that the events do not reflect all flooding or flash flooding events to occur in Broward County from 1997 to 2024. Events were selected based on their relevance to Miramar.

**Table 4-12 - Summary of NCEI Flooding Events in Broward County (1997 - 2024)**

Type	# of Events	Property Damage	Crop Damage	Deaths (Direct)	Injuries (Direct)
Flash Flood	13	\$82,720,000	\$25,000,000	0	0
Flood	13	\$10,045,000	\$0	0	0
<b>Total</b>	<b>26</b>	<b>\$92,924,100</b>	<b>\$25,000,000</b>	<b>0</b>	<b>0</b>

Source: NCEI Storm Events Database, July 2025

**Table 4-13 - NCEI Flooding Events in Broward County (1997-2024)**

Location	Date	Event Type	Injuries/Deaths	Property Damage	Crop Damage
-	9/5/1997	Flood	0	\$0	\$0
-	1/21/1998	Flood	0	\$0	\$0
East Portion	6/8/1999	Flash Flood	0	\$1,000,000	\$0
East Portion	10/15/1999	Flash Flood	0	\$45,000,000	\$25,000,000
-	10/3/2000	Flood	0	\$10,000,000	\$0
Hollywood	11/2/2001	Flood	0	\$20,000	\$0
Ft Lauderdale	5/27/2003	Flash Flood	0	\$1,000,000	\$0
Ft Lauderdale	10/22/2005	Flash Flood	0	\$20,000	\$0
(FII)Ft Laudrdl Intl	12/17/2009	Flash Flood	0	\$500,000	\$0
Hollywood	12/18/2009	Flood	0	\$0	\$0
Coral Spgs	10/28/2011	Flash Flood	0	\$0	\$0
Plantation	10/31/2011	Flash Flood	0	\$2,000,000	\$0
Lauderdale Lakes	8/26/2012	Flash Flood	0	\$2,000,000	\$0
Lauderdale Lakes	6/7/2017	Flood	0	\$10,000	\$0
Hollywood N Perry Ar	8/28/2017	Flood	0	\$0	\$0
Lauderdale Lakes	5/20/2018	Flood	0	\$15,000	\$0
Deerfield Beach	7/5/2020	Flood	0	\$0	\$0
(FII)Ft Laudrdl Intl	10/22/2020	Flood	0	\$0	\$0
Miramar	11/8/2020	Flash Flood	0	\$0	\$0
Miramar	11/9/2020	Flood	0	\$0	\$0
West Hollywood	4/12/2023	Flash Flood	0	\$28,000,000	\$0
(FII)Ft Laudrdl Intl	4/13/2023	Flood	0	\$0	\$0
Hallandale	6/11/2024	Flash Flood	0	\$0	\$0
Hallandale	6/12/2024	Flash Flood	0	\$3,200,000	\$0
Lauderhill	6/12/2024	Flash Flood	0	\$0	\$0
Pembroke	6/12/2024	Flood	0	\$0	\$0

Source: NCEI Storm Events Database, July 2025

The following provides details on select flood events recorded in the NCEI database. Events were selected based on their relevance to Miramar. These scenarios represent the types of flood events that can be expected in the future in the City of Miramar.

**October 15, 1999** – Widespread flooding from Hurricane Irene inundated most of the metropolitan areas of Miami-Dade, Broward, and Palm Beach counties.

**May 27, 2003** - A weak tropical wave extending north from the west Caribbean Sea in combination with a mid/upper-level trough of low pressure in the east Gulf of Mexico caused locally extreme rainfall over portions of the Broward-Miami-Dade metropolitan areas. The most rain occurred in a swath from Hollywood to Pompano Beach with an official maximum of 10.21 measured at Fort Lauderdale-Hollywood International Airport. Of that total, 7.36 inches fell from 6 to 8 PM which exceeds the 100-year maximum rate for that time period. Radar estimates of 12 to 14 inches of rain were made near Oakland Park and Wilton Manors.

**December 18, 2009** - Extensive and severe flooding occurred over southeastern Broward and northeastern Miami-Dade counties. Hardest-hit communities were Dania Beach, Hollywood, Hallandale Beach, Pembroke Park and Aventura. As much as 14 inches of rain fell in about 6 hours in North Miami Beach, with other reports along with radar estimates showing an area of 8 to 13 inches of rain primarily along and east of I-95 in the above-mentioned communities. Severe flooding began around 730 PM in Dania Beach, gradually progressing southward between 8 and 10 PM to cover the rest of the affected area. A total of 101 homes sustained major flood damage in Broward County, with an additional 88 homes having minor damage. Water was reported to be as high as 2 feet deep inside some homes, and a mobile home park in Pembroke Park had to be evacuated due to the rising water. Shelters were opened in Hallandale Beach and Hollywood to accommodate the evacuees. Six businesses also sustained significant water damage. Two buildings had roof collapses, one in Hallandale Beach and another in Aventura. Hundreds of cars were damaged or destroyed by the water. In addition to the water damage, about 2,000 customers lost power in Broward and Miami-Dade counties. Damage totals are estimated based partially on average amount of loss per home.

**October 31, 2011** - Torrential rainfall affected eastern sections of metro Broward County during the overnight hours of October 31st. Rainfall totals of 8 to 12 inches occurred over an area bounded by I-595 to the south and Pompano Beach to the north, from NW 31 Ave to the west all the way to the Atlantic coast. A few spots in this area likely received amounts close to 15 inches in about a 9-hour time span. These rains fell over areas already saturated from the rains of the previous two days. A total of 402 homes were affected by water damage and streets were closed due to inundation in Fort Lauderdale, Oakland Park, Wilton Manors and Pompano Beach. The hardest-hit area was between Broward and Commercial Boulevards between I-95 and Federal Highway where water covered the ground up to a few feet. The city of Fort Lauderdale opened a shelter for displaced residents in the hardest-hit areas. These areas qualified for federal assistance due to the magnitude and areal coverage of the flooding.

**May 20, 2018** - Heavy rainfall across the region in the range of 6 to 8 inches of rain in 6 hours fell across the region. The heavy rainfall led canals and to overflow. Water pumps to drain canals were already at capacity. The overflowing canals led to flooding of roadways with some roadways in the region becoming impassable. Water entered a few structures, mainly caused by the wake left behind by passing vehicles.

**November 8, 2020** - Multiple reports of significant flooding received from the broadcast media, trained spotters, law enforcement, and NWS employees were received over the course of a day. Reports of significant street flooding and major, damaging rainfall in many neighborhoods in the following cities: Miramar, Pembroke Pines, Southwest Ranches, Weston, Davie, Fort Lauderdale, and Lauderhill. Standing water remained for several days, blocking off some neighborhoods. Water entered above grade structures in Fort Lauderdale and Lauderhill, as well as many near or at grade structures in Davie. At least minor flooding was noted across the remainder of the county. Rainfall amounts of 8 to almost 21 inches were

measured across most of Broward County, with almost 21 inches in Pembroke Pines, and 12 to 18 inches in southwest Broward metro communities from Weston to Miramar.

**April 13, 2023** - During the afternoon and evening of April 12th, prolific rainfall occurred across southern and central Broward County, including the cities of Fort Lauderdale, Hollywood, Dania Beach, and Wilton Manors. Showers and thunderstorms repeatedly training over this urban corridor brought multiple hours with rainfall rates of 3-6 inches/hour, with total rainfall of 15-25 inches between Noon and Midnight. The highest measured rainfall amount was 25.91 at a WeatherSTEM gauge at Fort Lauderdale/Hollywood International Airport, with 20 inches falling between 4 and 10 PM. This rainfall rate has less than a 0.1% chance of being exceeded in any given year, and the rainfall over most of the Fort Lauderdale and Hollywood areas has an annual exceedance probability of no more than 0.5%. This extremely rare rainfall led to devastating impacts and crippled neighborhoods for several days. Port Everglades, which supplies 100% of the fuel for the area (13 million gallons per day), suffered a 50% reduction in distribution due to submerged fuel pumps, with interruptions lasting over 10 days. This led to a fuel shortage across the area, with most South Florida gas stations having to close for days at a time. Nearly one thousand calls were made to local towing companies for abandoned/stranded vehicles in flooded water, with the number of vehicle insurance claims across the area in the thousands.

### PROBABILITY OF FUTURE OCCURRENCE

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

Based on the historical record of 26 flood related events over the 28-year period from 1997 through 2024, the City of Miramar experiences a 92% chance of experiencing flooding each year.

***Probability: 4 – Highly Likely***

### CLIMATE CHANGE AND FUTURE CONDITIONS

Per the Fifth National Climate Assessment, frequency and intensity of heavy precipitation events is expected to increase across the country. Additionally, increased levels of rainfall, temperatures, sea level rise, and land cover change can exacerbate flood risks and are expected to occur throughout the southeast. Therefore, with more rainfall falling in more intense incidents, the region may experience more frequent flash flooding. Increased flooding may also result from more intense tropical cyclones; researchers have noted the occurrence of more intense storms bringing greater rainfall totals, a trend that is expected to continue as ocean and air temperatures rise.

Additionally, rising sea levels have a direct impact on groundwater levels. Groundwater levels rise at the same speed as sea level rise and are also influenced by extreme rain events. Miramar, like most of south Florida, is low lying and has a shallow groundwater table making it more susceptible to groundwater flooding. Higher groundwater levels mean less storage is available for rainfall in the unsaturated portion of the soil, resulting in a greater accumulation of water at the surface. As a result, less rain is needed to cause flooding. The Broward County 2025 Countywide Resilience Plan further explores climate risks and how multiple flooding mechanisms interact to influence future flooding in the County.

### VULNERABILITY ASSESSMENT

Flood damage is directly related to the depth of flooding and can be estimated by the application of a depth damage curve. In applying the curve, a specific depth of water translates to a percentage of damage to the structure, which translates to the same percentage of the structure's replacement value. Figure 4.9 depicts the depth of flooding that can be expected within the City during the 1-percent-annual-chance flood event based on the Effective DFIRM.

Vulnerability to flooding was evaluated using GIS analysis and FEMA's Hazus Flood Assessment Structure Tool (FAST). To estimate exposure to flood risk, parcel counts by FEMA flood zone were determined using a spatial intersection of building footprints, associated values from tax parcel data, and the FEMA DFIRM database. Occupancy types were derived from parcel data and translated into occupancy classes used in Hazus to facilitate an accurate loss estimate. An occupancy class is required in Hazus to apply the correct depth damage factor which ensures the most accurate damage assessment.

Content value estimations are based on FEMA Hazus methodologies of estimating value as a percent of improved structure values by property type. Table 4-14 shows the breakdown of the different occupancy types in Hazus and their estimated content replacement value percentages.

**Table 4-14 - Content Replacement Factors**

Property Type	Content Replacement Values
Residential	50%
Commercial	100%
Education	100%
Government	100%
Religious	100%
Industrial	150%

Source: FEMA's Hazus FAST

#### PROPERTY

Property exposure is summarized in Table 4-15 based on the flood zones in the Effective FIRM. Buildings are counted with the highest risk flood zone that they intersect. Risk information is detailed in terms of the number of buildings by flood zone, occupancy type, and total assessed value of improvements that may be exposed to the identified hazards.

**Table 4-15- Property at Risk**

Occupancy Type	Building Count Exposed	Total Building Value	Estimated Content Value	Total Value
<b>Zone AE</b>				
Agricultural	24	\$29,148,290	\$29,148,290	\$58,296,580
Commercial	711	\$1,473,830,660	\$1,473,830,660	\$2,947,661,320
Educational	115	\$2,334,618,030	\$2,334,618,030	\$4,669,236,060
Government	122	\$733,224,440	\$733,224,440	\$1,466,448,880
Industrial	129	\$1,517,903,040	\$2,276,854,560	\$3,794,757,600
Religious	30	\$134,355,050	\$134,355,050	\$268,710,100
Residential	22613	\$33,660,934,940	\$16,830,467,470	\$50,491,402,410
<b>Total</b>	<b>23,744</b>	<b>\$39,884,014,450</b>	<b>\$23,812,498,500</b>	<b>\$63,696,512,950</b>
<b>Zone AH</b>				
Commercial	12	\$5,763,770	\$5,763,770	\$11,527,540
Education	1	\$870,920	\$870,920	\$1,741,840
Industrial	1	\$1,380,280	\$2,070,420	\$3,450,700
Religious	5	\$42,076,600	\$42,076,600	\$84,153,200
Residential	159	\$107,476,590	\$53,738,295	\$161,214,885
<b>Total</b>	<b>178</b>	<b>\$157,568,160</b>	<b>\$104,520,005</b>	<b>\$262,088,165</b>
<b>Zone X (Shaded)</b>				
Agricultural	1	\$938,510	\$938,510	\$1,877,020
Commercial	103	\$272,675,400	\$272,675,400	\$545,350,800
Education	31	\$571,169,450	\$571,169,450	\$1,142,338,900

Occupancy Type	Building Count Exposed	Total Building Value	Estimated Content Value	Total Value
Government	22	\$782,837,570	\$782,837,570	\$1,565,675,140
Industrial	15	\$16,306,720	\$24,460,080	\$40,766,800
Religious	19	\$55,017,190	\$55,017,190	\$110,034,380
Residential	5604	\$5,059,576,300	\$2,529,788,150	\$7,589,364,450
<b>Total</b>	<b>5,795</b>	<b>\$6,758,521,140</b>	<b>\$4,236,886,350</b>	<b>\$10,995,407,490</b>
<b>Zone X (Unshaded)</b>				
Commercial	65	\$57,670,280	\$57,670,280	\$115,340,560
Education	1	\$359,060	\$359,060	\$718,120
Government	4	\$394,870	\$394,870	\$789,740
Industrial	9	\$16,643,670	\$24,965,505	\$41,609,175
Religious	8	\$12,634,760	\$12,634,760	\$25,269,520
Residential	867	\$506,541,660	\$253,270,830	\$759,812,490
<b>Total</b>	<b>954</b>	<b>\$594,244,300</b>	<b>\$349,295,305</b>	<b>\$943,539,605</b>

Source: City of Miramar building footprints, BCAD parcel data, 2023; FEMA Effective DFIRM

WSP performed a Level 2 flood loss analysis using FEMA's Hazus Flood Assessment Structure Tool (FAST) by leveraging the 2025 City of Miramar parcel data and Broward County building footprints. WSP developed a depth raster for all areas of the SFHA using FEMA DFIRM database data and loaded this raster as well as the parcel data into Hazus. Losses were calculated based on Hazus standard depth damage functions. In all, there are approximately 30,671 buildings in Miramar. Of these, 23,922 fall within the SFHA.

The following assumptions were made as part of this analysis:

- Where foundation type was not provided in the parcel data, foundation types were estimated as follows according to input from the City of Miramar Building, Planning, and Zoning Department:
  - 80% slab on grade and 20% crawl space
- Parcels with unknown occupancy were treated as residential properties.
- Where year built was not provided in the parcel data, it was left blank.
- First floor elevation was attributed through foundation type based on Hazus standards

Table 4-16 shows the building count, total value, estimated damages and loss ratio for buildings that fall within the 1-percent-annual-chance floodplain of the Effective FIRM by flood zone and land use type. The loss estimate for flood is based on the total of improved building value and contents value. Land value is not included in any of the loss estimates as generally the land is not subject to loss from floods.

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

**Table 4-16 - Estimated Building Damage and Content Loss**

Occupancy Type	Total Number of Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Damage	Loss Estimate	Loss Ratio
Agriculture	23	\$ 27,192,450	\$7,210,131	\$17,802,275	\$25,012,406	92%
Commercial	140	\$922,799,080	\$171,463,537	\$639,308,140	\$810,771,677	88%
Education	108	\$2,127,847,940	\$202,471,654	\$1,340,092,389	\$1,542,564,043	72%
Government	93	\$631,585,760	\$89,522,985	\$564,261,347	\$653,784,332	104%

Occupancy Type	Total Number of Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Damage	Loss Estimate	Loss Ratio
Industrial	82	\$691,700,600	\$171,412,815	\$505,360,744	\$676,773,560	98%
Religious	25	\$131,998,830	\$16,892,605	\$126,857,716	\$143,750,321	109%
Residential	18,459	\$30,265,573,730	\$10,990,779,541	\$6,532,446,664	\$17,523,226,206	58%
<b>Total</b>	<b>18,930</b>	<b>\$34,798,698,390</b>	<b>\$11,649,753,269</b>	<b>\$9,726,129,275</b>	<b>\$21,375,882,544</b>	<b>61%</b>

Source: Hazus FAST, Broward County building footprints, 2025 City of Miramar parcel data, FEMA Effective DFIRM

Based on the Hazus analysis using the Effective DFIRM, the City of Miramar would sustain approximately \$17.5 billion in property damages from a 1-percent-annual-chance flood event. This level of flooding would exceed a 10 percent loss ratio, which indicates the potential for significant challenges recovering from this level of flooding.

Figure 4.10 through Figure 4.14 show the location of buildings with estimated losses according to the Hazus loss estimate. Figure 4.10 is an overview of the entire City, and the remaining figures show detail of areas with high concentrations of estimated losses.

**Figure 4.10 - Buildings with Estimated Building Damage and Contents Loss (1%-Annual-Chance Flood Event)**

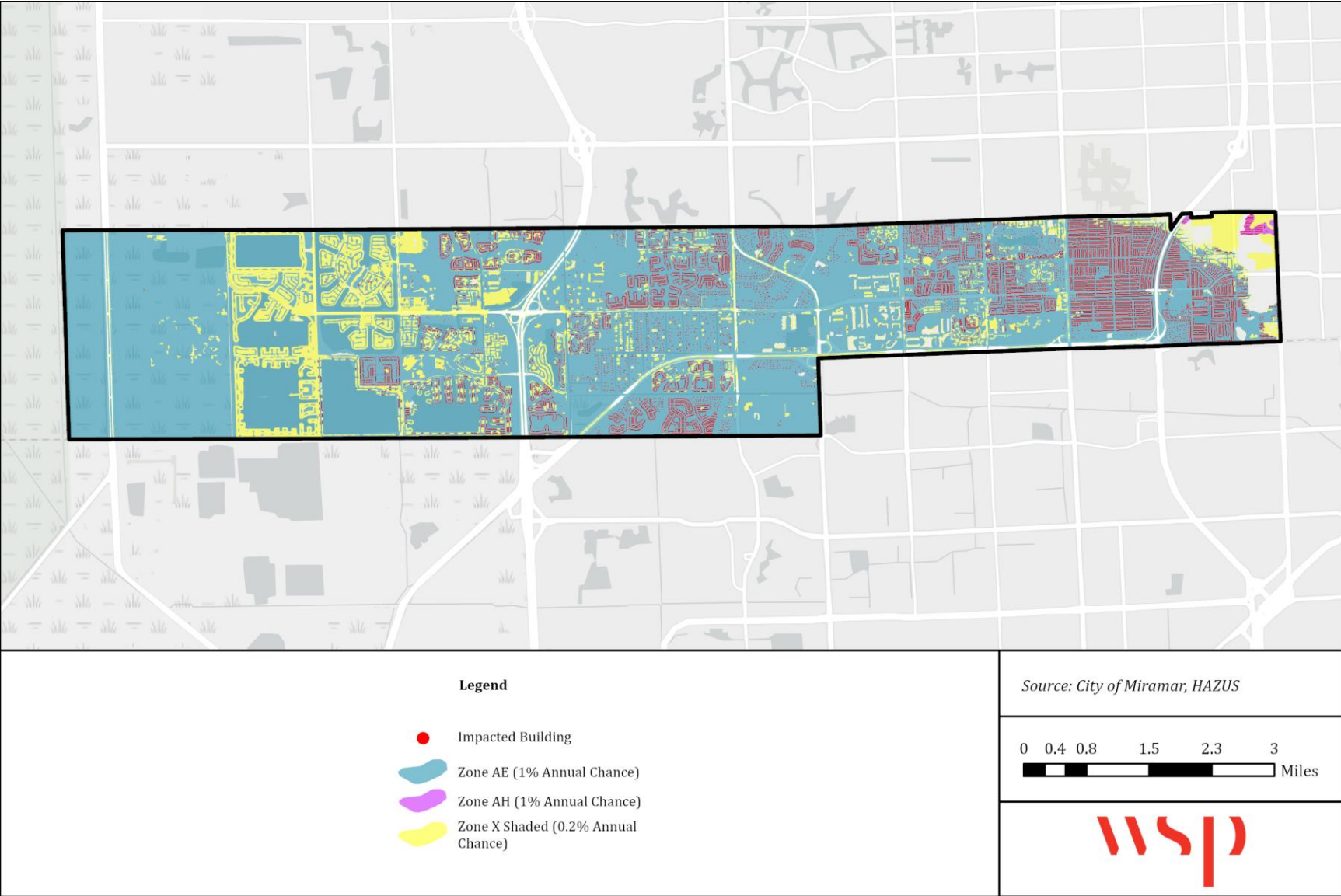


Figure 4.11 - Buildings with Estimated Loss, Inset 1

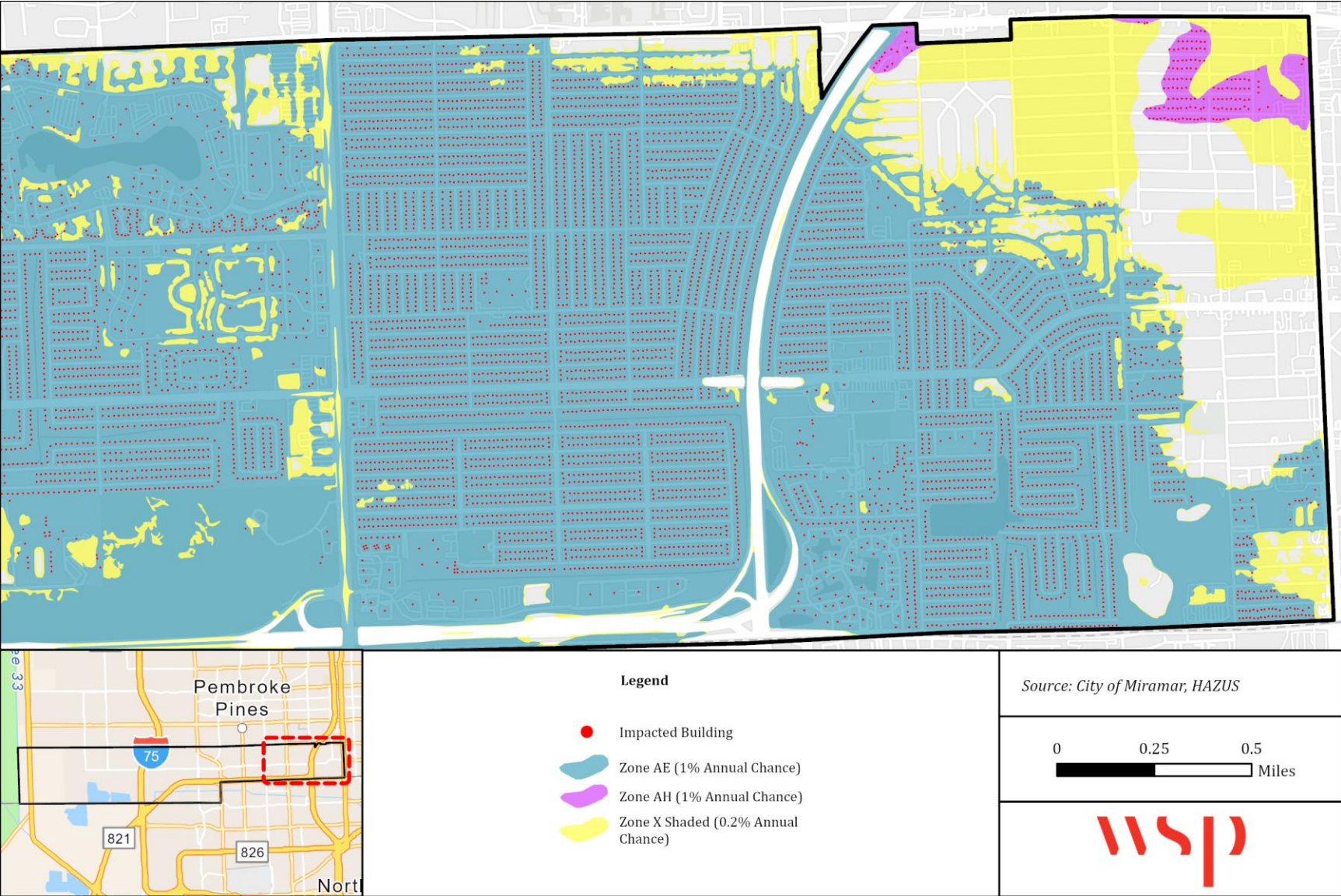


Figure 4.12 - Buildings with Estimated Loss, Inset 2



Figure 4.13 - Buildings with Estimated Loss, Inset 3

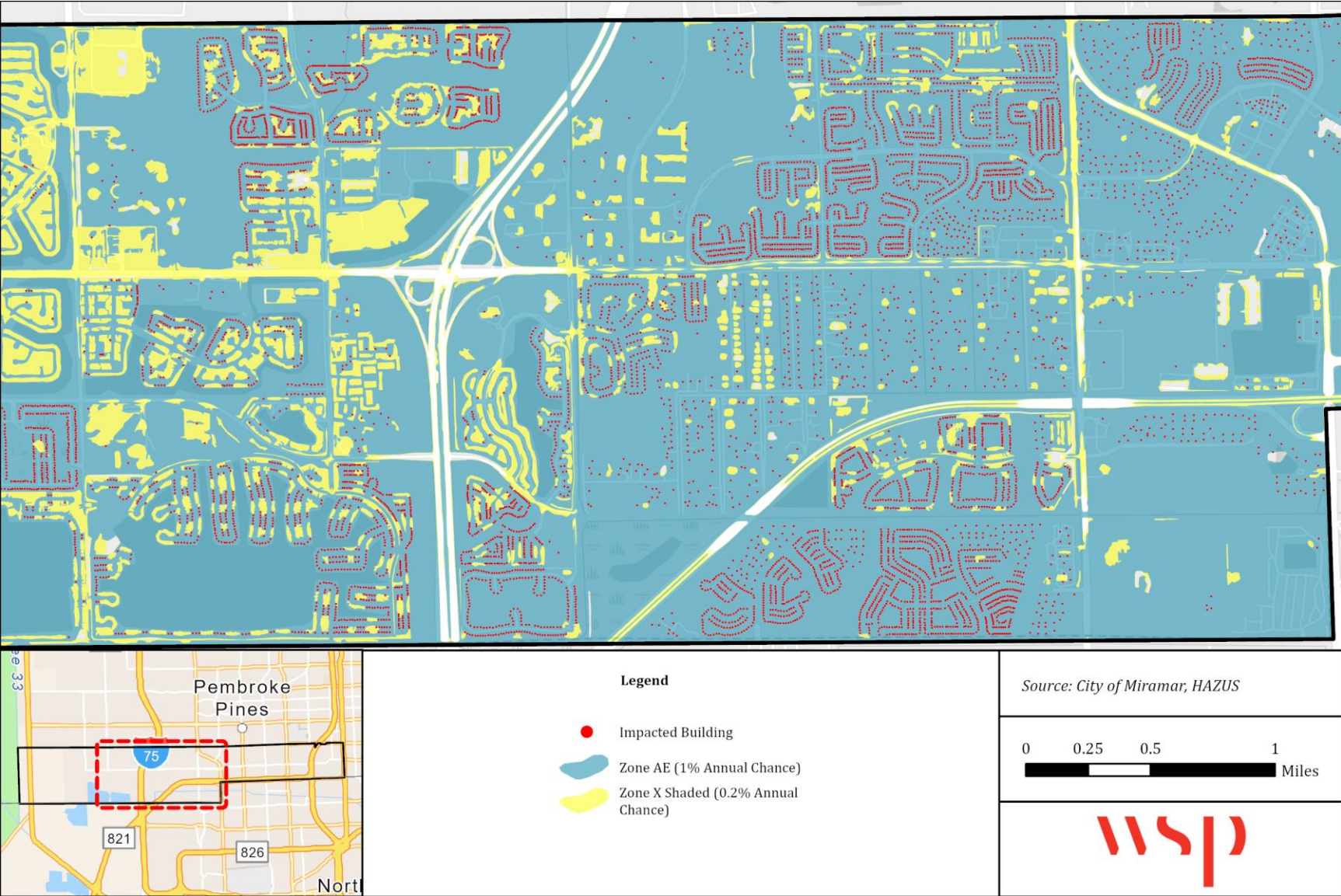


Figure 4.14 - Buildings with Estimated Loss, Inset 4



## PEOPLE

A separate analysis was performed to determine the population at risk in the individual FEMA flood zones based on the exposure of residential property and the average household size in the City of Miramar of 3.17 people per household according to ACS 2023 estimates. The resulting estimate of population at risk by flood zone is shown in Table 4-17. See Section 4.5.4 for discussion on the impacts of flooding on life, safety, warning, evacuation, and public health.

**Table 4-17 – Population at Risk to Flood**

Flood Zone	Residential Property Count	Population at Risk
Zone AE	22,613	71,683
Zone AH	159	504
Zone X (Shaded)	5,604	17,765
Zone X	867	2,748
<b>SFHA Total</b>	<b>29,243</b>	<b>92,700</b>

Source: FEMA Effective DFIRM; 2025 City of Miramar parcel data; American Community Survey 5-Year Estimates (2019-2023)

Per the results of the Hazus loss estimate, reported in Table 4-16, approximately 18,459 residential structures are expected to sustain damage from the 1% annual chance flood. Based on the average household size in Miramar, an estimated 58,515 residents are at risk of flooding impacting their homes.

## CRITICAL FACILITIES

A separate GIS analysis was performed to identify critical facilities located in the 1-percent-annual-chance and 0.2-percent-annual-chance floodplains. Critical facility data was overlaid with the DFIRM flood zones to determine exposure by flood zone. Facilities in Zone AE and Zone AH were also compared to flood depth raster data to estimate the depth of flooding that would occur at the facility. Critical facility exposure is summarized in Table 4-18 and shown in Figure 4.15 and Figure 4.16.

Figure 4.15 - Critical Facilities Exposure by Flood Zone

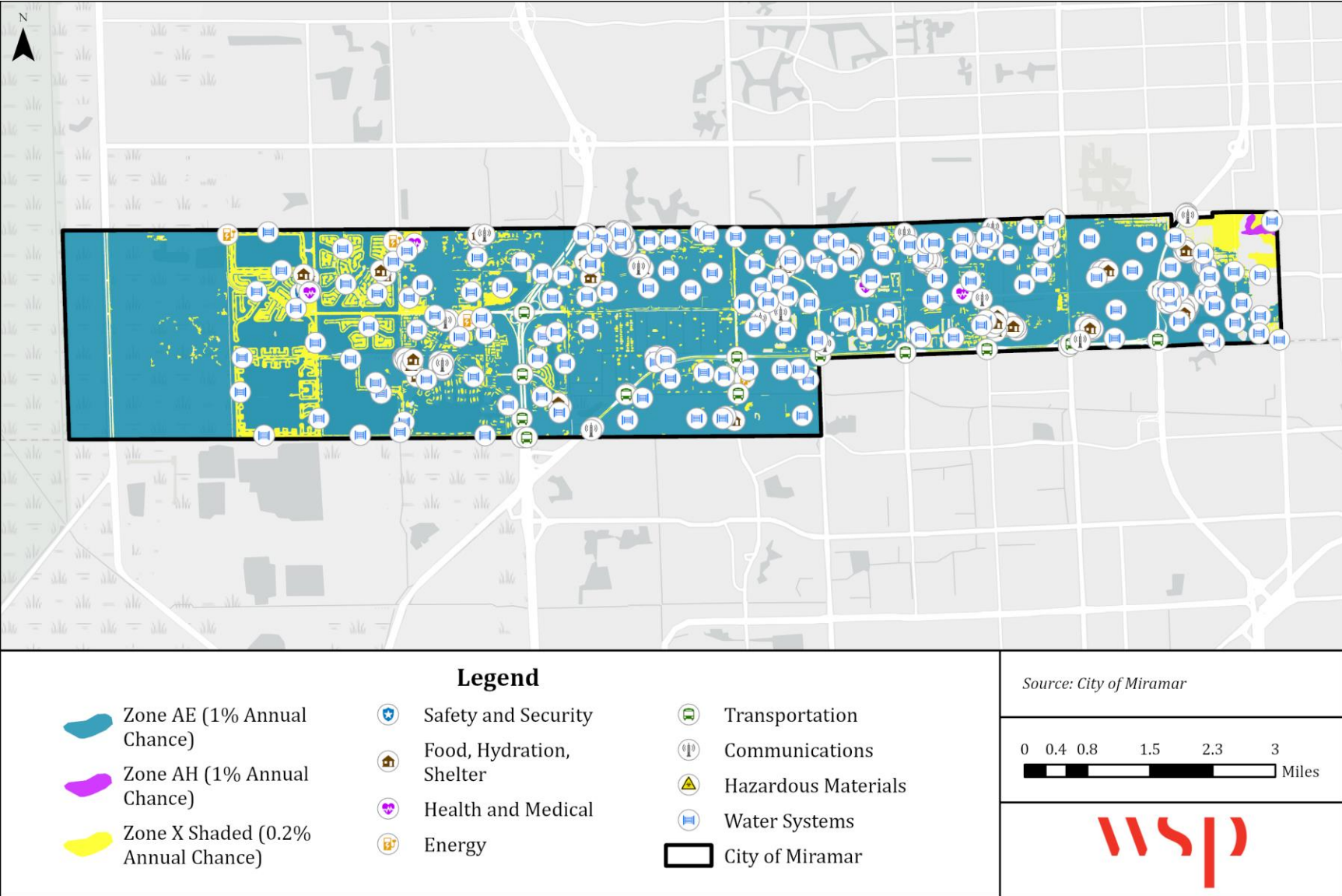
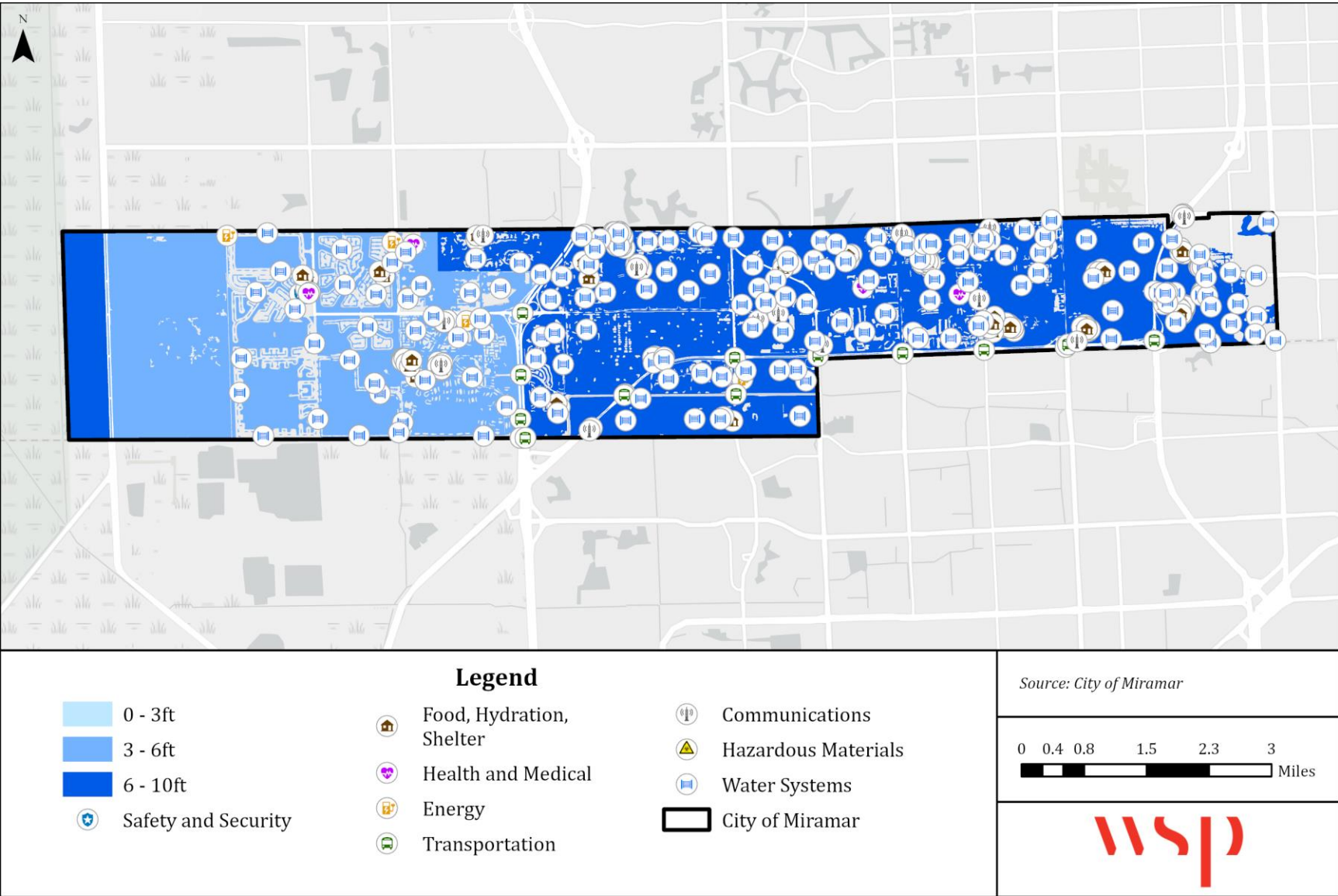


Figure 4.16 - Critical Facilities Exposure 1%-Annual-Chance Flood Depth Exposure



**Table 4-18 - Critical Facilities by Flood Zone**

Facility Name	Facility Type	Estimated Flood Depth (NAVD ft)
<b>Zone AE</b>		
Tropical Valley (SW 100 Ter) - 1901 VENTURES LLC	Communication Facilities	6.7
Tropical Valley (SW 100 Ter) - C & S INVESTMENTS OF BROWARD LLC	Communication Facilities	6.7
FDOT Red Rd/HEFT Interchange	Communication Facilities	6.7
FPL Easement (W of Red Rd)	Communication Facilities	6.7
Coconut Palm Elementary	Communication Facilities	6.6
New Park Towers	Communication Facilities	6.7
City Water Tower	Communication Facilities	6.7
Flamingo POC	Communication Facilities	6.7
Vizcaya Park - Communication Facilities <sup>1</sup>	Communication Facilities	6.7
Forzano Park	Communication Facilities	6.7
Dolphin Bay Elementary	Communication Facilities	5.7
Miramar Regional Park - Communication Facilities	Communication Facilities	5.7
Silver Shores Park	Communication Facilities	6.6
Vizcaya Park - Communication Facilities <sup>2</sup>	Communication Facilities	6.7
7950 RIVIERA BLVD	Communication Facilities	6.8
East WTP - Process Building	Drinking Water Facilities/ Water Treatment Plant	6.7
East WTP - Electrical Building	Drinking Water Facilities/ Water Treatment Plant	6.7
East WTP - High Service Pump Building	Drinking Water Facilities/ Water Treatment Plant	6.7
East WTP - Admin Building	Drinking Water Facilities/ Water Treatment Plant	6.7
BASSCREEK	Substation	5.7
WWTP-W1	Water Well	6.6
WWTP-F2	Water Well	6.6
WWTP-INJ-1	Water Well	6.6
WWTP-INJ-2	Water Well	6.6
DUALZONE MONITORING WELL	Water Well	6.7
E-4N	Water Well	6.7
E-3N	Water Well	6.7
Building 1	Wastewater Treatment	6.6
Maintenance Facility 1	Wastewater Treatment	6.6
Sludge Pump Station	Wastewater Treatment	6.6
Building 2	Wastewater Treatment	6.6
Building 3	Wastewater Treatment	6.6
Blower Building	Wastewater Treatment	6.6
Administration Building	Wastewater Treatment	6.6
Soils Processing Building	Wastewater Treatment	6.6
Building 4	Wastewater Treatment	6.6
Reuse Pump Station	Wastewater Treatment	6.6
Emergency Generation Facility and FPL Vault	Wastewater Treatment	6.6
Aeration Tank	Wastewater Treatment	6.6

Facility Name	Facility Type	Estimated Flood Depth (NAVD ft)
Maintenance Facility 2	Wastewater Treatment	6.6
Anaerobic Digester	Wastewater Treatment	6.6
Building 5	Wastewater Treatment	6.6
Pre Treatment Building	Wastewater Treatment	6.6
Building 6	Wastewater Treatment	6.6
BPS	Lift Station	6.7
LS-0047	Lift Station	6.7
LS-0046	Lift Station	6.7
LS-0085	Lift Station	6.7
LS-0026	Lift Station	6.7
LS-0023	Lift Station	6.7
LS-0052	Lift Station	6.7
LS-0034	Lift Station	6.7
LS-0009	Lift Station	6.7
LS-0048	Lift Station	6.7
LS-0091	Lift Station	6.7
LS-0057	Lift Station	6.7
LS-0094	Lift Station	6.7
LS-0095	Lift Station	6.7
LS-0096	Lift Station	6.7
LS-0071	Lift Station	6.7
LS-0081	Lift Station	6.7
LS-0037	Lift Station	6.6
LS-0036	Lift Station	6.6
LS-0035	Lift Station	6.6
LS-0054	Lift Station	6.6
LS-0053	Lift Station	6.6
LS-0058	Lift Station	6.6
LS-0064	Lift Station	6.6
LS-0056	Lift Station	6.6
LS-0077	Lift Station	6.7
LS-0070	Lift Station	6.6
LS-0069	Lift Station	6.6
LS-0041	Lift Station	6.6
LS-0049	Lift Station	6.6
LS-0050	Lift Station	6.6
LS-0038	Lift Station	6.6
LS-0030	Lift Station	6.6
LS-0032	Lift Station	6.6
LS-0031	Lift Station	6.6
LS-0042	Lift Station	6.6
LS-0072	Lift Station	6.6
LS-0063	Lift Station	6.6
LS-0062	Lift Station	5.7
LS-0076	Lift Station	5.7

Facility Name	Facility Type	Estimated Flood Depth (NAVD ft)
LS-0088	Lift Station	5.7
LS-0090	Lift Station	5.7
LS-0029	Lift Station	6.7
LS-0033	Lift Station	6.7
LS-0022	Lift Station	6.7
LS-0020	Lift Station	6.7
LS-0024	Lift Station	6.7
LS-0025	Lift Station	6.7
LS-0074	Lift Station	6.7
LS-0021	Lift Station	6.7
LS-0027	Lift Station	6.7
LS-0045	Lift Station	6.7
LS-0055	Lift Station	6.7
LS-0066	Lift Station	6.7
LS-0084	Lift Station	6.7
LS-0010	Lift Station	6.7
LS-0015	Lift Station	6.7
LS-0011	Lift Station	6.8
LS-0013	Lift Station	6.8
LS-0012	Lift Station	6.8
LS-0016	Lift Station	6.7
LS-0019	Lift Station	6.7
LS-0018	Lift Station	6.7
LS-0017	Lift Station	6.7
LS-0028	Lift Station	6.7
LS-0089	Lift Station	6.7
LS-0097	Lift Station	6.7
LS-00B	Lift Station	6.7
LS-00A	Lift Station	6.7
LS-00C	Lift Station	6.7
LS-00H	Lift Station	6.7
LS-00G	Lift Station	6.7
LS-00E	Lift Station	6.7
LS-00D	Lift Station	6.7
LS-00L	Lift Station	6.7
LS-00K	Lift Station	6.7
LS-00M	Lift Station	6.7
LS-0101	Lift Station	6.7
LS-0104	Lift Station	5.7
LS-0105	Lift Station	5.7
LS-0102	Lift Station	6.6
LS-0103	Lift Station	6.7
LS-0109	Lift Station	6.7
LS-0108	Lift Station	6.7
LS-0110	Lift Station	6.7

Facility Name	Facility Type	Estimated Flood Depth (NAVD ft)
LS-0111	Lift Station	5.7
LS-0113	Lift Station	5.7
LS-0112	Lift Station	6.7
LS-0114	Lift Station	6.7
LS-0115	Lift Station	6.7
LS-0116	Lift Station	6.7
LS-0117	Lift Station	6.7
LS-MPS	Lift Station	6.7
LS-PAL	Lift Station	6.7
LS-PR08	Lift Station	6.7
LS-PR06	Lift Station	6.6
LS-PR09	Lift Station	6.6
LS-PR03	Lift Station	6.7
LS-PR02	Lift Station	6.7
LS-PR04	Lift Station	5.7
LS-PR05	Lift Station	6.7
LS-PR07	Lift Station	6.6
LS-0001	Lift Station	6.8
LS-0003	Lift Station	6.7
LS-0002	Lift Station	6.7
LS-0004	Lift Station	6.7
LS-0005	Lift Station	6.8
LS-0006	Lift Station	6.8
LS-0007	Lift Station	6.7
LS-0118	Lift Station	6.7
LS-0119	Lift Station	6.7
LS-0120	Lift Station	5.7
LS-0121	Lift Station	6.7
FIU @ I-75	University	6.6
DeVry University	University	6.6
Miramar Educational Center	Community Center	6.7
Miramar Fire Rescue Station 70 - Fire Station	Fire Station	6.7
Miramar Fire Rescue Station 84	Fire Station	6.6
Miramar Fire Rescue Station 107	Fire Station	6.7
Miramar Fire Rescue Station 70 - Emergency Medical Service Facility	Emergency Medical Service Facility	6.7
Silver Shores Elementary School - PE Bldg - Risk Shelter Inventory	Risk Shelter Inventory	6.6
Coral Cove Elementary School - Main Bldg - Risk Shelter Inventory	Risk Shelter Inventory	6.6
Coral Cove Elementary School - PE Bldg - Risk Shelter Inventory	Risk Shelter Inventory	6.6
Coconut Palm Elementary School - Bldg 3 - Risk Shelter Inventory	Risk Shelter Inventory	6.6
Silver Shores Elementary School - Main Bldg - Risk Shelter Inventory	Risk Shelter Inventory	6.6

Facility Name	Facility Type	Estimated Flood Depth (NAVD ft)
Dolphin Bay Elementary School - Main Bldg - Risk Shelter Inventory	Risk Shelter Inventory	5.7
New Renaissance Middle School - Bldg 4 - Risk Shelter Inventory	Risk Shelter Inventory	6.7
New Renaissance Middle School - Bldg 1 & 2 - Risk Shelter Inventory	Risk Shelter Inventory	6.7
Coconut Palm Elementary School - Bldg 1 - Risk Shelter Inventory	Risk Shelter Inventory	6.6
Coconut Palm Elementary School - Bldg 4 - Risk Shelter Inventory	Risk Shelter Inventory	6.6
Dolphin Bay Elementary School - PE Bldg - Risk Shelter Inventory	Risk Shelter Inventory	5.7
Coconut Palm Elementary School - Main Bldg	Risk Shelter Inventory	6.6
Coconut Palm Elementary School - Bldg 2 - Risk Shelter Inventory	Risk Shelter Inventory	6.6
Fairway Elementary School - Bldg 6	School	6.8
A.C. Perry Elementary School - Portable 8	School	6.7
Miramar High School - Bldg 1 - School	School	6.7
Silver Shores Elementary School - PE Bldg - School	School	6.6
Coral Cove Elementary School - Main Bldg - School	School	6.6
Coral Cove Elementary School - PE Bldg - School	School	6.6
Fairway Elementary School - Bldg 3	School	6.8
A.C. Perry Elementary School - Bldg 8	School	6.7
Coconut Palm Elementary School - Bldg 3 - School	School	6.6
Somerset Academy Miramar South	School	6.7
Miramar Elementary School - Bldg 2	School	6.7
A.C. Perry Elementary School - Portable 4	School	6.7
Fairway Elementary School - Bldg 7	School	6.8
Miramar Elementary School - Main Bldg	School	6.7
Henry D. Perry Education Center - Main Bldg	School	6.7
Henry D. Perry Education Center - Bldg 1	School	6.7
A.C. Perry Elementary School - Portable 7	School	6.7
Silver Shores Elementary School - Main Bldg - School	School	6.6
Miramar High School - Bldg 5	School	6.7
A.C. Perry Elementary School - Portable 5	School	6.7
Fairway Elementary School - Bldg 4	School	6.8
Dolphin Bay Elementary School - Main Bldg - School	School	5.7
Sunshine Elementary School - Bldg 4	School	6.8
Miramar Elementary School - Bldg 3	School	6.7
A.C. Perry Elementary School - Bldg 9	School	6.7
Miramar High School - Bldg 6	School	6.7
Henry D. Perry Education Center - Bldg 2	School	6.7
Miramar High School - Bldg 7	School	6.7
Miramar High School - Bldg 8	School	6.7
Miramar Elementary School - Bldg 4	School	6.7
Sunshine Elementary School - Bldg 1	School	6.8
Everglades High School - Bldg 9	School	5.7

<b>Facility Name</b>	<b>Facility Type</b>	<b>Estimated Flood Depth (NAVD ft)</b>
New Renaissance Middle School - Bldg 4 - School	School	6.7
Sunshine Elementary School - Bldg 5	School	6.8
Sunshine Elementary School - Bldg 2	School	6.8
New Renaissance Middle School - Bldg 1 & 2 - School	School	6.7
Henry D. Perry Education Center - Bldg 3	School	6.7
A.C. Perry Elementary School - Bldg 10	School	6.7
Coconut Palm Elementary School - Bldg 1 - School	School	6.6
Fairway Elementary School - Bldg 2	School	6.8
A.C. Perry Elementary School - Bldg 5	School	6.7
Coconut Palm Elementary School - Bldg 4 - School	School	6.6
Dolphin Bay Elementary School - PE Bldg - School	School	5.7
Coconut Palm Elementary School - Main	School	6.6
Miramar High School - Bldg 9	School	6.7
Miramar High School - Bldg 10	School	6.7
Fairway Elementary School - Bldg 1	School	6.8
Sunshine Elementary School - Bldg 3	School	6.8
A.C. Perry Elementary School - Portable 3	School	6.7
Sunshine Elementary School - Bldg 6	School	6.8
A.C. Perry Elementary School - Portable 6	School	6.7
A.C. Perry Elementary School - Portable 1	School	6.7
Miramar High School - Bldg 11	School	6.7
A.C. Perry Elementary School - Portable 2	School	6.7
A.C. Perry Elementary School - Bldg 1	School	6.7
Coconut Palm Elementary School - Bldg 2 - School	School	6.6
Miramar High School - Bldg 12	School	6.7
A.C. Perry Elementary School - Bldg 6	School	6.7
A.C. Perry Elementary School - Bldg 4	School	6.7
A.C. Perry Elementary School - Bldg 3	School	6.7
Miramar High School - Bldg 14	School	6.7
Fairway Elementary School - Bldg 5	School	6.8
A.C. Perry Elementary School - Bldg 2	School	6.7
A.C. Perry Elementary School - Bldg 7	School	6.7
Everglades High School - Bldg 1	School	5.7
Everglades High School - Bldg 2	School	5.7
Everglades High School - Bldg 4	School	5.7
East Water Storage Tank	Water Storage Tank	6.7
East Remote Storage Tank	Water Storage Tank	6.7
860320	Bridge	5.7
860395	Bridge	8
864120	Bridge	-9999
860394	Bridge	8
860089	Bridge	6.7
860550	Bridge	6.7
860088	Bridge	-9999
860189	Bridge	6.7

Facility Name	Facility Type	Estimated Flood Depth (NAVD ft)
860149	Bridge	-9999
860092 - Bridge2	Bridge	6.8
<b>Zone AH</b>		
Gas station (Pembroke Rd & SW 68 Ave)	Communication Facilities	8
LS-00J	Lift Station	10
<b>Zone X (Shaded)</b>		
Glades Middle	Communication Facilities	-
8910 Miramar Pkwy	Communication Facilities	-
West WTP - Building	Drinking Water Facilities/ Water Treatment Plant	-
East WTP - Clear Well	Drinking Water Facilities/ Water Treatment Plant	-
East WTP - Maintenance Building	Drinking Water Facilities/ Water Treatment Plant	-
120074	Substation	-
120099	Substation	-
120111	Substation	-
PERRY	Substation	-
WWTP-W4	Water Well	-
WWTP-F1	Water Well	-
LS-0086	Lift Station	-
LS-0067	Lift Station	-
LS-0075	Lift Station	-
LS-0082	Lift Station	-
LS-0068	Lift Station	-
LS-0065	Lift Station	-
LS-0044	Lift Station	-
LS-0093	Lift Station	-
LS-0043	Lift Station	-
LS-0040	Lift Station	-
LS-0039	Lift Station	-
LS-0051	Lift Station	-
LS-0078	Lift Station	-
LS-0079	Lift Station	-
LS-0059	Lift Station	-
LS-0061	Lift Station	-
LS-0060	Lift Station	-
LS-0080	Lift Station	-
LS-0092	Lift Station	-
LS-0098	Lift Station	-
LS-0083	Lift Station	-
LS-0014	Lift Station	-
LS-0099	Lift Station	-
LS-0073	Lift Station	-
LS-001	Lift Station	-
LS-0100	Lift Station	-

Facility Name	Facility Type	Estimated Flood Depth (NAVD ft)
LS-0107	Lift Station	-
LS-0106	Lift Station	-
City Hall	City Hall	-
Universal Technical Institute	University	-
Miramar Cultural Center	Community Center	-
Sunset Lakes Elementary School	Community Center	-
Miramar Fire Rescue Station 100 - Fire Station	Fire Station	-
Miramar Fire Rescue Station 100 Tower	Fire Station	-
Memorial Healthcare System	Health Care Facility	-
Miramar Police Headquarter	Law Enforcement Facility	-
Miramar Police West District Station	Law Enforcement Facility	-
Miramar Fire Rescue Station 100 - Emergency Medical Service Facility	Emergency Medical Service Facility	-
Miramar Fire Rescue Station 100 - West	Emergency Medical Service Facility	-
Silver Lakes Elementary - Main Bldg - Risk Shelter Inventory	Risk Shelter Inventory	-
Silver Lakes Elementary School - Bldg 2	Risk Shelter Inventory	-
New Renaissance Middle School - Bldg 3 - Risk Shelter Inventory	Risk Shelter Inventory	-
Sunset Lakes Elementary School - Main Bldg - Risk Shelter Inventory	Risk Shelter Inventory	-
Sunset Lakes Elementary School - Bldg 2 - Risk Shelter Inventory	Risk Shelter Inventory	-
Silver Lakes Elementary School - Bldg 1	Risk Shelter Inventory	-
Sea Castle Elementary School - Bldg 2	School	-
Silver Lakes Elementary - Main Bldg - School	School	-
Sea Castle Elementary School - Bldg 3	School	-
Silver Lakes Elementary - Bldg 2	School	-
Somerset Academy Miramar	School	-
Sea Castle Elementary School - Bldg 6	School	-
Sea Castle Elementary School - Bldg 1	School	-
Sea Castle Elementary School - Bldg 7	School	-
Sea Castle Elementary School - Bldg 4	School	-
Miramar High School - Bldg 1A - School	School	-
Sea Castle Elementary School - Bldg 8	School	-
New Renaissance Middle School - Bldg 3 - School	School	-
Sunset Lakes Elementary School - Main Bldg - School	School	-
Sea Castle Elementary School - Bldg 9	School	-
Sea Castle Elementary School - Bldg 80	School	-
Sunset Lakes Elementary School - Bldg 2 - School	School	-
Silver Lakes Elementary - Bldg 1	School	-
Sea Castle Elementary School - Bldg 5	School	-
Miramar High School - Bldg 13	School	-
Miramar High School - Bldg 2	School	-
Miramar High School - Bldg 4	School	-
Everglades High School - Bldg 3	School	-
Everglades High School - Bldg 5	School	-

Facility Name	Facility Type	Estimated Flood Depth (NAVD ft)
Everglades High School - Bldg 6	School	-
Everglades High School - Bldg 7	School	-
Everglades High School - Bldg 8	School	-
Glades Middle School - Bldg 6	School	-
Glades Middle School - Bldg 1	School	-
Glades Middle School - Bldg 2	School	-
Glades Middle School - Bldg 3	School	-
Glades Middle School - Bldg 4	School	-
Glades Middle School - Bldg 5	School	-
West Remote Storage Tank	Water Storage Tank	-
860672	Bridge	-
860090	Bridge	-
<b>Zone X Unshaded</b>		
Multi Service Center	Communication Facilities	-
West WTP - Storage Tank	Drinking Water Facilities/ Water Treatment Plant	-
East WTP - Ground Storage Tank	Drinking Water Facilities/ Water Treatment Plant	-
LS-00F	Lift Station	-
LS-PR01	Lift Station	-
Miramar Multi-Service Complex	Community Center	-
Miramar Fire Rescue Station 19 - Fire Station	Fire Station	-
Memorial Hospital Miramar	Hospital	-
Miramar Fire Rescue Station 19 - Emergency Medical Service Facility	Emergency Medical Service Facility	-
Miramar High School - Bldg 3	School	-
860678 - Bridge1	Bridge	-
860680	Bridge	-
860678 - Bridge2	Bridge	-
860679	Bridge	-
860328	Bridge	-
860327	Bridge	-
860191	Bridge	-
860091	Bridge	-
860192	Bridge	-
860092 - Bridge1	Bridge	-
860188	Bridge	-
860093	Bridge	-
860361	Bridge	-

Overall, vulnerability to flood is considered high. There are approximately 23,922 buildings located in the SFHA and an additional 5,795 buildings located in the moderate risk Shaded Zone X. A 1% annual chance flood event is estimated to impact 18,930 buildings and cause approximately \$17.5 billion in property damage. Additional impacts on the estimated 60,008 residents of these buildings are not quantified, but include impacts to their physical, mental, and financial health and safety. Further damage could be sustained by infrastructure, and additional economic impacts could result from direct physical impacts as well as business interruption.

**Vulnerability – High****FLOOD INSURANCE ANALYSIS**

Flood insurance data on active policies and past claims is a valuable source of information on flood hazards. Flood insurance is available in communities that participate in the NFIP and is required as a condition for federal aid or for a mortgage or loan that is federally insured for a building located in a FEMA flood zone. The City of Miramar has been a Regular participant in the NFIP since December 1, 1977, and has participated in the CRS since 1993. Miramar is currently a Class 8 community. Table 4-19 through Table 4-22 reflect NFIP policy and claims data for the City categorized by structure type, flood zone, Pre-FIRM and Post-FIRM. It should be noted that there are 65 policies in force in AE Zones and 145 in the AH Zone, but there are 22,613 buildings in AE zones and 159 in the AH Zone. This means only 0.29% of properties in AE Zones and 91% in the AH Zone are covered by flood insurance.

**Table 4-19 – NFIP Policy and Claims Data by Occupancy Type**

Occupancy	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	2,263	\$1,280,819	\$708,624,000	1,733	\$3,568,941.61
2-4 Family	19	\$8,807	\$4,662,000	19	\$17,225.78
All Other Residential	57	\$41,635	\$20,445,000	12	\$22,365.02
Non-Residential	79	\$90,362	\$42,955,000	11	\$63,006.90
<b>Total</b>	<b>2,418</b>	<b>\$1,421,623</b>	<b>\$776,686,000</b>	<b>1,775</b>	<b>\$3,671,539.31</b>

Source: FEMA Community Information System as of 09/18/2025

**Table 4-20 – NFIP Policy and Claims Data by Flood Zone**

Flood Zone	Number of Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	65	39,937	\$18,192,000	\$612	921,372.26
AH Zones	145	86,594	\$43,179,000	\$60	259,013.41
B, C & X Zone					
Standard	1,555	912,784	\$510,825,000	\$47	63,466.35
Preferred	0	0	\$0	\$94	304,910.62
<b>Total</b>	<b>1,765</b>	<b>1,039,315</b>	<b>\$572,196,000</b>	<b>\$813</b>	<b>1,548,762.64</b>

Source: FEMA Community Information System as of 09/18/2025

**Table 4-21 – NFIP Policy and Claims Data Pre-FIRM**

Flood Zone	Number of Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	31	\$19,674	\$8,530,000	474.00	\$761,147.86
AH Zones	82	\$48,487	\$21,496,000	41	\$205,424.72
B, C & X Zone	310	\$206,484	\$96,356,000	88	\$138,210.75
Standard	310	\$206,484	\$96,356,000	44	\$63,466.35
Preferred	0	\$0	\$0	44	\$74,744.40
<b>Total</b>	<b>423</b>	<b>\$274,645</b>	<b>\$126,382,000</b>	<b>603</b>	<b>\$1,104,783.33</b>

Source: FEMA Community Information System as of 09/18/2025

**Table 4-22 - NFIP Policy and Claims Data Post-FIRM**

<b>Flood Zone</b>	<b>Number of Policies in Force</b>	<b>Total Premium</b>	<b>Total Coverage</b>	<b>Number of Closed Paid Losses</b>	<b>Total of Closed Paid Losses</b>
A01-30 & AE Zones	34	\$20,263	\$9,662,000	138.00	\$160,224.40
AH Zones	63	\$38,107	\$21,683,000	19	\$53,588.69
B, C & X Zone	1,245	\$706,300	\$414,469,000	51	\$230,166.22
Standard	1,245	\$706,300	\$414,469,000	3	\$0.00
Preferred	0	\$0	\$0	50	\$230,166.22
<b>Total</b>	<b>1,342</b>	<b>\$764,670</b>	<b>\$445,814,000</b>	<b>208</b>	<b>\$443,979.31</b>

Source: FEMA Community Information System as of 09/18/2025

#### 4.4.2 LEVEE FAILURE

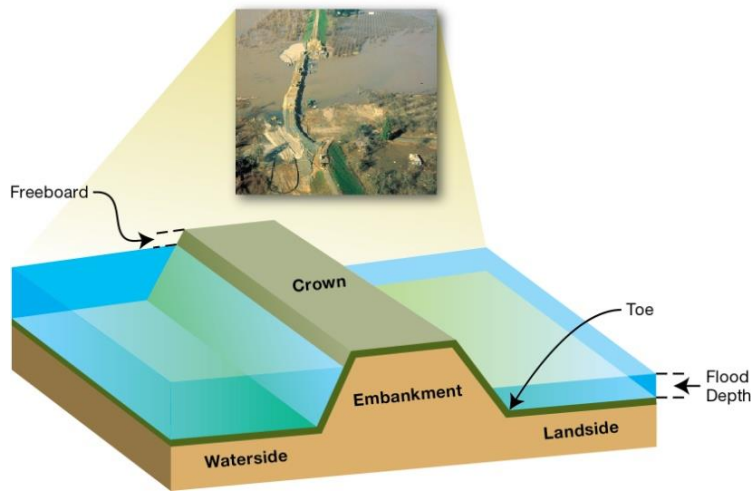
Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Levee Failure	Unlikely	Limited	Moderate	Less than 6 hrs	Less than 1 week	2.2

#### HAZARD DESCRIPTION

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

Levees and floodwalls are constructed from the earth, compacted soil or artificial materials, such as concrete or steel. To protect against erosion and scouring, earthen levees can be covered with grass and gravel or hard surfaces like stone, asphalt, or concrete. Levees and floodwalls are typically built parallel to a waterway, most often a river, in order to reduce the risk of flooding to the area behind it. Figure 4.17 shows the components of a typical levee.

**Figure 4.17 - Components of a Typical Levee**



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

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

For both dam and levee failure events, there is generally very little warning time. A failure may result from heavy rains and flash flooding and occur within hours of the first signs of breaching. The duration of the flood will vary but may last as long as a week.

**Warning Time: 4 – Less than six hours**

**Duration: 3 – Less than one week**

## LOCATION

According to the US Army Corps of Engineers' (USACE) National Levee Database (NLD), there are four recognized levee areas that overlap with the City of Miramar. These levees are detailed in Table 4-23 and their locations are shown in Figure 4.18.

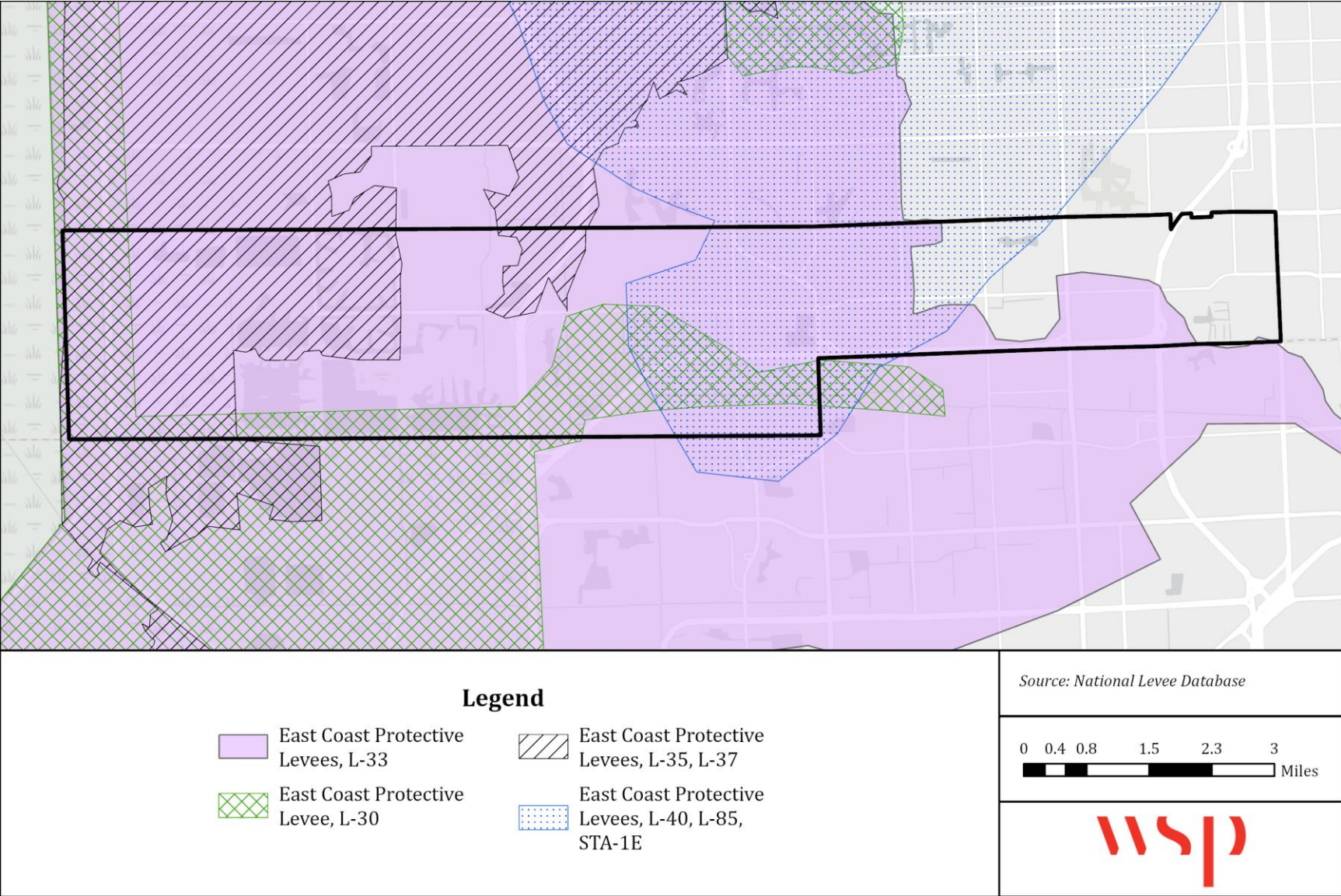
*Spatial Extent: 3 – Moderate*

**Table 4-23 – Levees with Potential Impact to City of Miramar, FL**

Levee Name	Levee ID	Year Constructed	Leveed Area (Square Miles)	People at Risk	Structures at Risk	Property Value
East Coast Protective Levees, L-40, L-85, STA-1E	3406000047	1952	303.04	915,725	240,000	\$14 Billion
East Coast Protective Levees, L-35, L-37	3406000139	1952	151.94	2,293,365	645,246	\$1 Billion
East Coast Protective Levees, L-33	3406000150	1952	251.27	98,629	32,918	\$2 Billion
East Coast Protective Levee, L-30	3406000151	1952	199.20	17,727	4,588	\$430 Million

Source: National Levee Database, August 2025

Figure 4.18 - Leveed Areas in the City of Miramar



## EXTENT

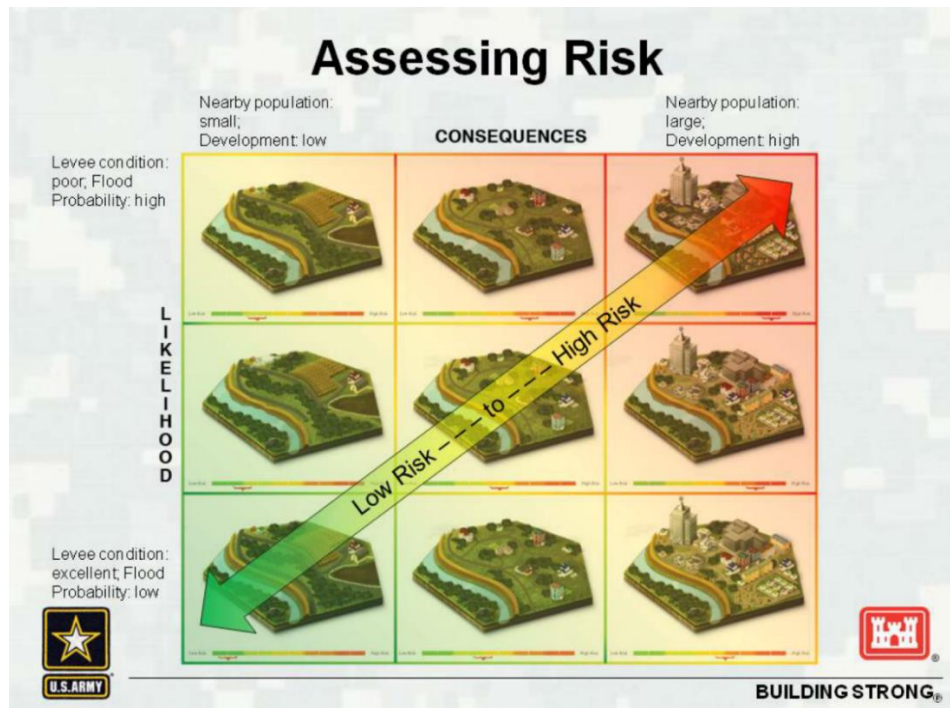
Each state has definitions and methods to determine the hazard potential of a levee. In Florida, levee safety is a shared responsibility among the Florida Department of Environmental Protection, the regional water management districts, United States Army Corps of Engineers (USACE), local and regional governments, consultants, and private levee owners.

The USACE uses basic information from the National Levee Database to create an initial risk assessment of each levee. The level of risk that damage can occur is determined by the following three questions:

- 1 How likely is the levee to get wet?** The most recent information on the frequency and severity of flooding along the leveed area, how the water moves, and the history of breaching (a break in the levee) and overtopping (water coming over the levee) of the system is used to determine the frequency of water on the levee.
- 2 How will the levee perform during the next flood (what is its condition)?** The most current levee inspection, performance history, flood-fight records, photos, and design documentation are used in completing engineering-based performance assessments.
- 3 If the levee breaches or overtops during a flood, what are the consequences?** The consequences include an estimate of the number of people living and working behind the levee and direct economic damage (number of properties, critical infrastructure). Other elements for consequences include the level of community awareness and the presence or absence of effective warning systems and evacuation plans.

Levee systems fall under one of the following risk classifications: Very high risk; High risk; Moderate risk; Low risk; and Very low risk. The risk level is determined by assessing the safety risk based on the three aforementioned factors of likelihood of flooding in the area, anticipated performance (condition) of levee and consequences if the levee were to break or overtop with water. It is important to note that even if a levee is in excellent condition, it still may be classified as high risk because of the high population and resources in the leveed area. Figure 4.19 illustrates the levee risk assessment utilized by the USACE.

**Figure 4.19 - Levee Risk Assessment**



Source: USACE

Based on the most recent risk assessments, the USACE considers only the East Coast Protective Levees, L-33 to be classified as a high risk due to potential for seepage that could lead to a levee breach. East Coast Protective Levees L-30 and L-35, L-37 were ranked as a moderate risk while L-40, L-85, STA-1E was ranked as low risk.

***Impact: 2 – Limited***

**PAST OCCURRENCES**

There are no records of damages, deaths, or injuries associated with levee failure in Miramar.

**PROBABILITY OF FUTURE OCCURRENCE**

Given the limited presence of levees and the absence of any prior incidents, it can be concluded that levee failure is unlikely. However, it is possible that with heavy rain events becoming more frequent and intense, conditions conducive to failures may occur more frequently in the future.

***Probability: 1 – Unlikely***

**CLIMATE CHANGE AND FUTURE CONDITIONS**

Studies have been conducted to investigate the impact of climate change scenarios on levee safety. The safety of levees for the future climate can be based on an evaluation of changes in design floods and the freeboard available to accommodate an increase in flood levels. The results from the studies indicate that the design floods with the corresponding outflow floods and flood water levels will increase in the future, and this increase will affect the safety of levees in the future. Studies concluded that the total hydrological failure probability of a levee will increase in the future climate and that the extent and depth of flood waters will increase by the future levee break scenario.

**VULNERABILITY ASSESSMENT**

A property exposure analysis was conducted to quantify the vulnerability within each leveed area in the city and is summarized in Table 4-24 through Table 4-27. It is important to note that some buildings within the city are affected by more than one leveed area and are reported in multiple of the property exposure tables below.

The East Coast Protective Levees L-33 is rated by USACE as a high risk levee; there are over 20,600 buildings with a total value of nearly \$40.7 billion within this leveed area in Miramar. Failure of this levee could result in widespread flooding in Miramar; however, such an occurrence is unlikely.

**Table 4-24 – Property Exposure to Levee Failure, East Coast Protective Levees, L-40, L-85, STA-1E**

Occupancy Type	Number of Affected Buildings	Building Value
Agricultural	20	\$26,254,550
Commercial	617	\$782,841,150
Education	21	\$276,459,580
Government	32	\$166,112,570
Industrial	91	\$1,097,198,810
Religious	10	\$64,027,030
Residential	6,936	\$24,041,038,780
<b>Total</b>	<b>7,727</b>	<b>\$26,453,932,470</b>

Source: National Levee Data, Parcel Data

**Table 4-25 – Property Exposure to Levee Failure, East Coast Protective Levees, L-35, L-37**

Occupancy Type	Number of Affected Buildings	Building Value
Agricultural	0	\$0
Commercial	20	\$204,448,410
Education	8	\$112,177,140
Government	13	\$191,684,170
Industrial	6	\$138,811,040
Religious	1	\$1,414,570
Residential	4,126	\$2,827,412,860
<b>Total</b>	<b>4,174</b>	<b>\$3,475,948,190</b>

Source: National Levee Data, Parcel Data

**Table 4-26 – Property Exposure to Levee Failure, East Coast Protective Levees, L-33**

Occupancy Type	Number of Affected Buildings	Building Value
Agricultural	25	\$30,086,800
Commercial	721	\$1,584,786,420
Education	64	\$1,252,388,380
Government	114	\$1,478,161,290
Industrial	119	\$1,446,588,770
Religious	17	\$70,820,460
Residential	19,585	\$34,804,585,650
<b>Total</b>	<b>20,645</b>	<b>\$40,667,417,770</b>

Source: National Levee Data, Parcel Data

**Table 4-27 – Property Exposure to Levee Failure, East Coast Protective Levees, L-30**

Occupancy Type	Number of Affected Buildings	Building Value
Agricultural	18	\$23,365,570
Commercial	89	\$8,439,050
Education	2	\$16,005,400
Government	8	\$30,345,500
Industrial	0	\$0
Religious	0	\$0
Residential	3,635	\$6,815,581,750
<b>Total</b>	<b>3,752</b>	<b>\$6,893,737,270</b>

Source: National Levee Data, Parcel Data

Based on this limited data, vulnerability from levee failure is considered low for Miramar. Despite significant property exposure within leveed areas, the potential for a levee failure is very low. Although uncommon, regular monitoring is necessary to minimize the occurrence of levee failure and avoid property damage and potential loss of life.

***Vulnerability – Low***

### 4.4.3 STORMWATER AND LOCALIZED FLOODING

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Stormwater/ Localized Flooding	Highly Likely	Limited	Moderate	Less than 6 hours	Less than 24 hours	2.9

#### HAZARD DESCRIPTION

Localized stormwater flooding can occur throughout the City of Miramar. Stormwater flooding occurs when heavy rainfall and an accumulation of runoff overburden the stormwater drainage system causing flooding in the areas where drainage is insufficient or otherwise underperforming. Localized flooding may be caused by the following issues:

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

Localized stormwater flooding in Miramar can be attributed to the density of developed and impervious land, which limits ground absorption and increases surface water runoff. South Florida faces a unique challenge with the storage of this surface water runoff. Low topographic gradients across a vast area and relatively pervious soils mean that Miramar and other South Florida cities rely on natural underground storage rather than conventional conveyance structures and large outfalls.

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

**Warning Time: 4 – Less than 6 hours**

**Duration: 2 – Less than 24 hours**

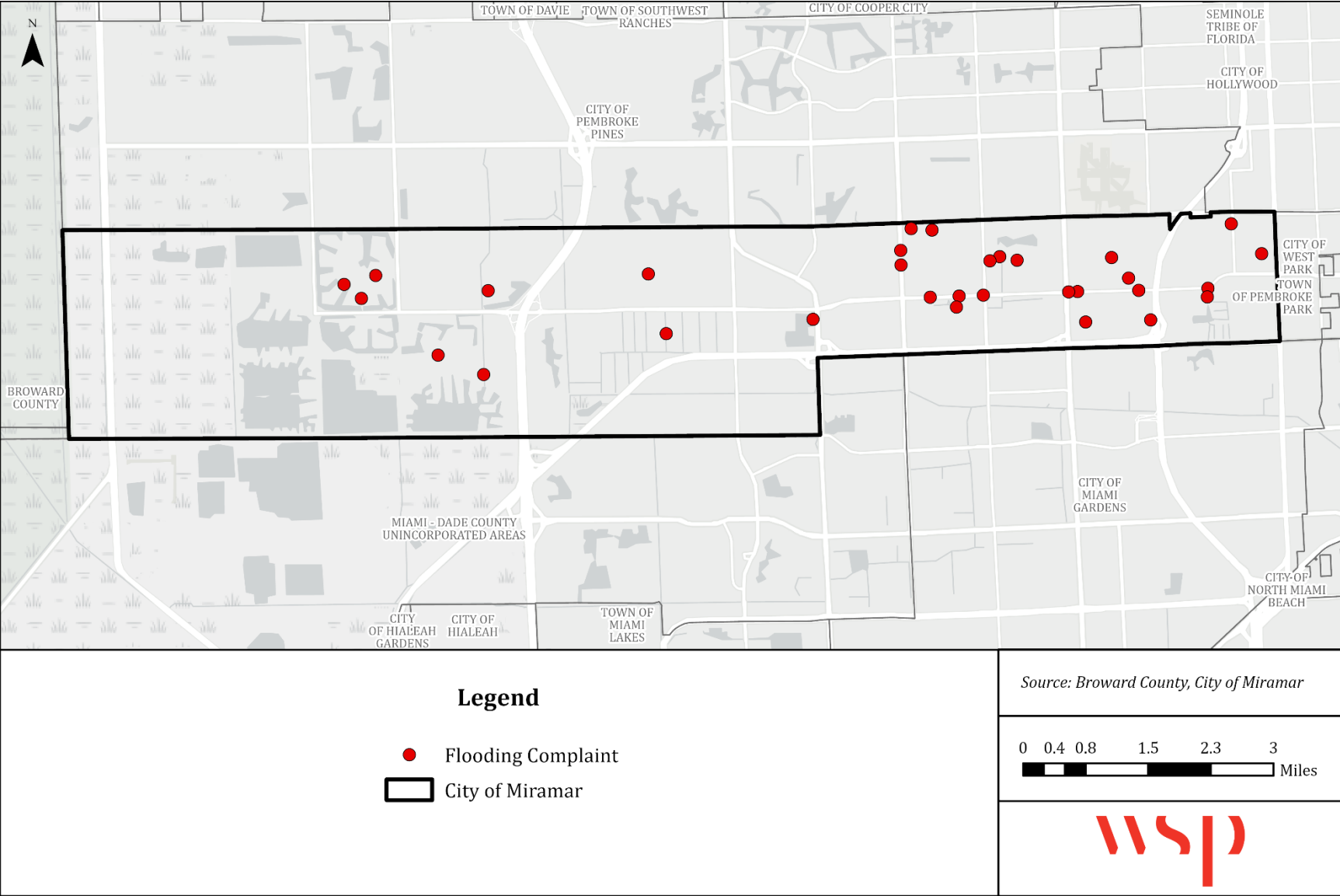
#### LOCATIONS

The City of Miramar shared a flooding survey, which requested that participants identify past locations of flooding problems. Respondents provided the location of events via text and therefore locations are approximate and are shown in Figure 4.20. This map also shows locations collected from stormwater inspection complaints. This primarily includes areas and infrastructure in need of cleaning and inspection. In addition to these flooding complaints, this map also includes reported flood events from Broward County’s Document the Floods, an ArcGIS application. The app encourages members of the public to report flooding in the county via an interactive map, and it has received five reports in Miramar since 2020. The city’s survey and Broward County’s app help capture localized flooding events.

Please note that these locations are not exhaustive, and there are likely many more areas of localized flooding that go unreported.

**Spatial Extent: 3 – Moderate**

Figure 4.20 -Localized Flooding Complaints



Public input received through the survey noted issues with localized flooding at the following locations:

- SW 48<sup>th</sup> & 160<sup>th</sup> Street
- Bass Creek Road
- Sherman Circle
- La Salle Boulevard
- Island Drive
- Fogg Road
- Miramar Boulevard
- SW 178<sup>th</sup> Avenue & SW 30<sup>th</sup> Street
- Palm Ave
- Douglas Road
- SW 28<sup>th</sup> Street & 178 Avenue
- Silver Shores Community
- Fairway & Acapulco Drive
- Miramar Parkway
- Sherman Circle
- Miramar Parkway & 67<sup>th</sup> Ave
- SW 62<sup>nd</sup> Street to SW 68<sup>th</sup> Street
- Fountains of Miramar Mall at 29<sup>th</sup> Street
- Country Club Ranches
- 67<sup>th</sup> Ter near fire station
- Monarch Lakes area
- East of University Street & Miramar Parkway
- Bahama Drive & Miramar Parkway
- Miramar Parkway from Douglas to Fairmont
- Silver Lakes neighborhood
- Fairway Elementary
- Island Drive and Miramar Boulevard
- Island Drive and Oleander at the intersection of Kismet and Everglades
- SW 174<sup>th</sup> Ave
- Red Rd & Miramar Parkway
- E Elm Lane

## EXTENT

The severity of flooding is generally linked to the flood depth, velocity, and how rapidly it occurs. However, unlike with the mapped floodplain, there is limited data on flood depths and recurrence intervals for localized flooding because it is highly variable based on stormwater system maintenance, development and runoff management, recent weather patterns, and each rain event. Localized flooding typically refers to smaller scale events that are less severe than riverine/canal flooding but can present a nuisance and generate substantial losses over repeated occurrences.

### *Impact: 2 – Limited*

## PAST OCCURRENCES

Table 4-28 details the 4 flash flood events associated with localized stormwater flooding since 1997, as reported in the NCEI Storm Events Database for Broward County. Events were selected based on their relevance to Miramar.

**Table 4-28 – NCEI Flash Flooding Events in Broward County (1997-2024)**

Location	Date	Event Type	Injuries/ Deaths	Property Damage	Crop Damage
Miramar	6/9/1999	Flash Flood	0	\$0	\$0
Ft. Lauderdale	6/23/2002	Flash Flood	0	\$10,000	\$0
Hollywood	10/4/2008	Flash Flood	0	\$1,000	\$0
Pembroke	6/4/2002	Flash Flood	0	\$0	\$0
<b>Total</b>			<b>0/0</b>	<b>\$11,000</b>	<b>\$0</b>

Source: NCEI Storm Events Database, April 2023

The following provides details on select flood events recorded in the NCEI database. These scenarios represent the types of stormwater and flash flood events that can be expected in the future in Miramar.

**June 9, 1999** - Street flooding in south Broward forced one family to evacuate their house.

**June 23, 2002** – Eight to ten inches of rain fell in central Broward County causing minor flooding in several homes.

**October 4, 2008** – An area of heavy rainfall produced flash flooding in southeastern Broward County.

**June 4, 2022** – Multiple reports from broadcast media and emergency managers of significant to severe street flooding in Eastern Broward County.

While only four events were found in the NCEI database, it is likely that many more localized events occurred. Because these events affect a smaller area and cause a minimal impact in comparison to larger events, they are often not recorded.

As of July 2025, Broward County’s Document the Floods web app reports five incidents of localized flooding in Miramar. Table 4-29 provides details pertaining to these incidents.

**Table 4-29 – City of Miramar Document the Floods Responses**

<b>Date</b>	<b>Description</b>	<b>Flood Type</b>
11/10/2020	Street is flooded at Silver Lakes, 15” deep	Rainfall/Storm/Hurricane
11/25/2020	Silver Lakes neighborhood street flooding into driveway, 16” deep	Rainfall/Storm/Hurricane
11/25/2020	Water in mail truck, Silver Lakes neighborhood, 16” deep	Rainfall/Storm/Hurricane
11/7/2021	Park/public area flooded	High Tide/Tidal Flooding
6/17/2024	Parking lot flooded.	Rainfall/Storm/Hurricane

Source: [Document the Floods](#)

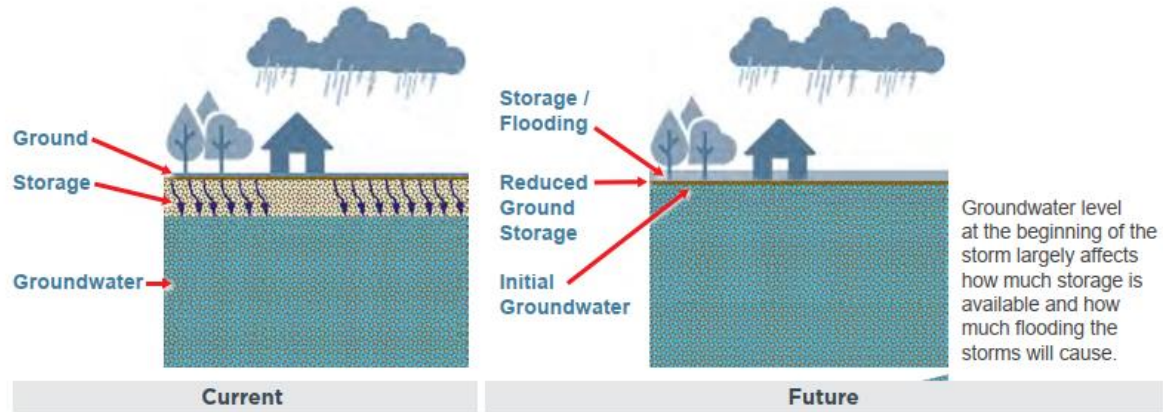
## PROBABILITY OF FUTURE OCCURRENCE

While limited information is available on localized stormwater events in Miramar, it can be assumed based on NCEI data and local flood reporting that these events are highly likely to occur. Additionally, periods of heavy rain associated with climate change increase the likelihood of occurrence.

**Probability: 4 – Highly Likely**

## CLIMATE CHANGE AND FUTURE CONDITIONS

Miramar experiences a high groundwater table due to its low-lying topography. Sea level rise and increased extreme precipitation events, associated with climate change, cause these groundwater levels to rise further. Broward County and its municipalities, including Miramar, depend on ground storage to manage stormwater, and increasing groundwater levels result in less storage. Essentially, as the groundwater table rises, there is less dirt to soak up heavy rainfall, increasing the likelihood of stormwater flooding. The impact of a higher groundwater table is shown in Figure 4.21.

**Figure 4.21 - The Stormwater Management System is Dependent on Ground Storage**

Source: Broward County Countywide Resilience Plan, 2025

Overall, as heavier rainfall events occur, the likelihood of localized stormwater flooding increases as more and more water is trapped by impervious surfaces. Broward County’s Countywide Resilience Plan recommends adoption of low impact development strategies such as swales, which can improve stormwater absorption. It also highlights strategies such as converting two-way roads to one-lane to increase pervious surface and converting 10% of large impervious surfaces (such as parking lots) to storage areas. These strategies reduce the likelihood of localized flooding events as they allow for more rainfall to be absorbed by the ground.

Additionally, expansion of impervious surfaces – typically associated with new development – further places additional strain on the city’s ability to handle stormwater flooding and necessitates adequate on-site stormwater management. If new developments do not incorporate adequate on-site stormwater management, not only will more property be exposed due to new construction, but an associated increase in impervious surface and reduction in flood storage areas could increase the vulnerability of existing property within these areas.

### VULNERABILITY ASSESSMENT

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

#### *Vulnerability – Medium*

#### 4.4.4 TROPICAL CYCLONES

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Tropical Cyclones	Likely	Catastrophic	Large	More than 24 hrs	Less than 1 week	3.3

#### HAZARD DESCRIPTION

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

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

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

As an incipient hurricane develops, barometric pressure (measured in millibars or inches) at its center falls and winds increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. Hurricanes are given a classification based on the Saffir-Simpson Scale; this scale is reproduced in Table 4-30. The progression of a tropical disturbance is described below.

**Tropical Depression:** A tropical cyclone with maximum sustained winds of 38 mph (33 knots) or less.

**Tropical Storm:** A tropical cyclone with maximum sustained winds of 39 to 73 mph (34 to 63 knots).

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

**Major Hurricane:** A tropical cyclone with maximum sustained winds of 111 mph (96 knots) or higher, corresponding to a Category 3, 4 or 5 on the Saffir-Simpson Hurricane Wind Scale.

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

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

**Warning Time: 1 – More than 24 hours**

**Duration: 3 – Less than 1 week**

### LOCATION

Hurricanes and tropical storms can occur anywhere within the City of Miramar planning area. While coastal areas are most vulnerable to hurricanes, their wind and rain impacts can be felt hundreds of miles inland.

**Spatial Extent: 4 – Large**

### EXTENT

Hurricanes and tropical storms can cause catastrophic damage to coastlines and several hundred miles inland. Wind speed is the determining factor in the Saffir-Simpson Scale (Table 4-30), which is used as a measure of hurricane intensity and rated on a scale of 1 to 5, with 5 being the most intense.

Hurricane force winds can extend outward by about 35 miles from the eye of a small hurricane to more than 150 miles from the center of a large hurricane. Tropical storm force winds may extend even further, up to approximately 300 miles from the eye of a large hurricane. In general, the front right quadrant of a storm, relative to its direction of movement, is the most dangerous part of the storm. Wind speeds are highest in this area due to the additive impact of the atmospheric steering winds and the storm winds.

**Table 4-30 – Saffir-Simpson Scale**






Category	Maximum Sustained Wind Speed (MPH)	Types of Damage
1	74-95	Very dangerous winds will produce some damage; Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap, and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110	Extremely dangerous winds will cause extensive damage; Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3	111-129	Devastating damage will occur; Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4	130-156	Catastrophic damage will occur; Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted, and power poles downed. Fallen trees and power poles will isolate residential

Category	Maximum Sustained Wind Speed (MPH)	Types of Damage
		areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
<b>5</b>	157 +	Catastrophic damage will occur; A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: National Hurricane Center

The Saffir-Simpson Scale categorizes hurricane intensity linearly based upon maximum sustained winds and barometric pressure, which are combined to estimate potential damage. Categories 3, 4, and 5 are classified as “major” hurricanes and, while hurricanes within this range comprise only 20 percent of total tropical cyclone landfalls, they account for over 70 percent of the damage in the United States. Table 4-31 describes the damage that could be expected for each category of hurricane. Damage during hurricanes may also result from spawned tornadoes, storm surge, and inland flooding associated with heavy rainfall that usually accompanies these storms.

**Table 4-31 – Hurricane Damage Classifications**

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

Source: National Hurricane Center; Federal Emergency Management Agency

The City of Miramar is susceptible to any category of hurricane, including Category 5 storms.

***Impact: 4 – Catastrophic***

## HISTORICAL OCCURRENCES

According to NOAA Historical Hurricane Tracks data, 65 hurricanes and tropical storms made landfall within 50 miles of the City of Miramar between 1900 and 2024. These storm tracks are shown in Figure 4.22. A summary of the storms by hurricane category is provided in Table 4-32.

**Table 4-32 - Landfalling Tropical Cyclone in City of Miramar, 1900-2024**

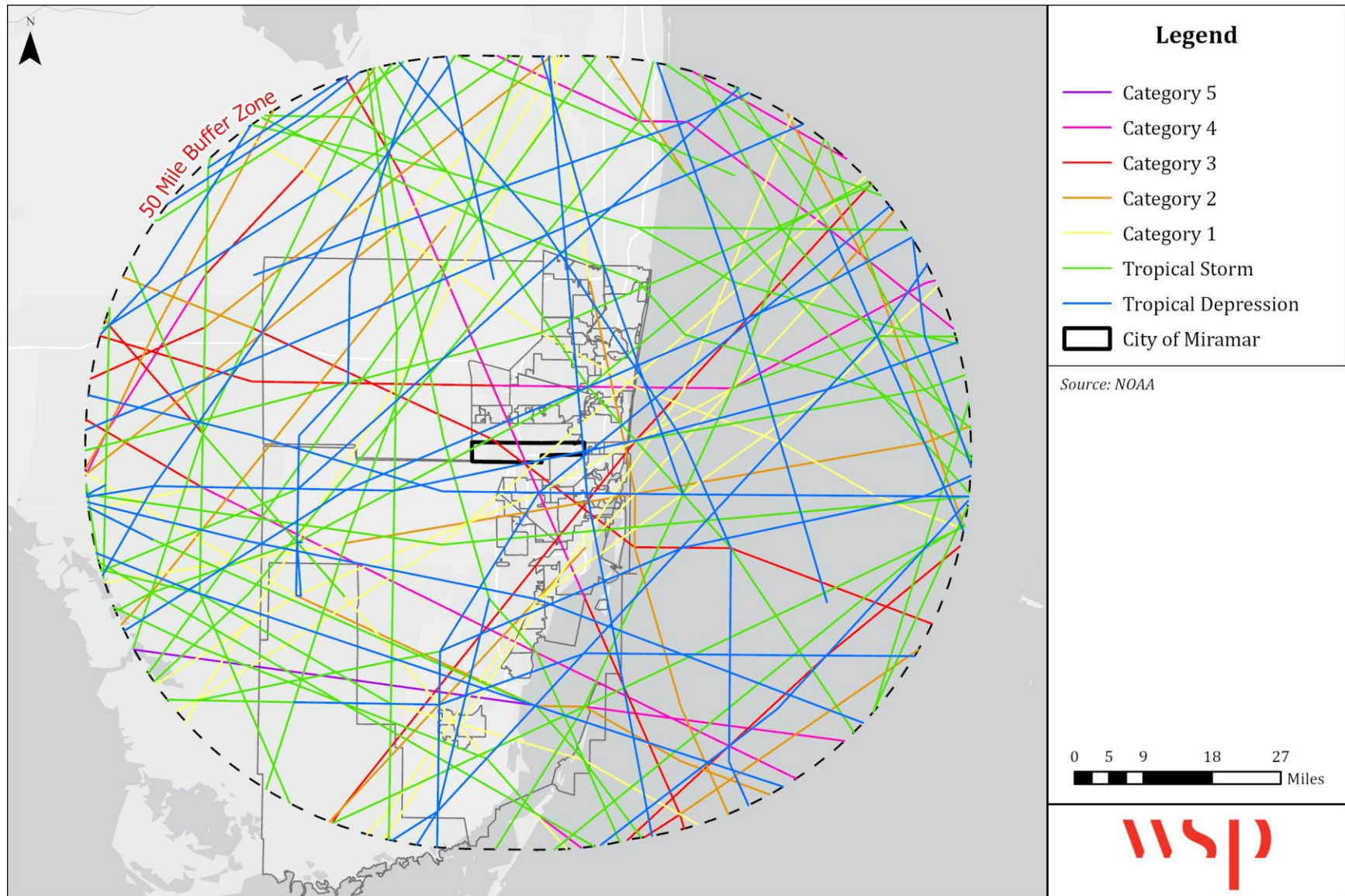
Storm Name	Date	Storm Category	Max Wind (mph)
Unnamed	8/10/1901	Tropical Storm	40
Unnamed	9/11/1903	Category 1	75
Unnamed	10/17/1904	Category 1	70
Unnamed	10/18/1906	Category 3	105
Unnamed	6/17/1906	Category 1	75
Unnamed	9/18/1907	Tropical Depression	30
Unnamed	10/11/1909	Category 3	100
Unnamed	9/26/1909	Tropical Depression	30
Unnamed	8/29/1909	Tropical Storm	45
Unnamed	6/28/1909	Tropical Storm	45
Unnamed	11/15/1916	Tropical Storm	53
Unnamed	8/25/1916	Tropical Storm	40
Unnamed	5/14/1916	Tropical Storm	38
Unnamed	10/21/1924	Category 1	76
Unnamed	10/21/1926	Category 3	110
Unnamed	9/18/1926	Category 4	125
Unnamed	9/16/1928	Category 4	128
Unnamed	8/30/1932	Tropical Storm	55
Unnamed	11/4/1935	Category 2	85
Unnamed	7/29/1936	Tropical Storm	55
Unnamed	6/15/1936	Tropical Storm	40
Unnamed	10/6/1941	Category 2	85
Unnamed	9/15/1945	Category 4	115
Unnamed	11/1/1946	Tropical Storm	40
Unnamed	10/12/1947	Category 1	80
Unnamed	9/17/1947	Category 4	115
Unnamed	10/5/1948	Category 2	90
Unnamed	9/22/1948	Category 4	115
Unnamed	8/26/1949	Category 4	115
King	10/18/1950	Category 4	115
Unnamed	2/3/1952	Tropical Storm	55
Unnamed	10/5/1953	Tropical Storm	35
Unnamed	8/29/1953	Tropical Depression	28
Unnamed	7/11/1953	Tropical Depression	28
Unnamed	6/18/1954	Tropical Depression	30
Unnamed	10/15/1956	Tropical Storm	55
Unnamed	5/25/1958	Tropical Depression	25
Florence	9/23/1960	Tropical Storm	35
Alma	8/26/1962	Tropical Depression	28
Isbell	10/14/1964	Category 2	90
Cleo	8/27/1964	Category 2	95

<b>Storm Name</b>	<b>Date</b>	<b>Storm Category</b>	<b>Max Wind (mph)</b>
Unnamed	9/27/1968	Tropical Depression	30
Dolly	8/10/1968	Tropical Depression	30
Gerda	9/7/1969	Tropical Depression	25
Unnamed	8/29/1971	Tropical Depression	25
Dawn	9/5/1972	Tropical Depression	30
Unnamed	10/6/1974	Tropical Storm	43
Dottie	8/19/1976	Tropical Storm	35
Unnamed	6/11/1976	Tropical Depression	20
David	9/3/1979	Category 2	85
Dennis	8/17/1981	Tropical Storm	35
Unnamed	7/2/1981	Tropical Depression	25
Isidore	9/27/1984	Tropical Storm	50
Bob	7/23/1985	Tropical Storm	40
Ana	6/29/1991	Tropical Depression	20
Andrew	8/24/1992	Category 5	145
Jerry	8/23/1995	Tropical Storm	35
Irene	10/16/1999	Category 1	70
Harvey	9/21/1999	Tropical Storm	50
Ivan	9/20/2004	Tropical Depression	25
Wilma	10/24/2005	Category 3	105
Katrina	8/25/2005	Category 1	70
Ernesto	8/30/2006	Tropical Storm	40
Bonnie	7/23/2010	Tropical Storm	35
Sally	9/12/2020	Tropical Storm	35

Source: NOAA

The map below is not an exhaustive list of hurricanes that have affected the City of Miramar. Several storms have not made landfall in the city, yet some have caused wind or rain impacts.

Figure 4.22 - Hurricane/Tropical Storm Tracks within 50 miles, 1900-2024



Source: NOAA Historical Hurricane Tracks

NCEI records hurricane and tropical storm events across the region by county and zone; therefore, one event that impacts multiple jurisdictions may be recorded multiple times. During the 28-year period from 1997 through 2024, NCEI records 36 hurricane and tropical storm events. The 26 named storms associated with these events are summarized in Table 4-33. This table only represents those events reported to NCEI as a Hurricane or Tropical Storm. Where property damage estimates were broken out by type, NCEI reports only the value of wind-related damages.

**Table 4-33 - Recorded Hurricanes and Typhoons in Broward County, 1997-2024**

Date	Storm	Deaths/Injuries	Property Damage	Crop Damage
9/25/1998	Tropical Storm	0/0	\$0	\$0
11/4/1998	Tropical Storm Mitch	0/65	\$30,000,000	\$20,000,000
9/13/1999	Hurricane Floyd	0/0	\$0	\$0
9/20/1999	Tropical Storm Harvey	0/0	\$0	\$0
10/14/1999	Tropical Storm Irene	0/4	\$54,000,000	\$33,000,000
9/16/2000	Tropical Storm Gordon	0/0	\$0	\$0
11/5/2001	Hurricane Michelle	0/0	\$30,000	\$0
9/4/2004	Hurricane Frances	0/0	\$80,000,000	\$0
9/25/2004	Hurricane Jeanne	0/0	\$50,000,000	\$0
6/9/2005	Tropical Storm Arlene	0/0	\$0	\$0
7/8/2005	Hurricane Dennis	1/0	\$0	\$0
8/25/2005	Tropical Storm Katrina	0/0	\$36,000,000	\$0
9/20/2005	Hurricane Rita	0/0	\$0	\$0
10/24/2005	Hurricane Wilma	1/0	\$0	\$0
8/29/2006	Tropical Storm Ernesto	0/0	\$0	\$0
8/18/2008	Tropical Storm Fay	0/1	\$15,000	\$0
8/25/2011	Hurricane Irene	0/0	\$0	\$0
8/26/2012	Tropical Storm Isaac	0/0	\$350,000	\$0
10/25/2012	Hurricane Sandy	0/0	\$0	\$0
9/9/2017	Hurricane Irma	1/0	\$0	\$0
9/2/2018	Tropical Storm Gordon	0/0	\$0	\$0
11/8/2020	Tropical Storm Eta	0/0	\$0	\$0
9/27/2022	Tropical Storm Ian	0/0	\$0	\$0
11/8/2022	Hurricane Nicole	0/0	\$0	\$0
9/26/2024	Hurricane Helene	0/0	\$0	\$0
10/9/2024	Hurricane Milton	0/0	\$0	\$0
<b>Total</b>		<b>3/70</b>	<b>\$250,395,000</b>	<b>\$53,000,000</b>

Source: NCEI

**September 16<sup>th</sup>, 2000** - Tropical Storm Gordon formed in the Gulf of Mexico about 375 miles west of Naples late on September 15. It moved northeast, briefly intensified to hurricane strength, then moved ashore in the Big Bend area of Florida as a tropical storm late on September 17. The outer fringes of Gordon moved across south Florida producing 3-6 inches of rain, numerous funnel clouds and waterspouts and at least three tornadoes.

**August 25<sup>th</sup>, 2005** - A tropical wave that moved across the Atlantic from near the west coast of Africa eventually spawned the tropical cyclone that became hurricane Katrina. The tropical wave became a tropical depression near the central Bahamas late on August 22. The depression moved slowly northwest and became tropical storm Katrina on August 24 near the northwest Bahama Islands then turned west and intensified to a hurricane on August 25, a few hours before making landfall on the southeast Florida Coast.

**August 26<sup>th</sup>, 2012** - Tropical Storm Isaac moved west-northwest across the Florida Straits south of the Florida Keys on August 26. The northern edge of the wind and rain area associated with Isaac affected the South Florida peninsula throughout the day on the 26th. Isaac continued on a west-northwest track into the Gulf of Mexico on the 27th with winds, rain and flooding continuing over parts of South Florida.

**September 9<sup>th</sup>, 2017** - Major Hurricane Irma made landfall in Southwest Florida on Marco Island as a Category 3 hurricane around 330 PM EDT on September 10th. The storm traveled north through southwest Florida through the evening. Effects from Irma were felt across South Florida from September 9th through September 11th. Irma had reached Category 5 strength and a minimum central pressure of 914 MB east of the Bahamas, maintaining Category 5 intensity until landfall along the north coast of Cuba on September 9th. Irma made its first Florida landfall in the Lower Florida Keys early on September 10th as a Category 4 hurricane. The strength and size of Hurricane Irma allowed impacts to be felt across all of South Florida. Irma brought widespread wind damage, heavy rainfall and storm surge to all areas. Hurricane-force sustained winds were measured in much of Collier County, as well as far southern and inland Miami-Dade County, with the possibility of additional hurricane-force sustained wind in more isolated areas over the remainder of South Florida where widespread tropical force sustained wind occurred. Widespread tree damage and some structural damage occurred across all of South Florida, with most structural damage on the minor side. Irma brought a significant storm surge on both coasts of South Florida. Storm surge of 6 to 8 feet was observed in the Everglades City and Goodland areas of Collier County, with 3 to 5 feet from Marco Island to Naples. Along the east coast, observed storm surge values of 4 to 6 feet were noted along Biscayne Bay from south of Miami to Homestead, and 2 to 4 feet elsewhere along the east coast from Key Biscayne to Palm Beach. Hurricane Irma brought widespread rainfall and some flooding across the region. From the period between 8 AM EDT September 9th and 8 AM EDT September 11th, 8 to 15 inches of rain were measured over interior portions of Southwest Florida, with estimated amounts of 16 to 20 inches in southwestern Hendry County. This rainfall near the end of a wet summer led to significant flooding over these areas. Around 5 to 10 inches of rain were noted elsewhere across South Florida. Around 32 deaths were attributed to Irma in southern Florida. The only direct death was an 86-year-old man who was knocked down by a gust of wind while opening the front door of his home in Broward County. Most of the deaths occurred during cleanup after the storm, as well as several as a result of carbon monoxide poisoning from misuse of generators. Initial and incomplete damage estimate across the area is estimated to be around \$800 million, but in all likelihood will be much higher once damage assessments are completed. |Total number of people who were at county evacuation shelters were as follows: Miami-Dade County - 31,092, Palm Beach County - 17,263, Collier County - 17,040, Broward County - 17,000, Hendry County - 3,000||Total number of customers without power were as follows: Miami-Dade County - 888,530, Broward County - 689,000, Palm Beach County- 566,240, Collier County - 197,630, Hendry County - 9,700, Glades County - 1,670.

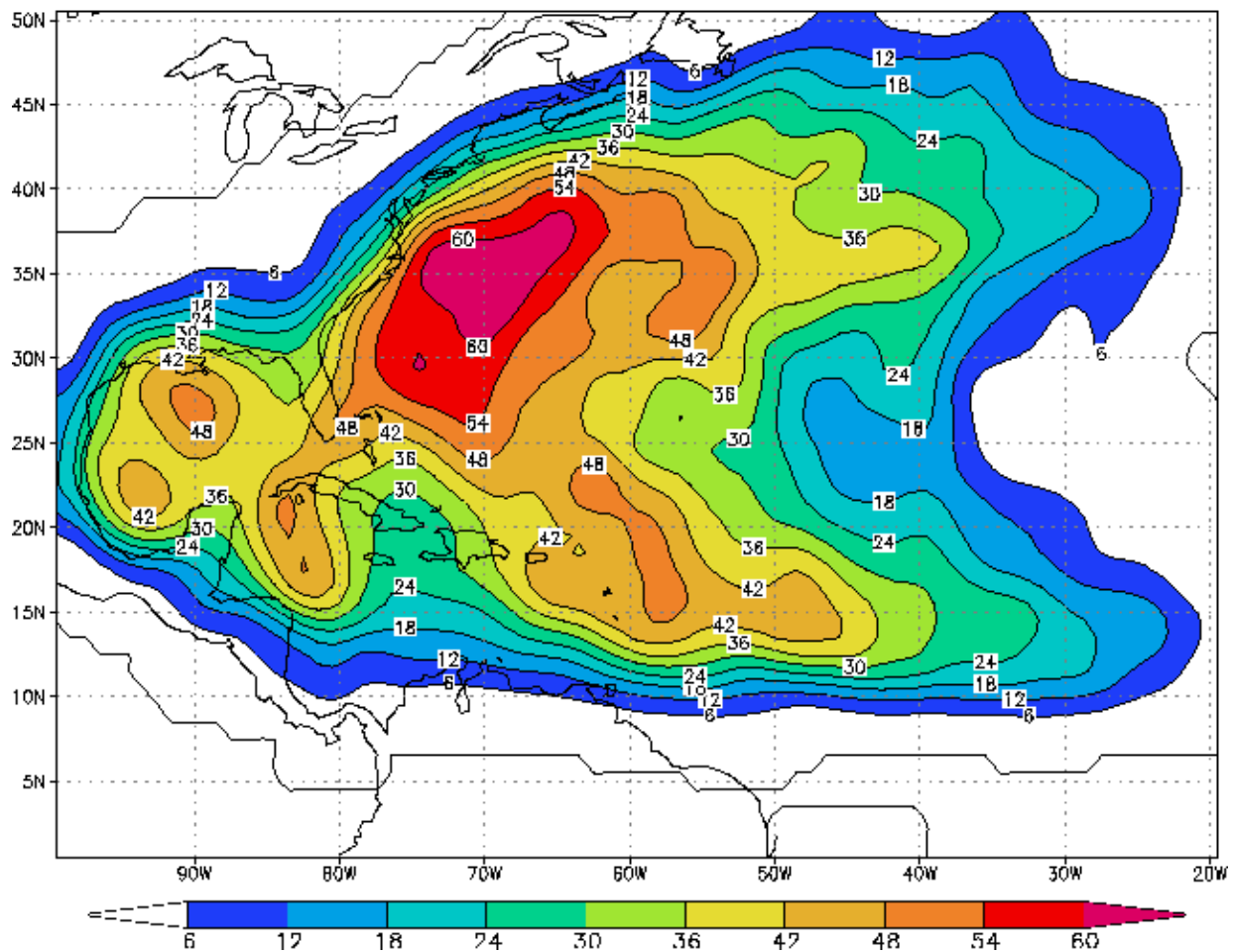
**October 9<sup>th</sup>, 2024** - Hurricane Milton became a Category 5 hurricane in the southwestern Gulf of Mexico. Milton's maximum winds decreased as it approached the Florida peninsula on Wednesday, October 9th, and made landfall near Siesta Key as a Category 3 hurricane with maximum sustained winds of 120 mph and a minimum central pressure of 954 mb. The outer circulation of Milton began affecting South Florida late on October 8th, with sustained tropical storm force winds spreading across much of the region through the early morning hours of Thursday, October 10th. A total of 15 tornadoes were recorded across South Florida on Wednesday, October 9th, two of these reaching EF-3 on the Enhanced Fujita Scale. Moderate to major coastal flooding occurred most of the Collier County coast. The tide level at the NOS gauge in Naples Bay near the city dock reached 5.08 ft above Mean Higher High Water (MHHW). A total of 2,900 people evacuated to refuge centers in Collier County, and about 1,000 in Palm Beach County. All of the associated effects of Milton in South Florida resulted in 10 injuries and at least \$361 million in property damage. The 15 tornadoes associated with Milton resulted in 10 injuries and at least \$81 million in damage, mainly in Palm Beach and Glades counties.

## PROBABILITY OF FUTURE OCCURRENCE

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

Figure 4.23 shows, for any location, the chance of a hurricane or tropical storm affecting the area sometime during the Atlantic hurricane season. The figure was created by NOAA's Hurricane Research Division, using data from 1944 to 1999. The figure shows the number of times a storm or hurricane was located within approximately 100 miles (165 kilometers) of a given spot in the Atlantic basin. Per this data, there has historically been approximately a 42% - 48% chance of a hurricane occurring in the City of Miramar in any given year.

**Figure 4.23 - Empirical Probability of a Named Hurricane or Tropical Storm**



Source: National Oceanic and Atmospheric Administration, Hurricane Research Division

In the 28-year period from 1997 through 2024, 26 hurricanes and tropical storms have impacted the City of Miramar, which equates to over 92 percent annual probability of hurricane winds impacting the planning area in any given year. This probability does not account for impacts from hurricane rains or storm surge, which may also be severe. The probability of a hurricane or tropical storm impacting the City of Miramar is likely.

**Probability: 3 – Likely**

## CLIMATE CHANGE

The City of Miramar's coastal location makes it a prime target for hurricane landfalls and changing climate and weather conditions may increase the number and frequency of future hurricane events. Hurricanes and other coastal storms may result in increased flooding, injuries, deaths, and extreme property loss. According to the US Government Accountability Office, national storm losses from changing frequency and intensity of storms are projected to increase anywhere from \$4-6 billion in the near future.

According to NOAA, weather extremes will likely cause more frequent, stronger storms in the future due to rising surface temperatures. NOAA models predict that while there may be less frequent, low-category storm events (Tropical Storms, Category 1 Hurricanes), there will be more high-category storm events (Category 4 and 5 Hurricanes) in the future. This means that there may be fewer hurricanes overall in any given year, but when hurricanes form, it is more likely that they will become large storms that can create massive damage.

## VULNERABILITY ASSESSMENT

Due to its coastal geography, the entire City of Miramar is uniformly likely to experience winds and heavy rain from hurricanes and tropical storms. Children, elderly, individuals with disabilities, and others who may have difficulty evacuating are especially vulnerable to harm from these storms and can result in immediate and long-term physical and emotional health problems among victims. In addition to damages from heavy rain and flooding, hurricanes can cause significant wind damage. Depending on the size and strength of the hurricane, associated winds are capable of damaging and destroying property and buildings. Additionally, hurricane winds can cause massive damage to the natural environment, uprooting trees and other debris within the storm's path. Wind-borne debris can exacerbate flooding by clogging stormwater systems and waterways and causing erosion.

***Vulnerability – High***

## 4.5 RISK AND VULNERABILITY CONCLUSIONS

### 4.5.1 FLOOD HAZARDS PROFILE SUMMARY

Table 4-34 summarizes the results of the hazard profile for the City of Miramar based on hazard identification data and input from the FMPC. For each hazard profiled within Section 4.4, this table includes the relative risk for the City according to the results of the Priority Risk Index (PRI).

**Table 4-34 – Summary of Flood Hazard Profile Results**

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Flood	Likely	Critical	Moderate	6 to 12 hours	Less than 1 week	3.0
Levee Failure	Unlikely	Limited	Moderate	Less than 6 hours	Less than 1 week	2.2
Stormwater/Localized Flooding	Highly Likely	Limited	Moderate	Less than 6 hours	Less than 24 hours	2.9
Tropical Cyclones	Likely	Catastrophic	Large	More than 24 hours	Less than 1 week	3.3

The results from the PRI have been classified into three categories based on the assigned risk value which are summarized in Table 4-35 below:

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

**Table 4-35 – Summary of Hazard Risk Classification**

<b>High Risk (≥ 3.0)</b>	Flood Tropical Cyclones
<b>Medium Risk (2.0 - 2.9)</b>	Levee Failure Stormwater/Localized Flooding
<b>Low Risk (&lt; 2.0)</b>	<i>none</i>

### 4.5.2 ASSESSMENT OF AREAS LIKELY TO FLOOD

The following targeted areas are identified as areas likely to flood in the future.

#### SFHAS AND 0.2%-ANNUAL-CHANCE FLOODPLAINS

82.8% of the City of Miramar falls within the 1-percent-annual-chance floodplain and 13.3% located in the 0.2%-annual-chance floodplain. Only 3.7% of the city is located in an area with minimal flood hazard. Therefore, the majority of Miramar has high to moderate risk of flooding. Changes in floodplain development and future development within the watershed in general as well as climate change-driven

changes in rainfall and sea level rise may increase the size of the SFHAs and the depth of flooding in the future. See Section 4.4.1 and Figure 4.7 for a description and map of the SFHA and 0.2 percent annual chance floodplain.

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#### AREAS OF LOCALIZED STORMWATER FLOODING

It is highly likely that underperforming drainage infrastructure and unmitigated properties will continue to experience localized flooding problems. An increase in impervious area due to future development in the drainage basins where localized flooding is already a noted problem could exacerbate existing localizing flooding issues. Increases in future flooding and new areas of localized flooding may arise if additional development and increases in impervious surface occur without measures taken to reduce the volume of runoff. See Section 4.4.3 and Figure 4.20 for a description and map of localized flooding hotspots throughout the city.

The City has several Capital Improvement Program (CIP) projects currently funded, or soon to be, that are related to drainage, including Historic Miramar drainage improvements (phase IV, V), utilities collection and distribution system improvements, wastewater collection system improvements, and water distribution system improvements. The City maintains a list of CIP projects that are implemented throughout a five-year plan; additional drainage projects will continue to be identified and implemented through this process.

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#### REPETITIVE LOSS AREAS

It is very likely that unmitigated repetitive loss properties will continue to flood in the future. Repetitive loss properties have a greater need for flood protection. Repetitive loss can be attributed to development within the SFHA as well as localized stormwater flooding. As mentioned above, rainfall-induced flooding and localized stormwater flooding could increase in the future if measures are not taken to mitigate the effects of development. Additionally, raising groundwater levels and high tides could influence flood conditions in Miramar and potentially worsen existing repetitive flooding problems.

#### REPETITIVE LOSS ANALYSIS

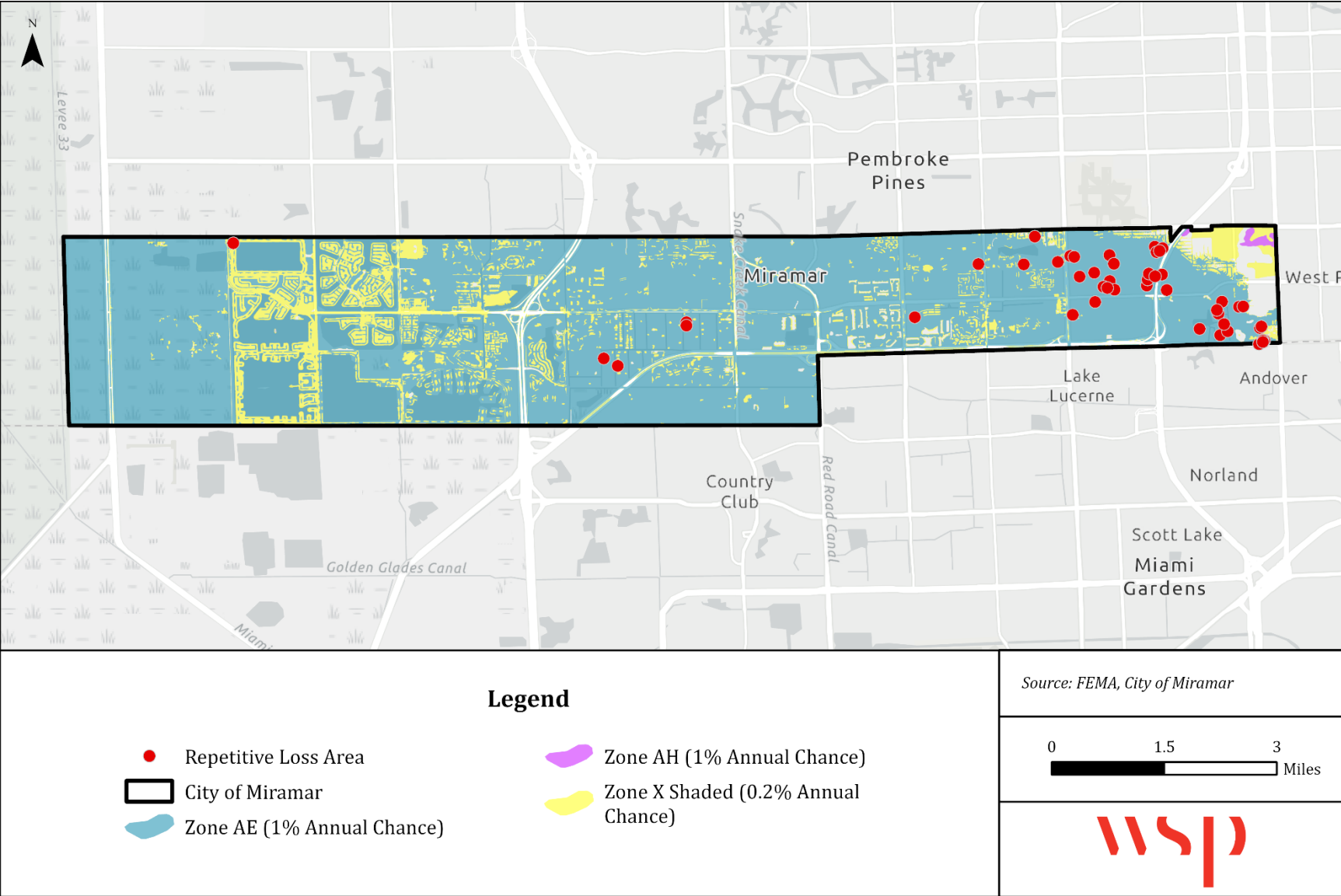
A repetitive loss property is a property for which two or more flood insurance claims of more than \$1,000 have been paid by the NFIP within any 10-year period since 1978. An analysis of repetitive loss was completed to examine repetitive loss properties against FEMA flood zones.

According to 2025 NFIP records, there are a total of 47 unmitigated repetitive loss properties in the City of Miramar. All of these properties are residential; there are no non-residential repetitive loss properties in Miramar.

#### REPETITIVE LOSS AREA MAPPING

The NFIP list of unmitigated repetitive loss properties is not a complete list of properties at risk to repeat flood events, as there are likely other properties that have not filed flood insurance claims but that have flood conditions similar to those on the repetitive loss list. Miramar is working to identify repetitive loss areas in accordance with the principles outlined in the CRS guidance titled Mapping Repetitive Loss Areas dated August 15, 2008. To define repetitive loss areas, the above list of FEMA-identified repetitive loss properties will be mapped along with historical claim properties (those with one claim paid against the NFIP) and additional surrounding properties with similar flood conditions. Flood sources, flood hazard areas, topography, and other factors will also be considered. Figure X shows general repetitive loss areas in relation to FEMA flood hazard areas.

**Table 4-36 - Overview of Repetitive Loss Areas**



### IMPACT OF FUTURE FLOODING

Changes in floodplain development, development in the Snake Creek Canal and Royal Glades Canal watersheds, and changes associated with climate change could make future flood problems worse in the above identified areas that are likely to flood.

### CHANGES IN FLOODPLAIN DEVELOPMENT

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

To evaluate the potential for new development in the SFHA, unimproved parcels (those that are vacant, have no building footprint, or have no improved value) were compared with the SFHA and the City's future land use. There are approximately 520 parcels with 3,897 acres of unimproved area within SFHA in Miramar; almost all of that acreage is in Zone AE with 0.5 acres is in Zone AH. Within the SFHA, most of the unimproved acreage is planned for low density residential, rural, retail uses, and utility uses (water supply).

Low density residential use and rural areas are likely to maintain larger areas of pervious surface and green space, which could minimize potential increases in flooding and associated impacts on existing development. Cluster development, stream buffers, and other growth management techniques could be used in these areas to minimize the exposure of the new development. Without preventive mitigation, exposure to flood risk within the SFHA could increase in the future.

The City has several regulatory tools in place, including the City of Miramar Stormwater Management Program, which helps City staff minimize the potential for new development in the floodplain.

**Table 4-37 - Future Land Use of Unimproved Parcels in the SFHA**

Future Land Use	Zone AE		Zone AH	
	Parcel Count	Total Acreage	Parcel Count	Total Acreage
Commercial	7	10.4	1	0.1
Estate (1 DU/AC)	37	93.3	-	-
Industrial	7	35.8	-	-
Institutional & Public Facility	1	107.3	-	-
Low 2	23	56.2	-	-
Low 3	126	418.5	-	-
Low 5	109	261.2	-	-
Low Medium 10	27	10.3	-	-
Medium 16	11	3.5	-	-
Medium High 25	1	2.1	-	-
Office Park	1	1.3	-	-
Recreation & Open Space	2	0.1	-	-
Regional Activity Center	47	264.0	-	-
Reserve Water Supply Area	37	697.0	-	-
Rural	62	1893.3	-	-
Transit Oriented Corridor	18	42.0	2	0.5
Transportation	1	0.1	-	-
<b>Total</b>	<b>517</b>	<b>3,896.5</b>	<b>3</b>	<b>0.6</b>

### CHANGES IN THE WATERSHED

Changes in the watershed, particularly an increase in impervious area, could make flood prone areas even more likely to flood in the future. As noted in Section 3.6.1, the City's current zoning reflects that over 4,000 acres (23% of the city) is zoned for planned development. Future land use designations in these areas

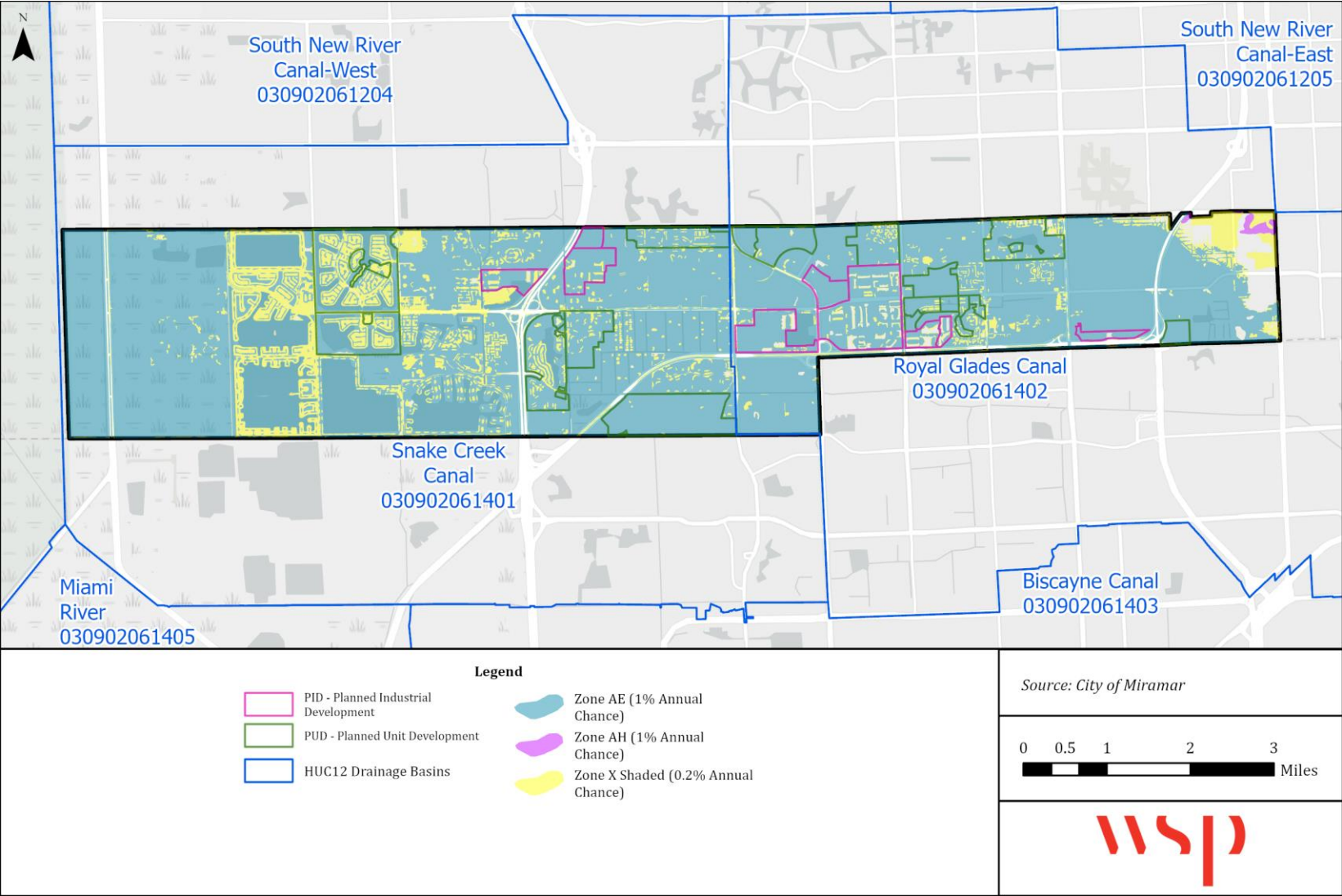
include primarily low density residential, industrial, and regional activity center. Lower densities may minimize the potential for increases in runoff.

Around 126 unimproved parcels, within the SFHA, were identified within areas of new planned unit development or industrial development – areas with no buildings that are planned for future development. Most parcels with planned development designation are located in the SFHA, with the remaining located in the Shaded Zone X.

Figure 4.24 shows the location of these planned developments, which are dispersed across both the Snake Creek Canal and Royal Glades Canal watersheds, within the City of Miramar. No single watershed is experiencing the brunt of new development.

The City’s Stormwater Drainage, Water Management Design, and Floodplain Management Standards allow City staff to regulate development both in and out of the floodplain in an effort to protect the watersheds.

**Figure 4.24 - Planned Residential Development**



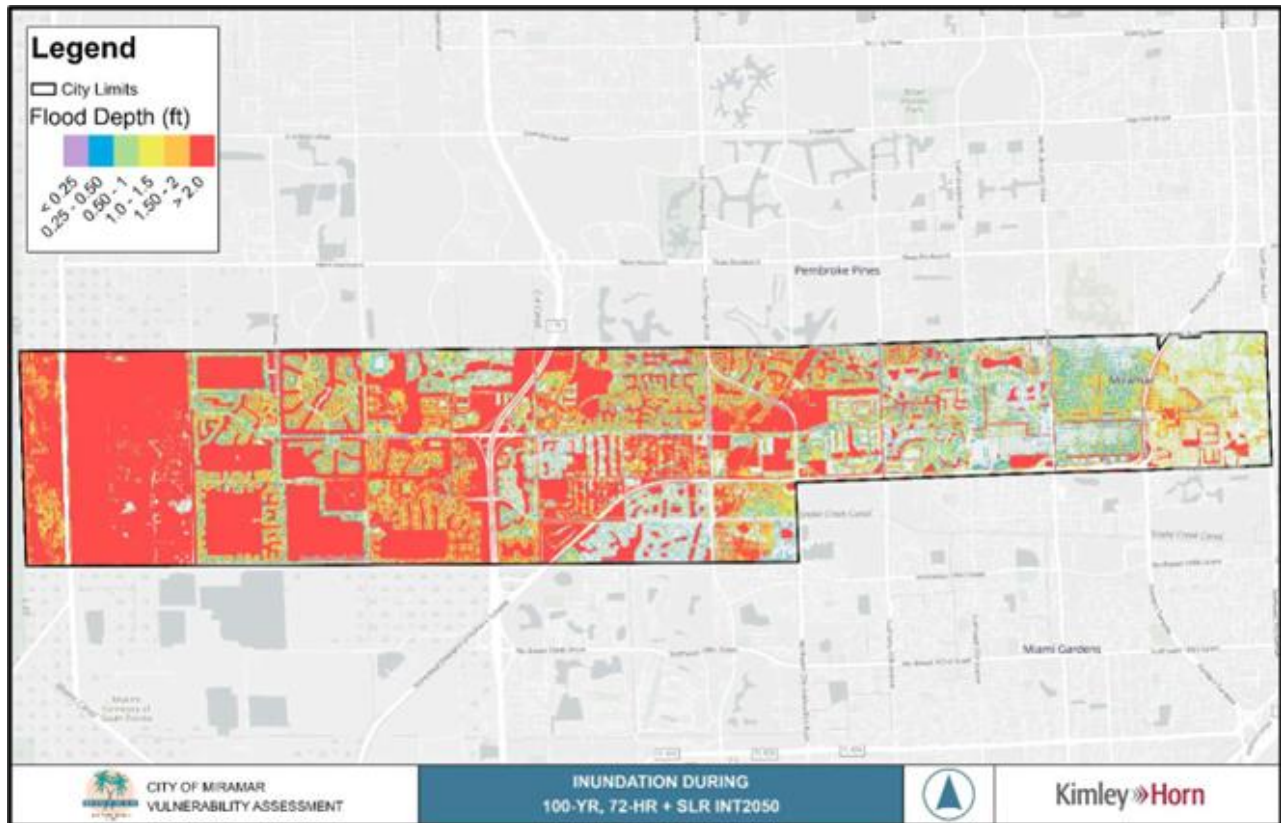
### CLIMATE CHANGE

As discussed in Section 4.1.4, climate change is expected to cause an increase in the frequency and intensity of heavy precipitation events and contribute to sea level rise. Future flood conditions in all identified areas would be impacted by these changes, as intense rainfall may result in greater runoff volumes which could overwhelm canals and floodplains as well as stormwater drainage systems. Additionally, groundwater levels increase with sea level rise, which means the ground can hold less water. The amount of groundwater storage impacts how much flooding heavy precipitation and storm events cause.

The City of Miramar released a sensitivity analysis as part of their vulnerability assessment in June 2025. This report identifies the city's canals and lakes, low-lying topography, and high groundwater table as features that make the city particularly vulnerable to the impacts of sea-level rise and extreme weather. Using this context, the report assesses the impact of projected rainfall events, sea-level rise, king tide events, and compound flooding in Miramar.

In the sensitivity analysis, projected rainfall with sea level rise flooding inundation extents were evaluated using data collected for the 100-year, 72-hour rainfall and projected sea level rise scenarios. Results of the projected compound rainfall and sea level rise scenario indicate significant flooding potential throughout the whole city, with the highest flooding occurring on the road centerlines and neighborhoods. Shown in Figure 4.25, below, much of the city is impacted by projected rainfall and the 2050 intermediate sea level rise scenario. Modeled flooding extent increases under the intermediate 2080 sea level rise projection.

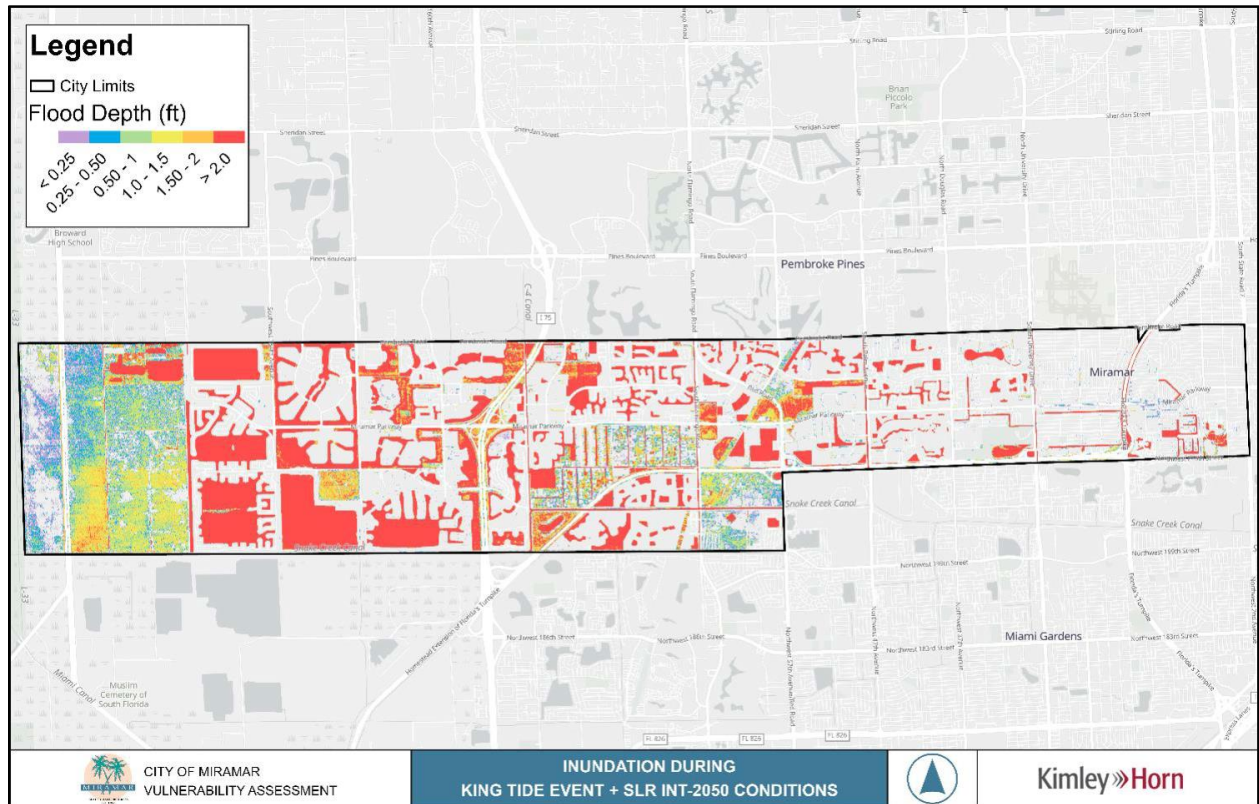
**Figure 4.25 - Future Flood Inundation: 100-year 72-hour Rainfall Event and Intermediate 2050 Sea Level Rise Projection**



Source: City of Miramar Vulnerability Assessment

The sensitivity analysis also examined potential impacts from king tides. Studied scenarios indicate limited flooding impacts to the City under current conditions, with only surface waters within the City's boundaries being affected. However, areas surrounding any surface waters are impacted by the future king tide flooding scenario coupled with sea level rise. King tide flooding extent further expands when combined with intermediate 2080 sea level rise projections, as flooding in this scenario encroaches into roads, adjacent neighborhoods, and impacts some critical infrastructure. Figure 4.26 shows the future king tide flooding extents coupled with the intermediate 2050 sea level rise scenario.

**Figure 4.26 – Future Flood Inundation: King Tide and Intermediate 2050 Sea Level Rise**



Source: City of Miramar Vulnerability Assessment

Table 4-38 and Table 4-39 below summarize the number of assets impacted by the future flood scenarios. The assets are categorized by FEMA Lifeline.

**Table 4-38 – Assets Exposed to Projected Rainfall (100-Year/72-Hour) & 2050 Sea Level Rise (Intermediate)**

FEMA Lifeline	Low	Medium	High
Water Systems	0	0	3

**Table 4-39 – Assets Exposed to Compound Flooding (100-Year) & King Tide & 2050 Sea Level Rise (Intermediate)**

FEMA Lifeline	Low	Medium	High
Water Systems	1	0	3
Food, Hydration, Shelter	2	0	0

### 4.5.3 HEALTH & SAFETY CONSEQUENCE ANALYSIS

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

#### PUBLIC HEALTH

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

- Floodwaters carry anything that was on the ground that the upstream runoff picked up, including dirt; oil; human and livestock waste; household, medical, and industrial hazardous waste; coal ash waste that can contain carcinogenic compounds; or lawn, farm and industrial chemicals. Pastures and areas where farm animals are kept or their wastes are stored can contribute polluted waters to the receiving streams.
- Flood-borne debris, including lumber, vehicles, or smaller sharp objects such as glass or metal fragments, can cause injury and subsequent infection. Debris can also present the risk of tetanus.
- Floodwaters saturate the ground, which leads to infiltration into sanitary sewer lines. When wastewater treatment plants are flooded, there is nowhere for the sewage to flow. Infiltration and lack of treatment can lead to overloaded sewer lines that can back up into low-lying areas and homes. Even when it is diluted by flood waters, raw sewage can be a breeding ground for bacteria such as E.coli and other disease-causing agents. Waterborne diseases of concern include Norovirus, Rotavirus, Hepatitis A and E, Cholera, and Typhoid. These diseases typically pose an acute risk of outbreak, occurring within 0-7 days.
- Stagnant pools can become breeding grounds for mosquitoes and other disease vectors. Vector-borne diseases of concern include Yellow Fever, West Nile Fever, and Dengue. Vector-borne diseases pose a long-term risk of greater than four weeks.
- Floodwaters can also displace insects, rodents, snakes, and other animals, potentially bringing them into contact with people. Animals can spread disease and can bite people and pets. They may also cause asthma or allergic reactions in some people. Rodent-borne disease outbreaks pose a mid-term risk of 1-4 weeks.
- Wet areas of a building that have not been properly cleaned breed mold and mildew. Mold and mildew can pose a severe health hazard, especially for small children and the elderly.
- Building utilities can harbor health hazards if not properly cleaned. When a furnace or air conditioner is turned on after a flood, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants. If the City water system loses pressure, a boil order may be issued to protect people and animals from contaminated water.
- Flooding can affect mental health due to trauma or stress. People can experience a long-term psychological impact of having been through a flood and seeing their home damaged and personal belongings destroyed. The cost and labor needed to repair a flood-damaged home puts a severe strain on people, especially the unprepared and uninsured. There is also a long-term problem for those who know that their homes can be flooded again. The resulting stress on floodplain residents takes its toll in the form of aggravated physical and mental health problems.
- Overcrowding in shelters can lead to possible disease outbreaks. Respiratory diseases of concern include Influenza, RSV, and COVID-19. Respiratory diseases pose an acute risk of outbreak, typically occurring within 0-7 days.

#### LIFE SAFETY

Flood waters may prevent access to areas in need of response or to the critical facilities themselves, which may prolong response time. The public must understand that they should never drive through flooded streets. The Centers for Disease Control and Prevention report that over half of flood-related drownings occur when a vehicle is driven into flood water, and the next highest percentage of deaths is due to people

walking into or near flood waters. The NWS warns that just 6 inches of fast-moving flood water can knock down an adult, 12 inches can carry away a small car, and 2 feet can carry away most vehicles. When someone drives through floodwater, they put their life and the lives of first responders at risk. First responders are at risk when attempting to rescue people from floodwaters. They are subject to the same hazards as the public and are more likely to be exposed to these hazards during response efforts.

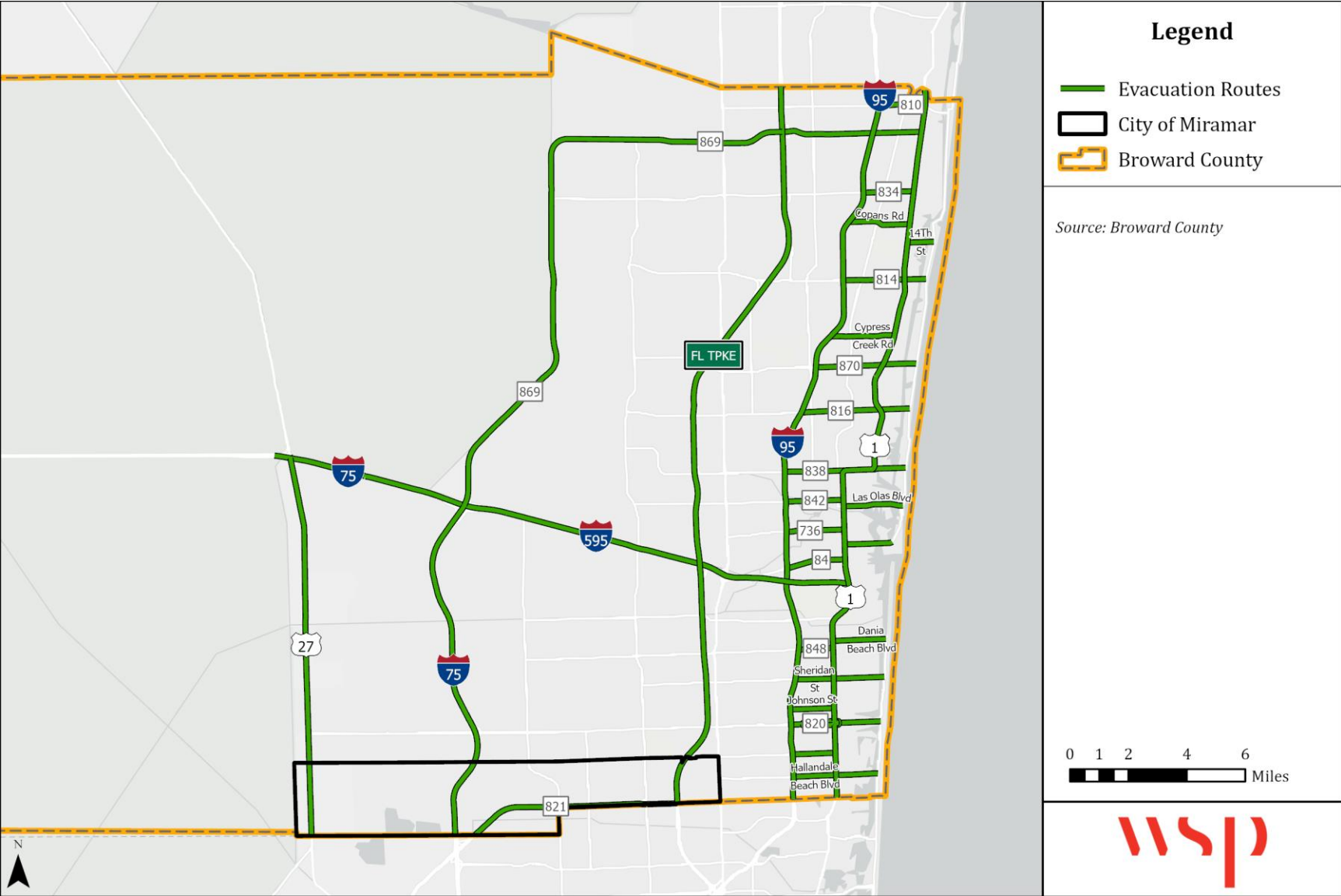
Residential, commercial, and public buildings, as well as critical infrastructure such as transportation, water, energy, and communication systems may be damaged or destroyed by flood waters. Floods can severely disrupt normal operations, especially when there is a loss of power. This can affect the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

### WARNING AND EVACUATION

Miramar coordinates with Broward County Emergency Management in issuing public warnings concerning expected floods and storms. Warnings are provided to the public via the Alert Miramar System, NOAA weather radios, and cable television interruption. Alert Miramar, powered by Everbridge, is a telephone database generated from the City's utility billing records, GIS mapping layers, and manual registrations.

Evacuation zones in Broward County are determined based on proximity to the coast, and therefore, Miramar is not included within the County's two primary evacuation zones – Evacuation Zones A & B. Evacuation zones are correlated with storm surge planning zones. Zone A is at greatest risk for storm surge from Category 1 or Category 2 and Zone B is at risk of storm surge for Category 3 and higher storms. Evacuation routes within Miramar include the Florida Turnpike, SR 821, and I-75 and displayed in Figure 4.27.

Figure 4.27 - Evacuation Routes in Broward County



## 5 CAPABILITY ASSESSMENT

This section provides a summary of the City of Miramar’s capability to implement flood mitigation projects and reduce flood hazard risk. The assessment reviews existing mitigation activities, policies, regulations, and plans that pertain to mitigation and can affect net vulnerability as well as administrative, technical and fiscal resources that may support mitigation project implementation. This section comprises the following subsections:

- 5.1 Regulatory Mitigation Capabilities
- 5.2 Administrative and Technical Mitigation Capabilities
- 5.3 Fiscal Mitigation Capabilities
- 5.4 Education and Outreach Capabilities

### 5.1 REGULATORY MITIGATION CAPABILITIES

Table 5.1 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the City of Miramar. Additional details on key identified regulatory tools are provided below.

**Table 5-1 - Regulatory Mitigation Capabilities**

Regulatory Tool (ordinances, codes, plans)	In Place? Y/N	Comments
Comprehensive Plan	Y	Miramar Blueprint - The Comprehensive Plan, plan update in progress
Land Use Plan	Y	Existing and future land use are included in the comprehensive plan.
Zoning ordinance	Y	City of Miramar Land Development Code (Ch 4)
Subdivision ordinance	Y	City of Miramar Land Development Code (Ch 8)
Floodplain ordinance	Y	City of Miramar Land Development Code (Ch 6)
Erosion, Sedimentation and Pollution Control ordinance	Y	South Broward Drainage District, <i>Stormwater Management Regulations, Standards, Procedures, and Design Criteria Manual</i>
Other special purpose ordinance (stormwater, growth management, wildfire)	Y	City of Miramar Code of Ordinances (Ch 21, Article VII); South Broward Drainage District, <i>Stormwater Management Regulations, Standards, Procedures, and Design Criteria Manual</i> ; SFWMD Permit Manual, <i>Stormwater Management Regulations, Standards, Procedures</i>
Building code	Y	Florida Building Code (2023)
BCEGS rating	Y	3/3
Stormwater Management Program	Y	City of Miramar Stormwater Management Program
Site Plan Review Requirements	Y	City of Miramar Land Development Code
Capital Improvements Plan	Y	5-Year plan
Economic Development Plan	N	No plan, but the City has an Economic Development & Housing Department

Regulatory Tool (ordinances, codes, plans)	In Place? Y/N	Comments
Local Emergency Operations Plan	Y	2025 Broward County Comprehensive Emergency Management Plan
Flood Insurance Study or Other Engineering Study for Streams	Y	FIS covers Red Road/NW 57 <sup>th</sup> Ave Canal and the Snake Creek Canal
Other special plans (i.e. Repetitive Loss Plan)	Y	City of Miramar Sensitivity Analysis (2025), Broward County Countywide Resiliency Plan 2025, Central and Southern Florida Flood Resiliency Study (in progress)
Elevation certificates	Y	Copies of all final ECs are maintained and available through Forerunner

Below is a summary of key regulatory tools in place in Miramar that already provide for flood risk reduction and/or could support the implementation of additional flood mitigation activities.

### COMPREHENSIVE PLAN

The City of Miramar’s existing comprehensive plan has not been updated since 2010, however, the City is currently in the process of a full plan update. The comprehensive plan contains the city’s future land use map and identifies goals, objectives, and policies to support orderly growth and development in Miramar. Several of the identified objectives and policies can be linked to flood mitigation, including the following:

- Foster a culture of resilience and preparedness to protect the City’s neighborhoods from the worst effects of flooding and climate change;
- Increase protection of residential areas and neighborhoods through the support of green design guidelines and/or form-based codes for new development and major renovation residential areas, historic neighborhoods, and areas vulnerable to flooding.
- Coordinate with SFWMD to maintain and enhance, where possible, the Everglades Buffer Strip in Miramar as part of Broward County’s inventory of urban wilderness areas which will be preserved as open space in perpetuity.

The plan also establishes stormwater management level of service standards to ensure that roads and buildings are elevated above the floodplain and that storm sewers can handle intense rainfall. It also includes storm sewer standards and requires that storm sewers be designed to handle (at minimum) a three-year rainfall intensity.

The Comprehensive Plan was reviewed for the development of this FMP to identify opportunities for plan integration and mitigation measures.

### LAND DEVELOPMENT CODE

The City of Miramar’s Land Development Code establishes standards for residential and non-residential development, site development, building setbacks and lots, encroachments, access, landscaping, and building design. Included with these standards are requirements for site development plans and plan review. These requirements help the City to enforce development standards, including development-related mitigation, such as setbacks, erosion and sedimentation control, stormwater control, site grading, driveway elevation and grading, and foundation design.

### FLOODPLAIN MANAGEMENT REGULATIONS

The City of Miramar’s floodplain management regulations are part of the Miramar Land Development Code, Chapter 6 – Flood Damage Prevention Ordinance. The City has been a participant in the NFIP since 1977 and has amended the floodplain management regulations overtime. New buildings, structures, and facilities within the SFHA are typically subject to the flood load and flood resistant construction

requirements found in the 2023 Florida Building Code (FBC), unless they are exempt. The Flood Damage Prevention Ordinance also specifies that buildings are subject to two feet of freeboard. The City's floodplain management regulations were reviewed for the development of this FMP to assist in the identification of potential mitigations strategies and projects.

### CAPITAL IMPROVEMENTS PROGRAM

The City of Miramar maintains a 5-Year Capital Improvements Program (CIP) which involves identification, management, and implementation of CIP projects to balance infrastructure demand with funding availability. Drainage projects are a major component of the CIP and are regularly identified and implemented through this process. Current CIP projects include Historic Miramar drainage improvements, removal of trees along city-owned canals, and Historic Miramar canal improvements.

The CIP is reviewed and updated annually to add new projects, reevaluate existing programs, and current priorities and revise recommendations based on new requirements and funding sources. Drainage and canal projects are typically funded through the City's Stormwater Management Fund, grants from the Florida Department of Environmental Protection (FDEP), state revolving loan fund, and/or the general fund.

### FLOOD INSURANCE STUDY (2024)

A Flood Insurance Study dated July 2024 was prepared by FEMA for Broward County, Florida and Incorporated Areas which includes the City of Miramar. The FIS and associated Flood Insurance Rate Maps identify areas within Miramar that are subject to flooding from the 1%-annual-chance flood event. This information is used by Miramar to implement floodplain regulations as participants in the NFIP and to promote sound land use and floodplain development within the community. The FIS was used in the development of this FMP to identify FEMA flood hazard areas and to calculate the associated flood depths for the 1%-annual-chance flood event.

### FLORIDA BUILDING CODE (2023)

The City of Miramar enforces the 2023 version of the Florida Building Code, which is based off the 2021 International Building Code. The 2023 Florida Building Code establishes the flood load and flood resistant construction requirements that are implemented by the floodplain administrator. Adopting new codes helps maintain or improve the City's Insurance Services Office (ISO) rating and National Flood Protection Association (NFPA) rating. Other benefits include options for the latest technology, additional energy cost savings, and adding the latest safety requirements to our built environment. The City will enforce the most up-to-date Florida Buildings Code as regulations evolve.

### BROWARD COUNTY LOCAL MITIGATION STRATEGY (2023)

The City of Miramar adopted the 2023 Broward County Local Mitigation Strategy (LMS), which is a multi-jurisdictional, multi-hazard mitigation plan. The LMS includes floods, tropical cyclones, and sea level rise/climate change among its identified hazards. Goals from the LMS are as follows:

1. Protect human health, safety, and welfare.
2. To increase business, residential, and community awareness and implementation of hazard mitigation.
3. To ensure adequate training opportunities to support hazard mitigation and enhance outreach efforts that educate the public on existing identified hazards as well as new and emerging threats and hazards.
4. To facilitate preventive measures to mitigate hazards.
5. To facilitate planning initiatives that ensure effective hazard mitigation programs and policies.
6. Develop and enhance regional mitigation efforts.
7. Promote mitigation partnerships and innovative methods of financing mitigation.
8. Lower flood insurance premiums through Community Rating System (CRS) activities.
9. Encourage resilient infrastructure county-wide.

The Broward County LMS was used in the development of this FMP to evaluate hazard risk and vulnerability, review and update the plan goals, and identify potential mitigations strategies and projects.

### CITY OF MIRAMAR VULNERABILITY ASSESSMENT – SENSITIVITY ANALYSIS (2025)

The City received funding from FDEP to conduct a citywide vulnerability assessment, which identifies regionally significant areas at risk of flooding. Using the 2018 Florida Digital Elevation Model (DEM) as the basis for terrain, the study models flood scenarios based on rainfall, sea level rise, king tide, and compound flooding. The study then identifies which critical facilities and transportation/evacuation routes would be impacted by each scenario. The City of Miramar Vulnerability Assessment was used in the development of this FMP to evaluate flood risk and future conditions and identify critical facilities.

### COUNTYWIDE RESILIENCY PLAN 2025 – BROWARD COUNTY

Broward County’s [2025 Countywide Resilience Plan](#) outlines the climate risks facing the area. The resiliency plan uses detailed hydraulic and hydrologic-modeling to address evolving flood risk with climate change across the county. Modeling assumes increased sea level rise, more intense rainfall, surge events, King Tide events, and increased groundwater elevation. The plan models potential outcomes based on changing climate conditions. Each modeling scenario can be customized based on boundary conditions (current sea level, 2 ft of sea level rise, and 3.3 ft of sea level rise), model drivers (amount of rainfall), and initial conditions (saturated or variable groundwater). Scenarios can be customized on Broward County’s [Scenario Viewer](#), which shows impacts to Broward County and its incorporated areas including Miramar.

To address the impacts identified during modeling, the County developed a two-tiered, adaptive planning approach. The first tier focuses on preparing for 2-feet of sea level rise by 2050, and the second tier provides strategies to address 3.3 feet by 2070. Strategies for each tier, such as sea walls, above-ground storage systems, additional pumping stations, reduction in impervious surfaces, etc. were included in modeling and selected based on their ability to improve the County’s resiliency. The Countywide Resiliency Plan was used in development of this FMP to evaluate flood risk and future conditions and inform mitigation actions.

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## 5.1.1 POST-DISASTER MITIGATION POLICIES AND PROCEDURES

Broward County Emergency Management is responsible for post-disaster response and recovery in Miramar. The 2025 Broward County Comprehensive Emergency Management Plan or Emergency Operation Plan (EOP) establishes policies and procedures for post-disaster mitigation. The Broward County Local Mitigation Strategy is also used to monitor and summarize post disaster impacts and incorporate necessary mitigation actions into plan updates.

Post disaster damage assessments play a key role in understanding the County’s mitigation needs. Steps for completing the damage assessments are outlined in the County’s emergency management plan and include the following steps:

- **Damage Assessment** - In the aftermath of a disaster damages assessments are conducted. These assessments may include Home Damage, Rapid Impact, Initial Damage, and Joint Preliminary Damage. County and municipal floodplain managers may also conduct damage assessments in SFHAs of the County. The extent and scope of assessments will vary depending on the type of disaster and the extent of damage.
  - **Home Damage Assessment** - Residents may utilize the application to report damage to their residence after a disaster. Residents will provide their damage level and/or flood level and may include images of the damage. The reports provide a critical early indication of where major damage has occurred.
  - **Rapid Impact Assessment** – A windshield survey is conducted immediate after a disaster (within 4 -6 hours after “all clear” is issued). The assessment provides Unified Command with information to rapidly assess the extent of damage

- Initial Damage Assessment – This process will provide supporting information for a presidentially declared disaster designation request. This assessment includes public and private property financial loss estimates and aims to determine the magnitude and severity of damage to private and public buildings and infrastructure and assess the level of flooding damage in the event of a severe rainfall event. Occurs within 24 hours of an event.
- Joint Preliminary Damage Assessment – This process is used to validate if a disaster’s impacts warrant a Presidential Declaration and is generally performed by teams consisting of Federal, State, and local agency representatives. This assessment will lead into Departments/Divisions identifying projects whose costs will require tracking.

In the event of a disaster, findings from the damage assessments and damage data collection, and success story reporting will be reported to the LMS Planning Subcommittee. These findings will in turn be reviewed and the plan will be updated to reflect lessons learned, or to address specific issues and circumstances arising from the event, regardless of the 5-year interval. Data collection worksheets, when collected, will be kept by the County. Any future revisions of the plan will be posted on the County’s website. The LMS allows Broward County and the City of Miramar to remain eligible for federal mitigation funding that reduce disaster losses and protect life and property from future disaster damages.

The comprehensive EOP has an Individual Assistance (IA) Unit which details how the County facilitates and coordinates FEMA’s IA funding. FEMA collaborates with other agencies such as the U.S. Small Business Administration (SBA) and the United States Department of Agriculture (USDA) to provide assistance to disaster survivors. Emergency Support Function (ESF) #18 has a Business Recovery Unit that coordinates the SBA disaster assistance when the County Emergency Operation Center (CEOC) is activated, including representatives from the state, county and municipalities. Office of Emergency Management will coordinate with the designated municipal emergency coordinator in the impacted jurisdiction for events not involving CEOC activation.

Major disasters can generate large volumes of natural and man-made debris requiring prompt removal and disposal to allow affected communities to return to normalcy after the event. The County’s EOP also outlines steps for handling debris management. Rapid clearance of debris from roadways is critical to allow public safety and other critical response efforts to take place. ESF #3 will manage the “first push” phase which consists of quickly clearing a path in major roads and/or lanes to allow first responder transportation to take place. More thorough road debris removal takes place after the “first push”.

ESF #3’s debris management concept of operation calls for the establishment of a Debris Management Center (DMC). The DMC is an off-site command center with the sole function of managing debris operations. Throughout the operational period, the DMC’s role includes monitoring of debris removal, for the Municipal Services District, and overseeing the operations. For Federally declared disasters, DMC staff also assure maximum reimbursement to the County by ensuring that documentation of debris management operations is accurate and complete.

### **BROWARD COUNTY EMERGENCY MANAGEMENT PLAN (2025)**

The Broward County Emergency Management Plan outlines the approach to emergency operations for the County and incorporated areas and assigns responsibilities for various emergency management tasks. It provides general guidance for emergency management activities and an overview of methods for mitigation, preparedness, response, and recovery. The objective of the emergency management program is to protect public health and safety and preserve public and private property. The Broward County Emergency Management Plan was used in the development of this FMP to assist in the development of the risk assessment, the identification of potential mitigation strategies and projects, and the evaluation of plan integration.

## 5.2 ADMINISTRATIVE AND TECHNICAL MITIGATION CAPABILITIES

Table 5-2 identifies personnel responsible for activities related to flood mitigation in the City of Miramar.

**Table 5-2 - Administrative/Technical Capabilities**

Resource	In Place? Y/N	Responsible Department
Planner/Engineer with knowledge of land development/land management practices	Y	Building Planning & Zoning Department <i>Lebrun Nixon, AICP, CFM, Senior Planner</i>
Engineer/Professional trained in construction practices related to buildings/infrastructure	Y	Engineering Services, Development Engineering <i>Salvador Suniga, P.E.</i>
Planner/Engineer/Scientist with an understanding of natural hazards	Y	Building Planning & Zoning Department <i>Lebrun Nixon, AICP, CFM, Senior Planner</i>
Personnel skilled in GIS	Y	Building, Planning, & Zoning Department, Miramar Maps/GIS <i>Yao Yan, GIS Manager</i>
Full time Building Official	Y	Building Planning & Zoning Department, Building, Permits & Inspections <i>Julio, Briceno, Building Official</i>
Floodplain Manager	Y	Building Planning & Zoning Department <i>Lebrun Nixon, AICP, CFM, Senior Planner</i>
Emergency Manager	Y	Fire & Rescue Department, Emergency Management <i>Tara Wagner, Division Chief of Emergency Management</i>
Grant Writer	Y	
Public Information Officer	Y	Marketing and Communications Department <i>Debon Campbell, Public Information Officer (PIO)</i>
Warning Systems	N	
GIS data: flood zones / hazard areas	Y	
GIS data: critical facilities	Y	
GIS data: current and/or future land use	Y	
GIS data: building footprints	Y	
GIS data: links to Assessor's data	Y	

Based on City staff input on administrative resources and departments with responsibilities related to mitigation, the City is well-equipped to implement flood mitigation. The City has staff across multiple departments that can support a variety of mitigation projects through planning, development regulations and code enforcement, engineering, public education and outreach, grant writing, and emergency preparedness, response, and recovery.

## 5.3 FISCAL MITIGATION CAPABILITIES

Table 5.3 identifies financial tools or resources that the City could use to fund mitigation activities.

**Table 5-3 - Fiscal Mitigation Capabilities**

Resource	Accessible/Eligible Y/N	Comments
Community Development Block Grants	Y	
State of Florida Department of Environmental Protection Grant Fund	Y	Have used
Capital improvements project funding	Y	
Authority to levy taxes for specific purposes	Y	
Fees for water, sewer, gas, or electric services	Y	Have used Utility Fund
Impact fees for new development	Y	
Incur debt through general obligation bonds	-	
Incur debt through special tax bonds	-	
Incur debt through private activities	-	
Withhold spending in hazard prone areas	-	
Other	Y	Available funding for related projects: Stormwater Management Utility Fee

Based on staff input on fiscal resources, the City has sources of local funding to support flood mitigation. Outside funding will likely be needed to supplement these resources. Potential sources for outside grant funding include CDBG funds, Florida Department of Environmental Protection Grant Fund, Florida Recovery Loan Fund, FEMA Hazard Mitigation Assistance grants, including the Hazard Mitigation Grant Program, and Flood Mitigation Assistance program.

## 5.4 EDUCATION AND OUTREACH CAPABILITIES

This section summarizes the City's flood-related outreach activities. As previously noted, Miramar has a Public Information Officer who can support flood-related outreach efforts. Miramar currently undertakes annual outreach activities which are credited under Activities 320 and 330. The City has sent informational material to properties located on and near flood zones, and it has reached out to insurance agencies, banks, and real estate agents detailing how to access FEMA floodplain location services. Additionally, the city maintains a webpage on flooding and flood-related information.

Since 2016, Broward County has implemented the [Document the Floods](#) program – a crowdsourcing initiative that enables members of the public to document and report flooding information and photos at specific locations throughout the County. The program was created to better understand changing flood patterns and document the frequency and extent of flooding from either heavy rainfall or high tides throughout Broward County. Residents can document their flooding observations, including date/time, location, depth, and source of flooding. In addition to reporting flood incidents or concerns, people can lookup areas of interest on a map to view flooding occurrences in areas of interest.

## 6 MITIGATION STRATEGY

**Requirement §201.6(c)(3): [The plan shall include] a mitigation strategy that provides the jurisdiction’s blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.**

This section describes the mitigation strategy development process and presents the mitigation action plan for the City of Miramar Floodplain Management Plan. It describes how the City met Steps 6, 7, and 8 of the 10-step planning process. This section contains the following subsections:

- 6.1 Mitigation Strategy Overview
- 6.2 Goals and Objectives
- 6.3 Identification and Analysis of Mitigation Activities
- 6.4 Mitigation Action Plan
- 6.5 Mitigation Action Details

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### 6.1 MITIGATION STRATEGY OVERVIEW

After organizing and collecting data and assessing risks, vulnerabilities, and capabilities, the FMPC used the reported findings to develop a mitigation strategy. The mitigation strategy is designed to be comprehensive, strategic, and functional, in that it includes a thorough review of all possible mitigation alternatives, achieves multiple local objectives, is consistent with other long-term planning goals, and facilitates implementation of the identified actions. The FMPC considered the following approaches to mitigation planning when preparing this mitigation strategy:

- Communicate the hazard information collected and analyzed through this planning process as well as mitigation success stories so that the community better understands what can happen where and what they themselves can do to be better prepared.
- Use existing rules, regulations, policies, and procedures to support new mitigation efforts.
- Consider multi-objective management opportunities so that funding may be shared and packaged and broader constituent support may be garnered.

The first step in designing the mitigation strategy is the identification of mitigation goals, which are presented in Section 6.2. Goals represent broad statements of intent and are realized through the implementation of specific mitigation actions.

The second step involves the identification and analysis of available mitigation alternatives that could achieve the identified goals. Alternatives must then be prioritized for implementation. An alternatives analysis was conducted by the FMPC in the development of this plan, but continuous evaluation and consideration of alternatives is a process to be sustained through the plan’s implementation and maintenance. Alternative mitigation measures will continue to be considered as future capabilities change and opportunities arise. Section 6.3 describes the analysis of mitigation action alternatives and the criteria for action prioritization.

The third and final step of the mitigation strategy is the selection of mitigation actions to pursue within the planning timeframe. Selected actions are detailed in the Mitigation Action Plan in Section 6.4. Section 6.5 provides additional details for each mitigation action.

### 6.1.1 CONTINUED COMPLIANCE WITH THE NFIP

Through this planning process and the review of mitigation action alternatives, an emphasis was placed on continued compliance with the NFIP and participation in the CRS. Compliance activities involve adopting current effective FIRMs, adopting and enforcing an acceptable flood damage prevention ordinance, maintaining records of floodplain development, and helping residents obtain information on flood hazards, floodplain map data, flood insurance, and proper construction measures.

The City of Miramar's Building, Planning & Zoning Department is responsible for the review and approval of all building permit applications in the City. During permit application review, the Floodplain Administrator reviews development plans to determine the applicability of floodplain management regulations. Once a development begins construction, on-site inspections are performed by department staff to ensure compliance with applicable regulations, including the floodplain management regulations as well as the building code.

### COMMUNITY RATING SYSTEM PARTICIPATION

Beyond the NFIP minimum requirements, the City also participates in the CRS. The CRS was created in 1990. It is designed to recognize floodplain management activities that are above and beyond the NFIP's minimum requirements. As of 2025, the City of Miramar is classified as a Class 8 community, which gives policyholders a 10% premium discount. The following is a summary of the CRS Activities for which the City currently receives credit based on the 2021 verification visit:

**Activity 310 – Elevation Certificates:** The City has written construction certificate management procedures for all new buildings and substantially improved/substantially damaged buildings.

**Activity 320 – Map Information Service:** The City receives credit for providing inquirers with basic flood zone information from the community's latest FIRM, historical flood information, and natural floodplain functions.

**Activity 330 – Outreach Projects:** Credit is provided for informational outreach projects, general outreach projects, and targeted outreach projects that are disseminated at least annually.

**Activity 340 – Hazard Disclosure:** Credit is provided for state regulations requiring disclosure of flood hazards.

**Activity 350 – Flood Protection Information:** The City receives credit for having documents related to floodplain management available in the reference section of the public library and for providing information on flood protection messages as well as real-time gage information on the City's website.

**Activity 420 – Open Space Preservation:** The City receives credit for preserving approximately eleven percent of the SFHA as open space.

**Activity 430 – Higher Regulatory Standards:** Credit is provided for enforcing regulations that require freeboard for new construction and substantial improvement, foundation protection, and local drainage protection. The City also receives credit for adoption of the international building code, for the City's Building Code Effectiveness Grading Schedule (BCEGS®) Classification, and for having Certified Floodplain Managers on staff.

**Activity 440 – Flood Data Maintenance:** Credit is provided for maintaining and using additional map data in the day-to-day management of the floodplain.

**Activity 450 – Stormwater Management:** The community enforces regulations for soil and erosion control and water quality.

**Activity 510 – Floodplain Management Planning:** Credit is provided for the Broward County Local Mitigation Strategy, adopted in 2023.

**6.1.2 POST-DISASTER RECOVERY AND MITIGATION**

As noted in Section 5.1.1 of the Capability Assessment, the City of Miramar aims to incorporate mitigation during response and recovery phases and has policies and procedures in place that determine post-disaster activities for hazard mitigation. Incorporating flood mitigation and prevention into post-disaster recovery includes measures such as public information activities to educate residents about property protection that can be incorporated into reconstruction, evaluating damaged public buildings and infrastructure for retrofit options, acquiring substantially damaged or repetitive loss structures from willing sellers, and providing education on and enforcement of floodplain management regulations.

Post-disaster redevelopment and mitigation procedures can also tie to emergency services actions, including measures such as providing safe drinking water, monitoring for diseases, vaccinating residents for tetanus and other diseases, clearing streets and drainage infrastructure, and cleaning up debris.

The FMPC has considered options for post-disaster mitigation in identifying mitigation action alternatives related to flood prevention, property protection, and emergency services. Following a flood event, the City will evaluate damages and recommend appropriate mitigation options from this plan.

**6.1.3 PLANNING FOR CRITICAL FACILITY PROTECTION**

Critical facility and infrastructure protection was also emphasized during goal setting and while reviewing mitigation action alternatives. The City of Miramar has several options to consider in planning to reduce the vulnerability of critical facilities and infrastructure. Per FEMA guidance, of primary concern is the protection of essential systems and equipment to maintain the function of these critical facilities and their ability to serve the community during and after hazard events. One way to protect critical facilities is to ensure that electrical systems, mechanical systems, and other essential equipment are sufficiently elevated above the base flood elevation. Another option is to install dry floodproofing to protect these critical components from floodwaters, flood forces, and leakage. Among the components that should be considered for protection are electrical service and distribution systems; data systems; heating, ventilation, and air conditioning systems; water and wastewater systems; emergency power systems, and elevators. Providing backup power systems will also help these facilities continue operating during power outages.

Alternatively, Miramar can consider relocating vulnerable critical facilities to new locations outside the floodplain. However, additional protection may still be required because areas outside the 1%-annual-chance and 0.2%-annual-chance floodplain are still at risk of flooding. According to FEMA, properties outside of high-risk flood areas account for over 20 percent of NFIP claims and one-third of disaster assistance for flooding.

The City of Miramar FMPC considered these concerns in developing their mitigation strategies.

**6.2 MITIGATION GOALS**

**Requirement §201.6(c)(3)(i): [The mitigation strategy section shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.**

Section 4 documents the flood hazards risks that threaten the City of Miramar and assesses the vulnerability of the City’s structures, infrastructure, and critical facilities. Section 5 evaluates the capacity of the City to reduce the impact of those hazards. The intent of goal setting is to bring these findings together to identify how existing capabilities can be employed or improved to reduce community risk and vulnerability.

Goals are general guidelines that explain what is to be achieved. They are usually broad-based policy type statements that represent long term aims and help define the benefits that the plan is trying to achieve. Goals are also necessary to guide the review of possible mitigation measures and to ensure that recommended actions are consistent with what is appropriate for the City. Mitigation goals need to reflect community priorities and should be aligned with other City plans.

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### 6.2.1 COORDINATION WITH OTHER PLANNING EFFORTS

The goals of this plan need to be consistent with and complement the goals of other planning efforts, especially the City's 2021 Comprehensive Plan Blueprint 2040. Comprehensive plans are important because they are developed and designed to guide future growth within the community. Therefore, to effectively pursue preventative flood mitigation for future development, this floodplain management plan should be integrated with the comprehensive plan. Likewise, the goals of the Broward County Local Mitigation Strategy are important to consider for integration, as the countywide plan plays an important role in local flood hazard mitigation. Goals from both of these plans were reviewed during the development of the goals of this plan.

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### 6.2.2 GOAL SETTING EXERCISE

At the second FMPC meeting, committee members participated in an exercise to brainstorm and recommend goals for this plan. This process began with a review of the Broward County Local Mitigation Strategy goals and the City's comprehensive plan goals, highlighting the stormwater management and conservation elements. FMPC members were asked to consider if and how these goals should be incorporated into the floodplain management plan and which elements of the goals were most important.

The FMPC also discussed common themes and topics that emerge in mitigation planning. Several of these topics aligned with feedback received by the public in the survey. The topics were as follows:

- Help people protect themselves
- Protect wetlands and environmentally sensitive areas
- Make sure future development doesn't make things worse
- Restrict development in hazardous areas
- Educate the public on risk, preparedness, and mitigation
- Protect existing and future buildings, critical facilities and infrastructure
- Protect people and public health and safety

This exercise helped the committee consider what they want the City to achieve through mitigation. Based on this discussion, goals were drafted, reviewed, and approved by the committee.

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### 6.2.3 RESULTING GOALS

The FMPC agreed upon the following three goals for the City's floodplain management planning effort:

- **Goal 1:** Continue outreach and public awareness on flood risk, preparedness, and mitigation to encourage people to responsibly protect their property and ensure public health and safety.
- **Goal 2:** Improve stormwater management to protect existing property, critical facilities, and infrastructure from current and future flood risk.
- **Goal 3:** Prioritize the use of green infrastructure and seek to integrate such techniques into future development projects to expand greenspace and manage stormwater.

## 6.3 IDENTIFICATION AND ANALYSIS OF MITIGATION ACTIVITIES

**Requirement §201.6(c)(3)(ii): [The mitigation strategy section shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction’s participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.**

To identify and select mitigation projects that support the mitigation goals and achieve the greatest risk reduction, the FMPC considered the Priority Risk Index ratings determined for each hazard in Section 4. While mitigation alternatives were considered to address risks associated with all identified hazards, an emphasis was placed on high and moderate priority flood-related hazards.

The FMPC analyzed viable mitigation options that supported the identified goals and addressed the risks and vulnerabilities associated with each hazard. The following list of mitigation categories, which are utilized as part of the CRS planning process, was used to organize the evaluation of mitigation alternatives:

- Prevention
- Property Protection
- Natural Resource Protection
- Emergency Services
- Structural Projects
- Public Information

A facilitated discussion then took place to examine and analyze the options for new actions. The FMPC was presented with examples of mitigation actions for each of the above categories and considered opportunities to alter, avert, adapt to, or avoid the flood hazard. Additionally, the FMPC thought about both existing and future buildings in evaluating possible mitigation actions. Appendix B Mitigation Strategy provides a detailed discussion organized by CRS mitigation category of mitigation alternatives considered. The City can continue to reference these alternatives in the review and identification of new mitigation activities. This comprehensive review of possible mitigation activities details why some actions were appropriate for implementation and why others were not. As promoted by CRS, mitigation alternatives across all categories were discussed and considered for flood risk reduction. The FMPC generated a list of preferred new and existing mitigation actions through a subsequent brainstorming session.

### 6.3.1 PRIORITIZATION PROCESS

Once the mitigation actions were identified, the FMPC was provided with several decision-making tools, including FEMA’s recommended prioritization criteria, STAPLEE, and others, to assist in deciding why one recommended action might be more important, more effective, or more likely to be implemented than another. STAPLEE criteria were used to generate preliminary prioritization scores, by rating projects as positive (+1), neutral (0), or negative (-1) against each of the criteria. STAPLEE stands for the following:

- **Social:** Will the measure have equitable outcomes? Does it benefit vulnerable populations?
- **Technical:** Will it work? Does it solve the problem? Is it feasible?
- **Administrative:** Does the community have the capacity to implement and manage project?
- **Political:** Is there public and stakeholder support? Is political leadership willing to support?
- **Legal:** Does the community have the authority to implement it? Are there liability implications?
- **Economic:** Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development?

- **Environmental:** Does it comply with environmental regulations? Does it benefit or protect existing natural resources?

Next, the FMPC considered each action’s potential efficacy based on the following criteria:

- Contribution of the action to save life or property
- Availability of funding and perceived cost-effectiveness
- Available technical and administrative resources for implementation
- Ability of the action to address the problem

In accordance with the DMA requirements, an emphasis was placed on the importance of cost effectiveness in determining action priority, as reflected in the prioritization criteria above. For each action, the FMPC considered the benefit-cost analysis in terms of:

- Ability of the action to address the problem
- Contribution of the action to save life or property
- Available technical and administrative resources for implementation
- Availability of funding and perceived cost-effectiveness

Note that the consideration of these criteria helped to prioritize and refine mitigation actions but did not constitute a full benefit-cost analysis. The cost-effectiveness of any mitigation alternative will be considered in greater detail through performing benefit-cost project analyses when seeking FEMA mitigation grant funding for eligible actions associated with this plan.

The FMPC also considered sustainable disaster recovery principles and smart growth principles when considering, refining, and evaluating mitigation project alternatives. Using these criteria, the FMPC was able to prioritize the importance of each mitigation project based on whether the project should be a low, medium, or high priority. The FMPC agreed that using the subjective criteria described above and prioritizing the actions collectively enabled the actions to be grouped in order of relative importance and helped steer the development of additional actions that meet the more important objectives while eliminating some of the actions which did not garner much support.

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## 6.4 MITIGATION ACTION PLAN

**Requirement §201.6(c)(3)(iii): [The mitigation strategy section shall include an] action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.**

This action plan was developed to present the recommendations developed by the FMPC for how the City of Miramar can reduce the risk and vulnerability of people, property, infrastructure, and natural and cultural resources to future disaster losses. Emphasis was placed on both existing and future development. The action plan summarizes who is responsible for implementing each of the actions as well as when and how the actions will be implemented. Each action’s priority is also noted based on the criteria in Section 6.3.1 as well as the benefit-cost review discussion conducted to meet the regulatory requirements of the Disaster Mitigation Act. Table 6.1 identifies the mitigation actions.

It is important to note that the City of Miramar has many existing, detailed action descriptions, which include benefit-cost estimates, in other planning documents, such as capital improvement plans and the countywide Local Mitigation Strategy. These actions are considered part of this plan, and the details, to avoid duplication, should be referenced in their original source document. The FMPC also realizes that

new needs and priorities may arise as a result of a disaster or other circumstances and reserves the right to support new actions, as necessary, as long as they conform to the overall goals of this plan.

Further, it should be clarified that the actions included in this mitigation strategy are subject to further review and refinement; alternatives analyses; and reprioritization due to funding availability and/or other criteria. The City is not obligated by this document to implement any or all of these projects. Rather, this mitigation strategy represents the community's overall intentions to mitigate flood risks and vulnerabilities.

The following fields are included in the mitigation action plan summary table:

- **Action Item:** Provides an ID number for each action.
- **Project:** Describes the mitigation activity.
- **Hazards Addressed:** Lists the hazards mitigated against.
- **Goals Met:** Lists the mitigation goals the action supports. See Section 6.2.
- **Priority:** Lists the action's overall priority rating of high, medium, or low. See Section 6.3.
- **Funding Source:** Lists potential sources of funding.
- **Timeframe:** Lists the estimated timeframe for the action to be completed.
- **Responsible Department:** Lists the department(s) that will lead implementation and report on progress at plan evaluation meetings.

**Table 6-1 - Mitigation Action Plan Summary Table**

Action Item	Project	Hazards Addressed	Goals Met	Priority	Responsible Department	Mitigation Category	Potential Funding Source	Timeline
1	Historic Miramar Infrastructure Improvement Project - Phases 5 and 6	Stormwater and Localized Flooding	2	High	Public Works	Structural Projects	HMGP; FMA; Operating Budget	5+ years
2	C-9 Canal outfall pipe plug removal. This will reduce the time it takes for water to recede in the lakes. Will include modeling and permitting. Location: 25°57'57.40"N/ 80°13'17.52"W	Stormwater and Localized Flooding	2	High	Public Works	Structural Projects	HMGP; FMA; Operating Budget	2 years
3	Acapulco drainage improvement	Stormwater and Localized Flooding	2	High	Public Works	Structural Projects	HMGP; FMA; Operating Budget	2 years
4	SW 33rd St. drainage improvement	Stormwater and Localized Flooding	2	High	Public Works	Structural Projects	HMGP; FMA; Operating Budget	2 years
5	Tarpon pipe collapse replacements	Stormwater and Localized Flooding	2	High	Public Works	Structural Projects	HMGP; FMA; Operating Budget	2 years
6	Implement CIP projects identified in the City's Stormwater Master Plan	Stormwater and Localized Flooding	2	High	Public Works	Structural Projects	HMGP; FMA; Operating Budget	2 years
7	Drainage improvements - Miramar Parkway from Canal Road to University Drive. This segment of Miramar parkway was originally intended to have swale drainage, but water has difficulty getting to the intended swale due to curb, driveway improvements, and swale regrading. Add inlets with connection to nearby canal or french drain to eliminate the problem of water retention in the curblines and ponding in the travel lanes.	Stormwater and Localized Flooding	2	High	Public Works	Structural Projects	Operating Budget	5+ years
8	Develop a voluntary property acquisition plan and program for repetitive loss areas and other high risk flood locations	Flood; Tropical Cyclones	1	Moderate	Building, Planning & Zoning	Property Protection; Prevention	HMGP; FMA	2 years

Action Item	Project	Hazards Addressed	Goals Met	Priority	Responsible Department	Mitigation Category	Potential Funding Source	Timeline
9	Create a public information program on the benefits of onsite retention. Highlight examples of LID techniques, the establishment of rain gardens, and the use of rain barrels to reduce flash flooding impacts.	Stormwater and Localized Flooding; Flood	1, 3	Moderate	Public Works; Public Information Officer	Public Information	Operating Budget	1 year
10	Promote and publicize the City's public flood risk website that allows property owners to access flood risk data for their individual properties. Prioritize Historical Miramar.	Flood	1	High	Public Information Officer; Building, Planning & Zoning	Public Information	Operating Budget	1 year
11	City staff provide advice and assistance to homeowners who want to flood proof their home or business. Publicize technical assistance for Activity 360 Flood Protection Assistance. Maintain records of assistance given to receive CRS credit.	Flood	1	High	Public Works; Engineering Services; Building, Planning & Zoning	Property Protection; Public Information	Operating Budget	1 year
12	Create plan for improved vegetative management around canals/lake to improve water quality. Include a public outreach educational component that describes benefits of increased vegetation around these waterways	Flood	3	Moderate	Public Works; Public Information Officer	Natural Resource Protection	Operating Budget	2 years
13	Coordinate open space opportunities with flood control needs for new developments, repetitive loss areas, or other localized flooding locations. Establish coordination between Parks and Recreation Department, Public Works, and Building, Planning and Zoning	Flood	3	Moderate	Public Works; Parks & Recreation; Building, Planning & Zoning	Natural Resource Protection	Operating Budget	2 years
14	Increase protection of residential areas and neighborhoods through the support of green design guidelines and LID requirements for new development and major renovation residential areas, historic neighborhoods, and	Flood	1,3	Low	Public Works; Building, Planning & Zoning	Prevention; Property Protection	Operating Budget	5+ years

Action Item	Project	Hazards Addressed	Goals Met	Priority	Responsible Department	Mitigation Category	Potential Funding Source	Timeline
	areas vulnerable to flooding. Could provide development incentives and variances for participation.							
15	Seek additional funding for the Embankment Restoration Program. Promote and publicize program to residents in high-risk areas.	Flood	2, 3	Low	Public Works	Structural Projects; Natural Resource Protection; Public Information	Operating Budget	1 year

## 7 PLAN ADOPTION

**Requirement §201.6(c)(5): [The plan shall include] documentation that the plan has been formally approved by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).**

The purpose of formally adopting this plan is to secure continued buy-in from the City of Miramar, raise awareness of the plan, and formalize the plan's implementation. The adoption of this plan completes Planning Step 9 of the 10-step planning process: Adopt the Plan, in accordance with the requirements of CRS Activity 510 and DMA 2000. The Miramar City Commissioners adopted the Floodplain Management Plan by passing a resolution. A copy of the executed resolution is provided below.

**PLACE HOLDER FOR RESOLUTION**

## 8 PLAN IMPLEMENTATION & MAINTENANCE

**Requirement §201.6(c)(4): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.**

Implementation and maintenance, which is Step 10 of the 10-step planning process, is critical to achieve the intended outcomes of this floodplain management plan. This section provides an overview of the approach for plan implementation and maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. This section also discusses integration of the plan into existing planning mechanisms and continued public involvement. It contains the following subsections:

- 8.1 Implementation
- 8.2 Maintenance

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### 8.1 ROLE OF FLOODPLAIN MANAGEMENT PLANNING COMMITTEE IN IMPLEMENTATION, MONITORING AND MAINTENANCE

With adoption of this plan, the City will be responsible for plan implementation and maintenance. The FMPC identified in Section 2 will reconvene quarterly to ensure that mitigation strategies are being implemented and that the City continues to maintain compliance with the NFIP. As such, the City agrees to continue its relationship with the FMPC and:

- Act as a forum for flood mitigation issues;
- Disseminate flood mitigation ideas and activities to all participants;
- Pursue the implementation of high-priority, low/no-cost recommended actions;
- Ensure flood mitigation remains a consideration for community decision makers;
- Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the community implement the plan’s recommended actions for which no current funding exists;
- Monitor and assist in implementation and update of this plan;
- Report on plan progress and recommended revisions to the City Commission; and
- Inform and solicit input from the public.

The FMPC’s primary duty moving forward is to see the plan successfully carried out and report to the City Commission, FDEM, FEMA, and the public on mitigation opportunities and the status of plan implementation. Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about flood mitigation, passing concerns on to appropriate entities, and posting relevant information on the City’s website to support continued public involvement.

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### 8.2 IMPLEMENTATION

Once adopted, the plan must be implemented to be effective in mitigating flood risk. While this plan contains many worthwhile actions, the City of Miramar will need to decide which action(s) to undertake first. That decision will be informed by the priority assigned the actions in the planning process as well as

funding availability. Low or no-cost actions can easily demonstrate progress toward successful plan implementation while the City works to secure funding for more costly high-priority actions.

Constant monitoring of funding opportunities that can be leveraged to implement some of the costlier recommended actions will be necessary. This includes creating and maintaining a bank of ideas on how to meet local match or participation requirements. With this preparation, when funding does become available, the City will be positioned to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, state and federal earmarked funds, benefit assessments, and other grant programs, including those that can serve or support multi-objective applications.

Mitigation is also successful when it is incorporated into the day-to-day functions and priorities of government. Implementation will be accomplished by adhering to the schedules identified for each action and through constant, pervasive, and energetic efforts to network and highlight the multi-objective, win-win benefits to the community. This effort is achieved through the routine actions of monitoring agendas, attending meetings, and promoting a safe, sustainable community. Ongoing implementation and maintenance of mitigation strategies may include consistent enforcement of existing policies and vigilant review of programs for coordination and multi-objective opportunities.

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### **8.2.1 RESPONSIBILITY FOR IMPLEMENTATION OF GOALS AND ACTIVITIES**

Elected officials, community department heads, and community staff are charged with implementation of various activities in the plan. During the quarterly reviews as described later in this section, an assessment of progress on each of the goals and activities in the plan will be determined and noted. At that time, recommendations may be made to modify timeframes for completion of activities, funding resources, and responsible entities. On a quarterly basis, the priority standing of various activities may also be changed. Some activities that are found not to be feasible may be deleted from the plan entirely and activities addressing problems unforeseen during plan development may be added.

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### **8.2.2 INCORPORATION INTO EXISTING PLANNING MECHANISMS**

An important implementation mechanism that is highly effective and low-cost is incorporation of the Floodplain Management Plan recommendations and their underlying principles into other plans and mechanisms. Where possible, plan participants will use existing plans and/or programs to implement flood mitigation actions. As described in the capability assessment in Section 5, the City already implements policies and programs that reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other planning mechanisms, including the following:

- Comprehensive Plan
- Capital Improvement Program
- Code of Ordinances
- Hazard Mitigation Plan
- Emergency Management Plan
- Other plans, regulations, and practices with a mitigation focus

Integration of the FMP with these planning mechanisms has already occurred over the last five years. FMPC members involved in these other planning mechanisms will be responsible for continuing integration of the FMP with these plans and programs as they are updated or revised in the future. Integration into existing planning mechanisms will be achieved through the routine actions of:

- Monitoring other planning/program agendas;
- Attending other planning/program meetings;
- Participating in other planning processes; and
- Monitoring community budget meetings for other integration opportunities.

Efforts will continuously be made to monitor the progress of mitigation actions implemented through other planning mechanisms and, where appropriate, priority actions from other plans will be incorporated into updates of this Floodplain Management Plan.

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## 8.3 MAINTENANCE

Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation and to update the plan as progress, roadblocks, or changing circumstances are recognized. Maintenance will occur on an established schedule according to the process discussed below.

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### 8.3.1 MAINTENANCE SCHEDULE

The City of Miramar Building, Planning, and Zoning Department is responsible for initiating plan reviews. To monitor progress and update the mitigation strategies identified in the action plan, the FMPC will review this plan quarterly and following a hazard event. Quarterly reviews will be documented with meeting minutes and summarized in an annual status report that will be shared with the City Commission and the public. The City will submit a five-year written update to ISO and FDEM, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule. With this plan update anticipated to be fully approved and adopted in 2026, the next plan update will be completed in 2030.

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### 8.3.2 MAINTENANCE EVALUATION PROCESS

Regular review and maintenance of this plan will seek to facilitate implementation, track progress towards achieving goals, and monitor changes that should be incorporated into the next plan update. Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

- Decreased vulnerability as a result of implementing recommended actions;
- Increased vulnerability as a result of failed or ineffective mitigation actions; and/or
- Increased vulnerability as a result of new development.

Updates to this plan will:

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

Changes will be made to the plan during the update process to accommodate for actions that have failed or are not considered feasible after a review of their consistency with established criteria, time frame, community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities will also be reviewed during the monitoring and update of this plan to determine feasibility of future implementation. Updating of the plan will be by written changes and submissions, as is appropriate and necessary, and as approved by the City Commission. In keeping with the five-year update process, the FMPC or similar committee will convene public meetings to solicit public input on the plan and its routine maintenance and the final product will be adopted by the City Commission.

To inform the plan update process and to maintain and implement the plan during the interim five-year period, the FMPC will conduct plan reviews quarterly and following a hazard event. Specifically, the City will adhere to the following process for the regular review and maintenance of this FMP:

### QUARTERLY PLAN REVIEW PROCESS

For the quarterly plan review process, the City of Miramar Building, Planning, and Zoning Department will be responsible for facilitating, coordinating, and scheduling reviews and maintenance of the plan. The quarterly reviews of the FMP will be conducted as follows:

- The City will reconvene the FMPC to meet and review the progress toward implementation of the plan’s mitigation action plan. This review will evaluate the progress made on implementation of each mitigation action listed in Section 6.4 Mitigation Action Plan.
- Meetings of the FMPC shall be published in accordance with local rules regarding public notice.
- Prior to the review, department heads and others tasked with implementation of the various activities will be queried concerning progress on each activity in their area of responsibility and asked to present a report at the review meeting.
- After each quarterly meeting, minutes of the meeting will be prepared by the City’s Building, Planning, and Zoning Department.
- The Building, Planning, and Zoning Department will prepare an annual report summarizing the discussions and decisions made during these meetings.
- The results of these quarterly FMPC meetings will be summarized in annual reports which will be made available to the local news media and the City Commission for informational purposes.
- The City’s Building, Planning, and Zoning Department will maintain copies of minutes and annual reports to provide to ISO/FEMA as part of the City’s annual recertification to the CRS program.

### QUARTERLY PLAN REVIEW CRITERIA IN PREPARATION FOR 5-YEAR UPDATE

The criteria recommended in 44 CFR 201 and 206 will also be utilized in reviewing and updating the plan. At quarterly review meetings, the FMPC will monitor and report on changes to the following information:

- Community growth or change in the past quarter.
- The number of substantially damaged or substantially improved structures by flood zone.
- The renovations to public infrastructure including water, sewer, drainage, roads, bridges, gas lines, and buildings.
- Natural hazard occurrences that required activation of the Emergency Operations Center (EOC) and whether the event resulted in a presidential disaster declaration.
- Natural hazard occurrences that were not of a magnitude to warrant activation of the EOC or a federal disaster declaration but were severe enough to cause damage in the community or closure of businesses, schools, or public services.
- The dates of hazard events and their descriptions.
- Documented damages due to the event.

- Closures of places of employment or schools and the number of days closed.
- Road or bridge closures due to the hazard and the length of time closed.
- Assessment of the number of private and public buildings damaged and whether the damage was minor, substantial, major, or if buildings were destroyed. The assessment will include residences, mobile homes, commercial structures, industrial structures, and public buildings, such as schools and public safety buildings.
- Review of any changes in federal, state, and local policies to determine the impact of these policies on the community and how and if the policy changes can or should be incorporated into the Floodplain Management Plan. Review of the status of implementation of projects (mitigation strategies) including projects completed will be noted. Projects behind schedule will include a reason for delay of implementation.

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### **8.3.3 CONTINUED PUBLIC INVOLVEMENT**

Continued public involvement is imperative to the overall success of the plan’s implementation. The update process provides an opportunity to solicit participation from new and existing stakeholders and to publicize success stories from the plan implementation and seek additional public comment. The plan maintenance and update process will include continued public and stakeholder involvement and input through attendance at designated committee meetings, web postings, press releases to local media, and through public meetings.

#### **PUBLIC INVOLVEMENT PROCESS FOR QUARTERLY REVIEWS**

The public will be notified by placing an advertisement on the City’s website specifying the date and time for the review and inviting public participation. The minutes of each quarterly review meeting and annual status reports will be made available to the local news media and the City Commission.

#### **PUBLIC INVOLVEMENT FOR FIVE-YEAR UPDATE**

When the FMPC reconvenes for the five-year update, they will coordinate with all stakeholders participating in the planning process—including those that joined the committee since the planning process began—to update and revise the plan. In reconvening, the FMPC will be responsible for coordinating the activities necessary to involve the greater public, including disseminating information through a variety of media channels detailing the plan update process. As part of this effort, public meetings will be held and public comments will be solicited on the plan update draft.

# APPENDIX A PLANNING PROCESS DOCUMENTATION

## A.1 PLANNING STEP 1: ORGANIZE RESOURCES

### FLOODPLAIN MANAGEMENT PLANNING COMMITTEE MEETING DATES, TOPICS, AND LOCATIONS

Meeting Title	Meeting Topic	Meeting Date	Meeting Location
FMPC Mtg. #1 - Project Kickoff	<ol style="list-style-type: none"> <li>1) Introduction to DMA and CRS requirements and the planning process</li> <li>2) Trends in disasters and justification for planning</li> <li>3) Review of FMPC responsibilities and the project schedule</li> <li>4) Preliminary hazard identification</li> </ol>	June 11, 2025 10:00 a.m.	Microsoft Teams Meeting
FMPC Mtg. #2	<ol style="list-style-type: none"> <li>1) Review draft Hazard Identification &amp; Risk Assessment (HIRA)</li> <li>2) Discuss asset inventory, risk, and vulnerability</li> </ol>	August 26, 2025 2:30 p.m.	Microsoft Teams Meeting
FMPC Mtg. #3	<ol style="list-style-type: none"> <li>1) Discuss goals &amp; objectives</li> <li>2) Review mitigation action plan requirements</li> <li>3) Discuss local capability</li> <li>4) Discuss new mitigation action alternatives</li> </ol>	October 21, 2025 2:00 p.m.	Microsoft Teams Meeting
FMPC Mtg. #4	<ol style="list-style-type: none"> <li>1) Review the draft Floodplain Management Plan</li> <li>2) Finalize the mitigation action plan</li> <li>3) Solicit comments and feedback</li> </ol>	January 20, 2026 11:00 a.m.	Microsoft Teams Meeting

FLOODPLAIN MANAGEMENT PLANNING COMMITTEE MEETING 1 MINUTES AND ATTENDANCE



**CITY OF MIRAMAR, FL FLOODPLAIN MANAGEMENT PLAN  
AND PROGRAM FOR PUBLIC INFORMATION**  
FLOODPLAIN MANAGEMENT PLANNING COMMITTEE (FMPC) - MEETING #1  
June 11, 2025, 10am, Microsoft Teams

**ATTENDANCE**

There were 17 attendees. The following individuals were in attendance:

- Alison Adams, Resident of Miramar
- Anneline Carter, Real Estate Agent
- Leah DeRiel, City of Miramar, Assistant City Engineer
- Shaun Gayle, City of Miramar, Assistant City Manager & Public Information Officer
- Josh Green, City of Miramar, Emergency Management Planner
- Tekisha Jordan, City of Miramar, Assistant Director of Building, Planning and Zoning Department
- Marilyn Markwei, City of Miramar, Building Coordinator
- Matt Thompson, Resident of Miramar & Planning and Zoning Board Member
- Nari Tomlinson, Resident of Miramar
- Rayon Angell, Angell's Insurance Specialist Inc.
- Whitney Taylor, Building Coordinator, Building, Planning, and Zoning Department
- Wendy Matos, Resident of Miramar
- Nixon Lebrun, City of Miramar, Floodplain Administrator
- Judeen Johnson, WSP, Project Manager
- Abby Moore, WSP
- Ranger Ruffins, WSP
- Kimmy Hansen, WSP

**AGENDA**

- Welcome & Introductions
- Community Rating System (CRS) Overview
- Project Overview
- Why Plan?
- CRS Activity 510 Floodplain Management Planning
  - FMP Requirements & Planning Process
  - Stakeholder Coordination
  - Public Outreach
  - Risk Assessment
- CRS Activity 330 Program for Public Information
  - PPI Requirements & Planning Process
  - Topics & Messages
- Next Steps

Judeen Johnson, the project manager for WSP, the City's consultant, provided initial introductions. Abby Moore and Ranger Ruffins facilitated the meeting according to the agenda above.

**CRS PROGRAM OVERVIEW**

- 1 The CRS Program is a voluntary, point-based program that provides a 5% premium discount to flood insurance policyholders for every 500 points that a community earns. Currently, the City of Miramar is a Class 8, which provides a 10% discount to all policyholders regardless of being located in or outside of the SFHA. The goals of the CRS program are to:
  - 2 Reduce flood damage to insurable property
  - 3 Strengthen and support the insurance aspects of the NFIP
  - 4 Encourage a comprehensive approach to floodplain management

Abby reviewed current flood insurance data with the committee which showed a total of 1,777 insurance claims that have been paid since the City joined the National Flood Insurance Program in 1977. Out of those claims, only 7 have been substantial damage claims. A substantial damage claim is a determination by local building officials that the cost to repair a structure after damage exceeds 50% of the structures market value before the damage occurred.

**PROJECT OVERVIEW**

The City of Miramar will be completing both a CRS Activity 510 - Floodplain Management Plan (FMP) and a CRS Activity 330 - Program for Public Information (PPI). Abby noted that all CRS activity descriptions and project details can be found in the CRS Coordinators Manual.

**WHY PLAN?**

Abby discussed that there have been more disaster declarations in recent years as well as increased cost for disaster response and recovery, in part due to population growth and development in hazardous areas which has increased exposure. So far, in 2024 there have been 27 weather/climate disaster events with losses exceeding \$1 billion each. Six of these disasters have been flood-related hazards.

Abby explained that we must plan for mitigation because the costs of response and recovery are growing, many events are predictable or repetitive, loss reduction works, and there are funds available to help. The average benefit-cost ratio for a federally funded mitigation project is 6:1. Planning for mitigation helps break the disaster cycle of damage occurring followed by rebuilding only for the structure to be damaged again during the next disaster event.

**FMP PLANNING PROCESS**

Ranger reviewed the intent of DMA planning and explained the basis of DMA planning requirements in the Code of Federal Regulations, which establish the four-phase planning process. This process dovetails with the CRS Program's 10-Step planning process. The completed plan will meet the requirements of both programs.

The purpose of a floodplain management plan is to reduce potential losses from future disasters. Ranger reviewed the FMP planning process noting that the planning requirements of the DMA outline four ordered phases: 1) organize resources, 2) risk assessment, 3) develop a mitigation plan, and 4) adoption and implementation. These phases outline a ten-step planning process reflected in both DMA and CRS planning requirements. Ranger reviewed the 10-Step planning process, which is as follows:

- 1 Organize to Prepare the Plan
- 2 Involve the Public
- 3 Coordinate
- 4 Assess the Hazard
- 5 Assess the Problem
- 6 Set Goals
- 7 Review Possible Activities
- 8 Draft an Action Plan
- 9 Adopt the Plan
- 10 Implement, Evaluate, and Revise the Plan

**Phase 1: Organize Resources****Step 1 – Organize to Prepare the Plan**

In this step the City convened the Floodplain Management Planning Committee (FMPC) which includes local staff, citizens, and stakeholders. Additionally, the City can organize existing resources and inventory what tools, data, and services are available to create the plan.

**Step 2 – Plan for Public Involvement**

Prepare and develop ways to engage the public in the planning process. This could include integrating the public on the FMPC, posting information on websites, developing press releases, and implementing surveys and questionnaires.

The WSP planning team has developed a public survey that will help the FMPC better understand the community's experiences and concerns with flooding. The survey can be accessed at the link [HERE](#).

Ranger asked the committee if they would be able to host the planning process documents on their website or if WSP would need to create a new website. Shaun noted that a member from the marketing team will need to be involved and that it may be best to have WSP create a website, and they will include a link on the City's site for the public to view.

**Step 3 – Coordinate with Other Departments and Agencies**

The FMPC should seek the support of other departments for assistance with plan development. These agencies can help connect with the public, provide critical information and data, and provide important insight that enriches the FMP. Ranger noted that to maximize CRS credit we must involve 30 outside stakeholders in the planning process. Please see slide 23 for a list of potential departments and agencies.

**Phase 2: Risk Assessment****Step 4 – Identify the Hazards**

Hazard identification explores what types of events may occur within the City. Hazards are profiled based on their extent, past occurrences, seasonal patterns, magnitude, and other factors.

Ranger reviewed the potential hazards that could be included in the plan: Coastal Flood, Stormwater and Localized Flooding, Dam & Levee Failure, and Tropical Cyclone. A committee member asked why coastal flood and dam and levee failure would be included. Ranger explained that there are coastal flood zones within Miramar City limits and there is a presence of dams on the west side of the City. WSP will evaluate these hazards further. Ultimately, the committee can decide what hazards are needed in the plan. Hazard profiles will include the location a hazard can occur, previous occurrences, potential impacts, probability of future occurrence, and extent of the evaluated hazards.

**Step 5 – Assess the Problem**

The vulnerability assessment considers what assets will be affected and to what extent. This step also considers the City's existing local capability to implement mitigation projects.

Ranger noted that critical facilities and critical infrastructure will be categorized into FEMA lifeline categories. Nixon noted that the City's Resilient Florida Program Vulnerability Assessment is still being developed but can help provide an updated critical asset inventory to WSP.

**Phase 3: Develop a Mitigation Plan****Step 6 – Set Planning Goals**

The FMPC will develop goals to guide the creation and implementation of the plan's mitigation strategy.

**Step 7 – Review Possible Activities**

The FMPC will review and choose mitigation activities that reflect the goals and capability of the City.

**Step 8 – Draft Action Plan**

The FMPC along with City staff will identify and prioritize actions and determine which department is responsible for particular mitigation actions, when the actions will be completed, and how they will be financed.

**Phase 4: Adoption and Implementation****Step 9 – Adopt the Plan**

At this step, the plan will be adopted by City Commission. The public will have the opportunity to review and provide input that will be incorporated into the plan before adoption.

**Step 10 – Implement, Evaluate and Revise the Plan**

Plan implementation requires several steps including assigning an overall project manager and integrating actions into staff work plans. Overtime, the FMPC should monitor changes in vulnerability, report on progress, publicize successes, and revise the plan as necessary. The DMA and CRS program require updates every 5 years. After the plan is adopted the FMPC can maximize CRS credit by meeting quarterly to review plan progress.

**PPI PLANNING PROCESS**

The PPI is a way for the community to think outside of the box for public outreach and develop a coordinated approach to annual outreach projects and post-event flood response projects. Through the PPI the community identifies flood-related information needs, selects outreach topics and messages, identifies target areas and audiences, develops outreach projects, and identifies stakeholders that can support outreach. Abby reviewed the PPI planning process, which is a seven-step process.

- 1 Establish a PPI Committee
  - a The FMPC will serve as the committee for both FMP and PPI processes
  - b Includes staff from the community and outside stakeholders
- 2 Assess the Community's Public Information Needs
  - a Identify Priority Areas
  - b Assess Flood Insurance Coverage
  - c Determine Priority Audiences
  - d Inventory Other Public Information Efforts
- 3 Formulate Messages
  - a CRS Priority Topics
  - b Four Additional Topics
- 4 Identify Outreach Projects to Convey the Messages
  - a Review & update existing outreach projects
  - b What is working and what is not working
- 5 Examine Other Public Information Initiatives
  - a Activities other than outreach projects:
    - i How to improve the community's website
    - ii What technical assistance is needed
    - iii How to publicize flood protection services
- 6 Prepare the PPI Document
  - a Document must be adopted by City Commission
- 7 Implement, Monitor, and Evaluate the Program
  - a Annual Review
  - b Update every five years

Abby noted that the PPI is a great platform for advertising other flood protection projects that the City is working on and could potentially provide extra CRS points. Additionally, it is better to focus on a select handful of messages to repeat to the community, so they are more likely to remember and put the messages into practice.

**PROJECT SCHEDULE**

Abby briefly reviewed the project schedule as shown on slide 38. WSP aims to schedule the first public meeting for the end of June and will plan to meet with the FMPC again in August. The committee

confirmed that this schedule timeline works, and they will plan to have a final meeting in January following the holidays.

#### DISCUSSION

It was asked if there is a threshold of participants that need to be engaged in the planning process. Abby explained that there is no required number, as FEMA does not look at who attends. FEMA is only looking to confirm that meetings were held and advertised to provide the public a chance to attend. The committee noted that they will also have to provide proof of involvement to the City Commission and want to put forth the best efforts to get as many people involved in the planning process as possible.




















A committee member asked for clarification on the City's CRS score and how these new plans may impact their score. Abby noted that the City of Miramar is currently given a CRS rating of 8. To maintain this score, verification visits will be held for the City to show documentation for all activities they are currently receiving credit for. Once plans are completed, the City will need to ask for modification to a Class 7 as they will be improving existing projects and adding new ones.

#### NEXT STEPS

Abby requested the FMPC to share the public survey link and QR code on their social media pages and City website. Additionally, the FMPC as asked to send WSP any necessary data or information that could be included in the plan. WSP will begin work on the risk and vulnerability assessment and will schedule a public kickoff meeting and second FMPC meeting in the coming weeks.



▼ In this meeting (17) Mute all

- KH** Hansen, Kimberly 
- AA** Alison Adams (Unverified) 
- AC** Anneline Carter (Unverified) 
- LD** DeRiel, Leah (Unverified) 
- SG** Gayle, Shaun D. (Unverified) 
- JG** Green, Josh (Unverified) 
-  Johnson, Judeen 
- TJ** Jordan, Tekisha I. (Unverified) 
- MM** Markwei, Marilyn M. (Unverified) 
- MT** Matt Thompson (Unverified) 
- AM** Moore, Abigail  
Organizer 
- NT** Nari Tomlinson (Unverified) 
- N** Nixon (Unverified) 
- RA** Rayon Angell (Unverified) 
-  Ruffins, Ranger 
- WT** Taylor, Whitney D. (Unverified) 
- W** wendy (Unverified) 

FLOODPLAIN MANAGEMENT PLANNING COMMITTEE MEETING 2 MINUTES AND ATTENDANCE



**CITY OF MIRAMAR, FL FLOODPLAIN MANAGEMENT PLAN  
AND PROGRAM FOR PUBLIC INFORMATION**

**FLOODPLAIN MANAGEMENT PLANNING COMMITTEE (FMPC) - MEETING #2**

August 26, 2025, 2:30pm, Microsoft Teams

**ATTENDANCE**

There were 12 attendees. The following individuals were in attendance:

- Leah DeRiel, City of Miramar, Assistant City Engineer
- Josh Green, City of Miramar, Emergency Management Planner
- Tekisha Jordan, City of Miramar, Assistant Director of Building, Planning and Zoning Department
- Marilyn Markwei, City of Miramar, Building Coordinator
- Matt Thompson, Resident of Miramar & Planning and Zoning Board Member
- Vanessa Gajardo, Services Support Coordinator, Building, Planning, and Zoning Department
- Whitney Taylor, Building Coordinator, Building, Planning, and Zoning Department
- Wendy Matos, Resident of Miramar
- Nixon Lebrun, City of Miramar, Floodplain Administrator
- Abby Moore, WSP
- Ranger Ruffins, WSP
- Kimmy Hansen, WSP

**AGENDA**

- Welcome & Introductions
- Floodplain Management Plan**
  - Planning Process Update
  - Hazard Identification & Risk Assessment (HIRA) Review
    - HIRA Overview
    - Hazards Identification and Flood History
    - Asset Inventory
    - Hazard Profiles – Risk and Vulnerability Assessment
- Program for Public Information**
  - Target Areas & Audiences
  - Topics & Messages
  - Next Steps

Abby Moore and Ranger Ruffins facilitated the meeting according to the agenda above.

**FLOODPLAIN MANAGEMENT PLAN**

**PLANNING PROCESS UPDATE**

Abby updated the HMPC on where we are in the 10-Step Planning Process. The planning process is currently at Steps 4 and 5 (Assess the Hazard and Assess the Problem). These steps comprise the Hazard Identification and Risk Assessment (HIRA). Abby noted that there are three key factors that are assessed

to determine risk and a hazards potential impact – the hazard itself, vulnerability to a given hazard, and exposure. Once Steps 4 and 5 are complete, the information gathered in this process will factor into the remaining steps, which include setting the plan goals and drafting the mitigation action plan.

**HAZARD IDENTIFICATION & RISK ASSESSMENT (HIRA) REVIEW**

**HIRA Overview and Organization**

The four components of the HIRA are the hazard identification, hazard profiles, asset inventory, and loss estimates. The HIRA is organized into two sections of the plan. Section 3 is the Hazard Identification and Section 4 contains hazard profiles for all identified hazards and the findings of the Vulnerability Assessment.



**Identified Hazards**

Hazards were identified for initial review based on the list of hazards included in the 2023 State HMP, the 2023 Broward County LMS, major disaster declarations for the county, and FMPC input from the previous meeting. The full list of identified hazards for this plan are: Flood, Levee Failure, Stormwater/Localized Flooding, and Tropical Cyclones.

**Disaster Declaration History**

Ranger reviewed data on past hazard events, including past major disaster declarations as well as an event history from NOAA’s National Centers for Environmental Information (NCEI) Storm Events Database. There have been 18 flood-related disaster declarations including Broward County since 1960 – most recently Hurricane Milton and Hurricane Nicole. NCEI reports 150 flood related events since 1999 totaling over \$313M in property damage.

Ranger noted that the NCEI Storm Events Database is dependent on the data provided to NOAA and NWS, so some information may be incomplete, particularly as far as records of past property damage amounts, deaths, and injuries are concerned.

**Asset Inventory**

Ranger reviewed the building exposure analysis shown on slide 14 of the presentation, which is calculated using building footprint attribute data. Majority of the buildings in the City of Miramar are residential. The asset inventory also includes an update to the inventory of critical facilities and infrastructure categorized by FEMA Lifelines. There are 373 critical facilities and infrastructure captured in this assessment.

**HAZARD PROFILES**

**Priority Risk Index (PRI) Results Summary**

All of the hazards were evaluated using the Priority Risk Index (PRI) to rank their relative importance. With the PRI, hazards are rated on their probability, impact, spatial extent, warning time, and duration to produce an overall score and associated priority level. Ranger encouraged the FMPC to review the assigned ratings and provide feedback if they think any ratings should be adjusted.

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Flood	Likely	Critical	Moderate	6 to 12 hrs	Less than 1 week	3.0
Levee Failure	Unlikely	Limited	Moderate	Less than 6 hrs	Less than 1 week	2.2
Stormwater/Localized Flooding	Highly Likely	Limited	Moderate	Less than 6 hrs	Less than 24 hrs	2.9
Tropical Cyclones	Likely	Catastrophic	Large	More than 24 hrs	Less than 1 week	3.3

Ranger provided a summary of the hazard risk and vulnerability assessment findings for each of the identified hazards:

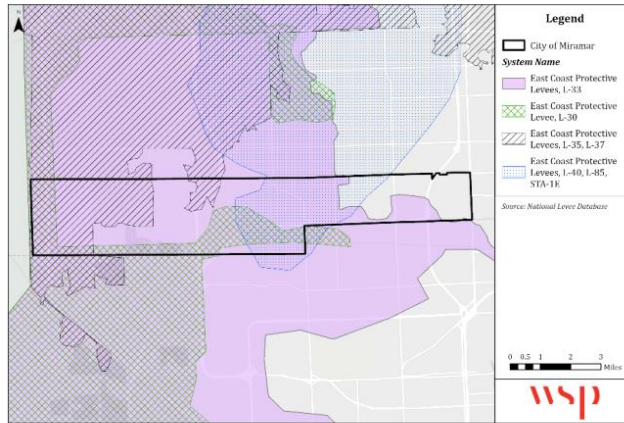
**Flood**

An overview of the acreage in FEMA flood hazard areas was presented. Approximately 83% of the flood zone acreage is within the SFHA. NCEI reports 26 flood events occurring in Broward County from 1997 to 2024, causing over \$92 Million in property damage. A property exposure analysis, shown on slide 21, revealed that over 29,000 buildings within the City of Miramar are exposed to the 1% and 0.2%-annual-chance flood event. Total estimated value of these buildings is over \$10 billion.

Ranger also showed that 69 percent of all critical facilities in the City are located within the Special Flood Hazard Area.

**Levee Failure**

There are four levees with protected areas that include portions of the City of Miramar. All levees are maintained by the SFWMD with risk assessments completed between 2015-2023. Currently there are no immediate concerns with these levees. However, East Coast Protective Levees, L-33 was rated as high risk due to the highly developed area it could impact if it were to fail.



**Stormwater/Localized Flooding**

Approximately, 30 locations of localized flooding were identified in the public survey by residents. These locations include Sherman Circle, Miramar Parkway, Miramar Boulevard, and Silver Lakes. The committee noted that there are some additional side streets off of Miramar Parkway that flood as well as some areas near Sunshine Boulevard and the Country Club. A committee member asked if the current drainage system would be evaluated within the FMP as many of the highlighted areas where flooding has occurred could potentially be attributed to drainage problems or clogs. Ranger noted that an inventory of the current drainage system will not be included in this plan but this could be added as a mitigation strategy or suggested project. Abby noted that the City is working to develop a Stormwater Master Plan that will dive deeper into the stormwater system.

**Tropical Cyclones**

There have been 65 named hurricane and tropical storm tracks that have passed within 50 miles of the City of Miramar from 1900-2024. NCEI records report over \$220.4 M in property damage from hurricanes and tropical storms since 1997 which is likely low due to under reporting. Additionally, nearly all Disaster Declarations are hurricanes and tropical storms. Increased frequency and intensity of these storms will impact flood hazards in the City.

**PROGRAM FOR PUBLIC INFORMATION**

**Target Areas**

The PPI target areas are groups of people who will be sent targeted outreach through direct mailings. Abby discussed options with the committee and was given approval to move forward with the recommended target areas listed below.

Recommended Target Areas:

1. Special Flood Hazard Areas (SFHA)
2. Repetitive Loss Areas
3. Realtors, Lenders, and Insurance Agents

**Target Audiences**

Target audiences are people who need different types of flood-related information. For example, residents or businesses in high-risk areas or groups with similar flood exposure or flood information needs. Abby asked the Committee to confirm the target audience recommendations listed below.

Target Audience Ideas:

1. Homeowners Associations
2. Spanish Speaking Population
3. Landscapers
4. Realtors, Lenders, and Insurance Agents

The committee discussed changing “Spanish Speaking Populations” to “Non-English-Speaking Populations” to accommodate a wider range of residents and translate information into more languages, including Creole. The committee noted that it may be helpful to target property managers who can help distribute materials to landscapers. Nixon commented that the City may be able to utilize sending out brochures with the Utilities and Billing department.

**Topics & Messages**

Abby presented the six CRS priority topics and the four additional topics that can be altered by the committee to fit the needs of the City. The topics are listed below:

CRS Priority Topics:

1. Know your hazard
2. Insure your property
3. Protect yourself and your family
4. Protect your property
5. Build responsibly
6. Protect natural floodplain functions

Additional Topic Ideas:

1. Hurricane Preparedness
2. General Preparedness
3. Reduce Stormwater Flooding
4. Flood Education

The committee agreed to move forward with the four additional topic ideas. Nixon noted that the City already has some literature and pamphlets regarding these additional topics that they could utilize and build upon. The committee was asked to send all existing materials of these topics to Abby or Ranger. Additionally, Abby suggested that for “flood education,” the City could work on teaching younger students about flooding in local schools so they can take this knowledge home and share it with their parents.

**PROJECT SCHEDULE**














Abby briefly reviewed the project schedule as shown on slide 35. WSP aims to schedule the third FMPC meeting for the end of October.

**NEXT STEPS**

Abby requested the FMPC to review the draft HIRA once it is made available and to submit information on local capabilities. Additionally, Abby requested that the committee continue public involvement by promoting the public survey link and QR code on their social media pages and City website. The next FMPC meeting will aim to review capabilities, develop goals and objectives, and brainstorm mitigation action ideas.



∨ In this meeting (12) Mute all

- KH** Hansen, Kimberly 
- LD** DeRiel, Leah (Unverified) 
- VG** Gajardo, Vanessa J. (Unverified) 
- JG** Green, Josh (Unverified) 
- TJ** Jordan, Tekisha I. (Unverified) 
- NL** Lebrun, Nixon (Unverified) 
- MM** Markwei, Marilyn M. (Unverified) 
- MT** Matt Thompson (Unverified) 
- AM** Moore, Abigail 
-  **Ruffins, Ranger**  
Organizer 
- WT** Taylor, Whitney D. (Unverified) 
- W** Wendy (Unverified) 

FLOODPLAIN MANAGEMENT PLANNING COMMITTEE MEETING 3 MINUTES AND ATTENDANCE



**CITY OF MIRAMAR, FL FLOODPLAIN MANAGEMENT PLAN  
AND PROGRAM FOR PUBLIC INFORMATION**

**FLOODPLAIN MANAGEMENT PLANNING COMMITTEE (FMPC) – MEETING #3**

October 21, 2025, 2:00pm, Microsoft Teams

**ATTENDANCE**

There were 10 attendees. The following individuals were in attendance:

- Leah DeRiel, City of Miramar, Assistant City Engineer
- Sean Hennessy, City of Miramar, Marketing and Communications
- Nari Tomlinson, Resident of Miramar
- Tekisha Jordan, City of Miramar, Assistant Director of Building, Planning and Zoning Department
- Whitney Taylor, Building Coordinator, Building, Planning, and Zoning Department
- Nixon Lebrun, City of Miramar, Floodplain Administrator
- Judeen Johnson, WSP
- Abby Moore, WSP
- Ranger Ruffins, WSP
- Kimmy Hansen, WSP

**AGENDA**

- Welcome & Introductions
- Floodplain Management Plan**
  - Planning Process Update
  - Capability Assessment
  - Public Survey Results
  - Set Plan Goals
  - Discuss Mitigation Action Plan
- Program for Public Information**
  - Target Areas, Audiences & Messages
  - Outreach Projects
  - Next Steps

Abby Moore and Ranger Ruffins facilitated the meeting according to the agenda above.

**FLOODPLAIN MANAGEMENT PLAN**

Abby updated the FMPC on where we are in the 10-Step Planning Process. The planning process is currently at Steps 6 through 8.

**CAPABILITY ASSESSMENT**

- Abby shared the existing resources and tools that give the City of Miramar and Broward County strong administrative and planning capabilities.
- The committee was asked to look for any capability gaps that could be addressed within the FMP.

- Nixon noted that they will be hiring a new floodplain coordinator, working towards more employees becoming Certified Floodplain Managers, and budgeting towards more mitigation funding.

**PUBLIC SURVEY RESULTS**

- So far, the survey has received 157 responses from the public.
- The committee noted that based on survey responses shown in slides 10-13, it may be beneficial to further publicize the new public website that allows property owners to access flood risk data for individual properties.
- The committee discussed how some property owners may be referencing outdated flood maps and may not know they are located in a flood zone.

**SET PLAN GOALS**

Ranger discussed how goals can help shape the mitigation action plan and that the committee should aim for at least 3-5 broad goals. The proposed goals, shown on slide 18, were reviewed by the committee. No edits were requested at this time. Abby noted that these goals can be expanded or changed in order to fit the action plans if needed.

- Nixon noted that the public works department is pursuing funding for the stormwater master plan. Abby thought the plan was currently being updated. Nixon will confirm the status of the plan. If public works is still pursuing funding, the plan will be added as an action in this FMP. If planning is already underway then any relevant actions outlined in the plan could be added as a FMP action.

**DISCUSS MITIGATION ACTION PLAN**

When generating new mitigation activities it is important to consider FEMA’s six hazard mitigation categories, the high-risk hazards identified within the Priority Risk Index results, existing actions from relevant plans, input from key stakeholders, and public feedback.

- Ranger reviewed the map on slide 23 which shows the flooding hotspots that were reported in the public survey. Nixon noted that he could provide additional locations of properties that have called in for flood assistance. He will also follow up with any complaints collected by public works.
  - Leah added that the vulnerability assessment outlines focus areas where residents have noted ongoing flood challenges. WSP will review the assessment and add any areas not already captured on the localized flooding map.
- The committee noted that the newly updated 2045 City of Miramar Comprehensive Plan contains new conservation and open space policies that may be referenced for new mitigation activities in the FMP. WSP will review the plan for potential actions.
- Nixon noted that the development of a Substantial Damage Management Plan (SDP) would not be a project to include in the FMP as the City already has an established process for evaluating substantial damages. Additionally, given the new Florida SB 180 restrictions, the City cannot enforce cumulative substantial damage, and as a result does not need a SDP to outline a process for tracking the frequency of substantial damages.
- Nixon asked if there were still funding sources available for acquisition and elevation. Abby confirmed that the FEMA Hazard Mitigation Grant Program (HMGP) was still available.



- Ranger informed the FMPC of the online strategy submission form where recommendations for mitigation strategies can be submitted to be included in the forthcoming FMP. She asked committee members to share the form with other City staff or relevant stakeholders.

#### PROGRAM FOR PUBLIC INFORMATION

Abby reviewed the current PPI target areas, target audiences, topics, and outreach projects as shown in slide 32 and 33 of the presentation.

- Nixon confirmed that the City is currently providing outreach presentations to HOAs, will have translating capabilities in both Spanish and Creole, and they will be able to provide a list of property managers.
- The committee decided to remove presentations in schools as an outreach project as it is not necessary to meet maximize CRS credit.





















#### PROJECT SCHEDULE

Abby briefly reviewed the project schedule as shown on slide 35. WSP aims to schedule the final FMPC meeting for January of 2026.

#### NEXT STEPS

Abby asked the FMPC to complete the following actions:

- Review the draft HIRA and submit comments by Friday, November 21<sup>st</sup>
- Submit mitigation actions via email or submission form by Friday, December 12<sup>th</sup>
- Send revisions/comments on Plan Goals by Friday, December 12<sup>th</sup>

 KH	Hansen, Kimberly	
 LD	DeRiel, Leah (Unverified)	
 SH	Hennessy, Sean (Unverified)	
	Johnson, Judeen	
 TJ	Jordan, Tekisha I. (Unverified)	
 NL	Lebrun, Nixon (Unverified)	
 AM	Moore, Abigail	
 NT	Nari Tomlinson (Unverified)	
	<b>Ruffins, Ranger</b> Organizer	
 WT	Taylor, Whitney D. (Unverified)	

## FLOODPLAIN MANAGEMENT PLANNING COMMITTEE MEETING 4 MINUTES AND ATTENDANCE



## CITY OF MIRAMAR, FL FLOODPLAIN MANAGEMENT PLAN AND PROGRAM FOR PUBLIC INFORMATION

### FLOODPLAIN MANAGEMENT PLANNING COMMITTEE (FMPC) – MEETING #4

January 20, 2026, 11:00am, Microsoft Teams

#### ATTENDANCE

There were eight attendees. The following individuals were in attendance:

- Leah DeRiel, City of Miramar, Assistant City Engineer
- Marilyn Markwei, City of Miramar, Public Works Department
- Whitney Taylor, Building Coordinator, Building, Planning, and Zoning Department
- Nixon Lebrun, City of Miramar, Floodplain Administrator
- Ranger Ruffins, WSP
- David Stroud, WSP
- Abby Moore, WSP
- Judeen Johnson, WSP

#### AGENDA

- Introductions
- Floodplain Management Plan
  - Planning Process Update
  - Review of the Draft Plan
    - Organization of the Plan
  - Mitigation Action Plan
    - Review Projects
- Next Steps

Ranger Ruffins facilitated the meeting according to the agenda above.

#### FLOODPLAIN MANAGEMENT PLAN

Ranger updated the FMPC on where we are in the 10-Step Planning Process. The planning process is currently finalizing Steps 7 and 8. Once the draft plan is completed, the City Commission will adopt the plan to complete Step 9 and the FMPC will continue to meet quarterly to complete Step 10 over the next five years.

#### ORGANIZATION OF THE PLAN

- Section 1 provides background information on the context and justification for the plan.
- Section 2 outlines the planning process, reviewing the 10-step planning process and providing some documentation of the process. It includes a summary of the FMPC participants, FMPC meetings, public meetings, and public & stakeholder outreach and involvement efforts. This section also includes a summary of the public survey. Thanks to City staff outreach efforts we received 167 responses, which provided valuable information on flood risks, vulnerabilities, and mitigation ideas.

- Section 3 provides an overview of the current conditions in the City. It includes demographic information, social vulnerability, growth and development trends, and other statistics on current conditions.
- Section 4 provides the risk and vulnerability assessment. This section comprises the bulk of the plan and was reviewed at the second FMPC meeting. Ranger showed a table summarising the Priority Risk Index results which rank the hazards in order of priority based on a standardized scoring system.
- Section 5 provides the capability assessment. This section reviews existing tools, resources, and staff that can support mitigation project implementation.
- Section 6 is the mitigation strategy, which includes an overview of the process to develop the mitigation strategy, the mitigation goals, and a review of actions and how they were selected and prioritized. This section also presents the resulting mitigation action plan table as well as detailed information on each action. Ranger reviewed the three proposed mitigation goals which were discussed at the third FMPC meeting. There were no additional comments on the proposed goals.
- Section 7 will document plan adoption. The City Commission must formally adopt the plan by resolution; a copy of the resolution will be included in this section for documentation.
- Section 8 explains the plan implementation and maintenance procedures that the City and the FMPC must follow to keep the plan current. The FMPC should meet quarterly to maximize CRS credit and to more regularly work together to identify potential funding for implementation or consider any needed changes to the mitigation actions or the plan.
- Appendix A provides planning process documentation including all FMPC and public meeting records, public outreach records, and stakeholder outreach documentation.
- Appendix B provides a review of mitigation alternatives, noting potential actions and which may or may not be recommended for the city.
- Appendix C lists data sources and references used in the plan.

#### DISCUSS MITIGATION ACTION PLAN

Ranger presented the projects that were submitted by Leah and Marilyn and the projects that were proposed by WSP and asked for FMPC feedback.

Projects proposed by FMPC members:

1. Historic Miramar Infrastructure Improvement Project – confirmed that this will include Phases 5 & 6. Phase 5 is in design phase but City can seek funding for implementation.
2. C-9 Canal outfall pipe plug removal – confirmed this will be pursued; modeling and permitting will be needed.
3. Acapulco drainage improvement – this project may need adjustment but that will be determined through design; will need to find funding for a consultant for design and implementation.
4. SW 33<sup>rd</sup> Street drainage improvement – this section of street does not have positive drainage; the plan is to connect it so that outfalls into a lake.
5. Tarpon pipe collapse replacements – this is an outfall pipe into a lake; should be implemented within the next 12-18 months but funding is needed for construction.
6. Implement CIP projects identified in the City's Stormwater Master Plan – plan development is underway and project specifics can be added in future updates.

7. Drainage improvements on Miramar Parkway from Canal Road to University Drive – this area has no drainage structures, was designed for soil drainage; fill and driveways preventing adequate drainage causing ponding along curb and in travel lanes. Lower priority than the other projects. Marilyn confirmed that resident complaints have been received about this area.

Projects proposed by WSP:

8. Develop a voluntary acquisition plan – David confirmed that this is a fully voluntary program. FEMA provides funding through the Flood Mitigation Assistance (FMA) which has annual allocations and through the post-disaster Hazard Mitigation Grant Program (HMGP).
9. Create a public information program on benefits of onsite retention and rain gardens – added to address public survey feedback. Marilyn agreed that residents can do more to reduce flooding. David suggested expanding to other LID approaches such as rain barrels.
10. Promote and publicize City’s flood risk website – no concerns or revisions
11. Flood protection advice and assistance (provide and document in accordance with CRS Activity 360) – David explained requirements to implement for CRS; WSP will incorporate this in the City’s PPI for additional bonus credit. This service is already provided by Public Works and Engineering staff and would just need to be publicized and documented property for CRS credit. Will also assign Building, Planning, and Zoning staff to support moving forward.
12. Create plan for improved vegetative management around canals to improve water quality – should be revised to lakes. Majority of lakes belong to South Broward Drainage District, but some lakes are maintained by the City and these could be addressed by this action. Public education may be needed as residents often don’t like to see vegetation around lakes.
13. Coordinate open space opportunities with flood control needs – no concerns or revisions

Projects from updated comprehensive plan to integrate with FMP:

14. Coordinate with SFWMD on Everglades Buffer Strip – this area is already dedicated for conservation; do not need to include this project.
15. Support green design guidelines and LID requirements – this can be included but Nixon noted that the City will not be able to implement it in the near future due to SB180. It will be included as a long-term goal.
16. Preserve undeveloped acquired land near I-75 and Pembroke Road for nature center or similar use – Leah noted that City is expanding Pembroke Road in right of way, but USACE may be looking to preserve some land outside of right of way. Remove this project due to conflicting development plans.

Marilyn noted that the City has an ongoing embankment stabilization program which could be added as an additional project.

Ranger will provide a draft mitigation action plan with the selected projects for FMPC review. We will need to confirm action details including action priority, responsible department, potential funding source, and timeframe for implementation.

**NEXT STEPS**

Ranger reviewed the project schedule and the FMPC meetings. This will be the last time we meet as a committee, but we need to hold a final public meeting.

Action items for the FMPC:

- Send revisions/comments on the mitigation actions by Friday, January 30<sup>th</sup>

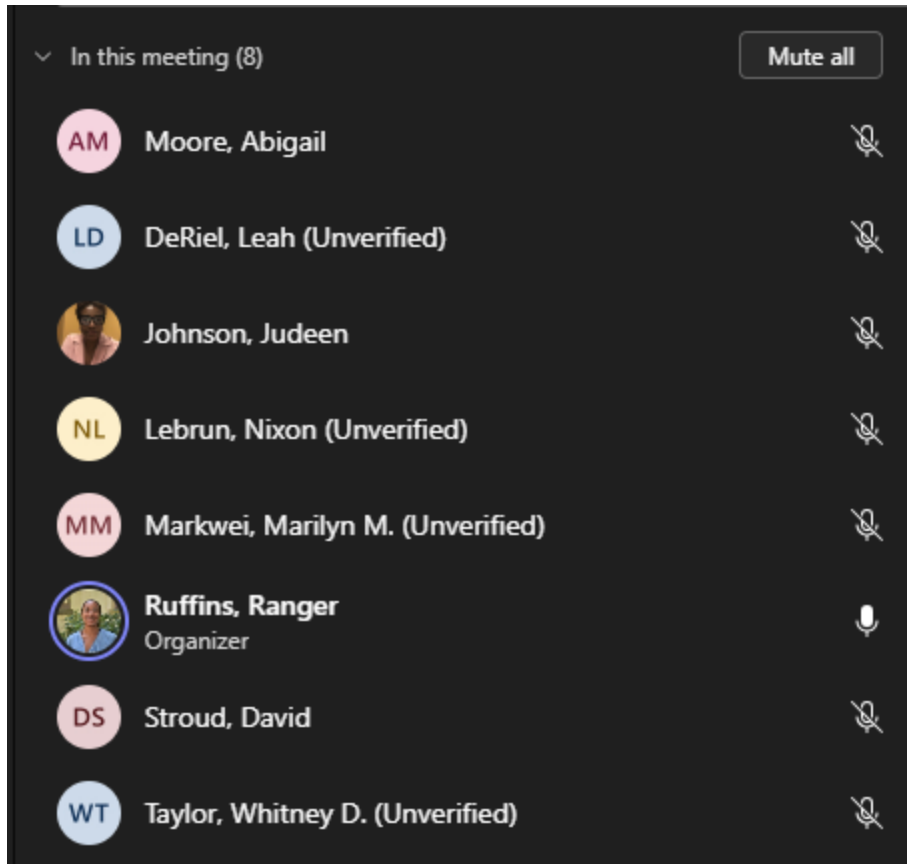
- Review the draft plan and submit comments to WSP

Action items for WSP:

- Send draft FMP for committee review
- Send draft PPI for committee review
- Schedule the final public meeting for the FMP

Nixon noted that he is working with procurement to finalize how we will approach the RLAA.

Leaning toward adoption of the plan at the City Commission's first meeting in March; there will be lead time to get all documents and information submitted prior to the meeting.



## A.2 PLANNING STEP 2: INVOLVE THE PUBLIC

### PUBLIC MEETING DATES, TOPICS, AND LOCATIONS

Meeting Type	Meeting Topic	Meeting Date	Meeting Locations
Public Meeting #1	<ol style="list-style-type: none"> <li>1) Introduction to DMA, CRS and the planning process</li> <li>2) Introduction to hazard identification</li> <li>3) Discussion on integrating FMP with existing city projects</li> </ol>	July 17, 2025 6:00 - 7:00 p.m.	City Commission Chambers, 2300 Civic Center Place, Miramar, FL
Public Meeting #2	<ol style="list-style-type: none"> <li>1) Review draft Floodplain Management Plan</li> <li>2) Solicit comments and feedback from the public</li> </ol>	TBD	TBD

## PUBLIC MEETING 1 MINUTES, ATTENDANCE, AND OUTREACH



## CITY OF MIRAMAR, FL FLOODPLAIN MANAGEMENT PLAN

## PUBLIC MEETING #1

July 17, 2025, 6pm, City Commission Chambers, 2300 Civic Center Place

## ATTENDANCE

There were nine attendees. The following individuals were in attendance:

- Alison Adams, Miramar Parks Homeowners Group
- Suzee Bailey, Residents for Resilience
- Leah DeRiel, City of Miramar, Assistant City Engineer
- Shaun Gayle, City of Miramar, Assistant City Manager & Public Information Officer
- Tekisha Jordan, City of Miramar, Assistant Director of Building, Planning and Zoning Department
- Nixon Lebrun, City of Miramar, Floodplain Administrator
- Andrew Unander, City of Miramar, Planner
- Judeen Johnson, WSP, Project Manager
- Abby Moore, WSP

## AGENDA

- Introductions
- Community Rating System (CRS) Overview
- Why Plan?
- CRS Activity 510 Floodplain Management Planning (FMP)
  - FMP Requirements & Planning Process
  - Stakeholder Coordination
  - Public Outreach
  - Risk Assessment
- Next Steps

Abby Moore facilitated the meeting according to the agenda above.

## CRS PROGRAM OVERVIEW

The CRS Program is a voluntary, point-based program that provides a 5% premium discount to flood insurance policyholders for every 500 points that a community earns. Currently, the City of Miramar is a Class 8, which provides a 10% discount to all policyholders regardless of being located in or outside of the SFHA. The City is working to improve its CRS classification. The goals of the CRS program are to:

- 1 Reduce flood damage to insurable property
- 2 Strengthen and support the insurance aspects of the NFIP
- 3 Encourage a comprehensive approach to floodplain management

Abby reviewed current flood insurance data with the committee which showed a total of 1,777 insurance claims that have been paid since the City joined the National Flood Insurance Program in 1977. Out of those claims, only 7 have been substantial damage claims, though other substantial damages may have occurred that weren't covered by flood insurance. Substantial damage is a determination by local building officials that the cost to repair a structure after damage exceeds 50% of the structure's market value before the damage occurred.

**WHY PLAN?**

Abby discussed that there have been more disaster declarations in recent years as well as increased cost for disaster response and recovery, in part due to population growth and development in hazardous areas which has increased exposure. So far, in 2024 there have been 27 weather/climate disaster events with losses exceeding \$1 billion each. Six of these disasters have been flood-related hazards.

Abby explained that we must plan for mitigation because the costs of response and recovery are growing, many events are predictable or repetitive, loss reduction works, and there are funds available to help. The average benefit-cost ratio for a federally funded mitigation project is 6:1. Planning for mitigation helps break the disaster cycle of damage occurring followed by rebuilding only for the structure to be damaged again during the next disaster event.

**FLOODPLAIN MANAGEMENT PLANNING (FMP) PLANNING PROCESS**

Abby reviewed the Disaster Mitigation Act (DMA) planning process and explained the basis of DMA planning requirements which are established in the Code of Federal Regulations. The DMA planning process dovetails with the CRS Program's 10-Step planning process for floodplain management planning so that completed plan will meet the requirements of both programs.

The purpose of a floodplain management plan is to reduce potential losses from future disasters. Abby reviewed the FMP planning process and the four phases of DMA phases: 1) organize resources, 2) risk assessment, 3) develop a mitigation plan, and 4) adoption and implementation. These phases outline a ten-step planning process reflected in both DMA and CRS planning requirements. Ranger reviewed the 10-Step planning process, which is as follows:

- 1 Organize to Prepare the Plan
- 2 Involve the Public
- 3 Coordinate
- 4 Assess the Hazard
- 5 Assess the Problem
- 6 Set Goals
- 7 Review Possible Activities
- 8 Draft an Action Plan
- 9 Adopt the Plan
- 10 Implement, Evaluate, and Revise the Plan

**Phase 1: Organize Resources****Step 1 – Organize to Prepare the Plan**

In this step the City convened the Floodplain Management Planning Committee (FMPC) which includes local staff, citizens, and stakeholders. Additionally, the City will organize existing resources and inventory what tools, data, and services are available to support the plan.

**Step 2 – Plan for Public Involvement**

Throughout the planning process, the City will prepare and develop ways to engage the public in the plan. This could include integrating the public on the FMPC, posting information on the City website, developing press releases, and implementing surveys and questionnaires.

The WSP planning team has developed a public survey that will help the FMPC better understand the community's experiences and concerns with flooding. The survey can be accessed at the link [HERE](#).

**Step 3 – Coordinate with Other Departments and Agencies**

The FMPC will seek the support of other departments and outside agencies for assistance with plan development. These agencies can help connect with the public, provide critical information and data, and provide important insight that enriches the FMP. Stakeholders, including Residents 4 Resilience, were invited to this public meeting.

**Phase 2: Risk Assessment****Step 4 – Identify the Hazards**

Hazard identification explores what types of events may occur within the City. Hazards are profiled based on their extent, past occurrences, seasonal patterns, magnitude, and other factors.

Abby reviewed the potential hazards that could be included in the plan: Surface Water Flood, Stormwater Flooding, Levee Failure, and Tropical Cyclone. WSP will also integrate findings from the City of Miramar’s Vulnerability Assessment and the Broward County Vulnerability Assessment to incorporate how changes to future coastal flooding may affect flooding in Miramar in the future. WSP will evaluate these hazards further. Hazard profiles will include the location a hazard can occur, previous occurrences, potential impacts, probability of future occurrence, and extent of the evaluated hazards.

**Step 5 – Assess the Problem**

The vulnerability assessment considers what assets will be affected and to what extent. This step also considers the City’s existing local capability to implement mitigation projects.

The vulnerability assessment will include a combination of qualitative, quantitative, and spatial analysis methodologies. Abby noted that critical facilities and critical infrastructure will be categorized into FEMA lifeline categories to support future Hazard Mitigation Assistance grant applications.

**Phase 3: Develop a Mitigation Plan****Step 6 – Set Planning Goals**

The planning committee will develop goals and objectives to guide the creation and implementation of the plan’s mitigation strategy. Public and stakeholder input through the survey will be presented to the committee for inclusion in the goals and objectives.

**Step 7 – Review Possible Activities**

The committee will review and choose mitigation activities that reflect the goals and capability of the City and to address problems identified through the risk and vulnerability assessment. The City will look to integrate findings and projects from the Local Mitigation Strategy, the Capital Improvement Plan, the Vulnerability Assessment, and other relevant plans.

**Step 8 – Draft Action Plan**

The committee along with City staff will identify and prioritize actions and determine which department is responsible for particular mitigation actions, when the actions will be completed, and how they will be financed.

**Phase 4: Adoption and Implementation****Step 9 – Adopt the Plan**

At this step, the plan will be adopted by City Commission. The public will have the opportunity to review and provide input that will be incorporated into the plan before adoption.

**Step 10 – Implement, Evaluate and Revise the Plan**

Plan implementation requires several steps including assigning an overall project manager and integrating actions into staff work plans. Overtime, the committee will monitor changes in vulnerability, report on progress, publicize successes, and revise the plan as necessary. The CRS program requires updates to the plan every 5 years. After the plan is adopted the committee will meet quarterly to review plan progress.

**PROJECT SCHEDULE**

Abby briefly reviewed the project schedule. WSP will meet with the committee again in August to review the risk assessment and October to discuss the mitigation strategy. Final committee and public meetings will be held in January to review the draft plan.

**OPPORTUNITIES TO STAY INVOLVED**

Abby encouraged all attendees to complete the public survey and to share the survey with neighbors, residents, and other stakeholders. The survey will help WSP and the City to understand experiences with past flood events, how flooding impacts Miramar, and ideas for mitigation.

The City’s website will be used to house information on the planning process, including presentation slides and meeting minutes.

**DISCUSSION**

The schedule was discussed in more detail, including opportunities to align and integrate the FMP with the city’s stormwater management planning, Historic Miramar project, and Capital Improvement Plan. In addition to identifying structural mitigation projects, this plan will also inform land use and planning related decisions and policies.

There was a question about how repetitive loss data will be used. The FMP will identify repetitive loss areas and target these areas for mitigation. The City will undertake an additional Repetitive Loss Area Analysis to develop building level mitigation measures for these high risk properties and areas.

There was discussion about ways to encourage increased public participation in this plan. The City’s marketing team will support continued public outreach efforts.



**City of Miramar Floodplain Management Plan  
Public Meeting #1  
Thursday, July 17<sup>th</sup>, 2025 6:00 PM**

	<b>Name</b>	<b>Agency/Organization/Affiliation</b>	<b>Email</b>
1.	Abby Moore	WSP	abigail.moore@wsp.com
2.	Allison Adams	Miramar Parks Homeowners Group	aadams62@hotmail.com
3.	Suzee Bailey	Residents for Resilience	res4resilience@gmail.com
4.	Susan Gayle	City of Miramar	sdgayle@miramarfl.gov
5.	Tekisha Jordan	City of Miramar	tyjordan@miramar.fl.us
6.	Nixon Lebrun	Miramar Building Planning & Zoning	Nlebrun@miramarfl.gov
7.	Andrew Ulander	City of Miramar	AUNANDER@MiramarFL.gov
8.	Leah deRiel	Miramar Engineering	LDERIEL@MIRAMARFL.GOV
9.	Judeen Johnson	WSP	judeen.johnson@wsp.com
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			

PUBLIC MEETING 1 FLYER



The flyer features a top section with an aerial view of a coastal town and a beach. Below this, the title "City of Miramar PUBLIC MEETING" is displayed in large white text on a green background. The main body of the flyer is a dark blue triangle containing white text. At the bottom right, there is a circular logo with two palm trees and the text "MIRAMAR BEAUTY AND PROGRESS EST 1955".

**City of Miramar  
PUBLIC MEETING**

*Join us and share your input on the  
City's Floodplain Management Plan*

*Have you experienced flooding in the past?  
Are there areas in your neighborhood prone  
to flooding?  
Do you have suggestions for how to reduce  
flood risk?*

**Thursday, July 17th  
6:00 pm – 7:00 pm  
Miramar City Hall**  
Commission Chambers  
2300 Civic Center Place

**MIRAMAR**  
BEAUTY AND PROGRESS  
EST 1955

FLYER FACEBOOK POST



The image shows a Facebook post from the City of Miramar. It includes the city's profile picture and name, followed by a list of questions and a link to "See more". The main content of the post is a smaller version of the flyer described above. At the bottom right of the post, it says "1 share".

City of Miramar  
18h · 🌐

- Have you experienced flooding in the past?
- Are there areas in your neighborhood prone to flooding?
- Do you have suggestions for how to reduce flood risk?

Join us and share your input on the City's Floodplain Management Plan!... [See more](#)

**City of Miramar  
PUBLIC MEETING**

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**MIRAMAR**  
BEAUTY AND PROGRESS  
EST 1955

1 share

FLYER INSTAGRAM POST

**City of Miramar  
PUBLIC MEETING**

*Join us and share your input on the  
City's Floodplain Management Plan*

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Are there areas in your neighborhood prone to flooding?  
Do you have suggestions for how to reduce flood risk?*

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6:00 pm – 7:00 pm  
Miramar City Hall**  
Commission Chambers  
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**MIRAMAR**  
BEAUTY AND PROGRESS  
EST 1955

cityofmiramar • Follow

cityofmiramar 18h

- Have you experienced flooding in the past?
- Are there areas in your neighborhood prone to flooding?
- Do you have suggestions for how to reduce flood risk?

Join us and share your input on the City's Floodplain Management Plan!

Thursday, July 17th | 6pm - 7pm  
Miramar City Hall Commission Chambers  
2300 Civic Center Place

**No comments yet.**  
Start the conversation.

4 likes  
18 hours ago

Log in to like or comment.

*PUBLIC MEETING 2 MINUTES, ATTENDANCE, AND OUTREACH*

PLACE HOLDER

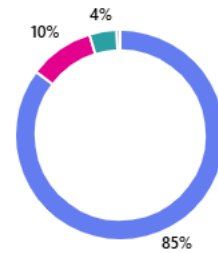
## OTHER PUBLIC OUTREACH EFFORTS

### PUBLIC SURVEY

1. What is your affiliation with the City of Miramar?

[More details](#)

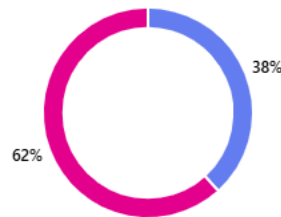
● I live in Miramar	162
● I work in Miramar	19
● I visit Miramar for shopping/recreation	8
● Other	1



2. Have you ever experienced or been impacted by high water or flooding in Miramar?

[More details](#)

● Yes	64
● No	103



3. If you answered "Yes" to question 2, please explain your experience with flooding and provide the location of the incident:

[More details](#)

65  
Responses

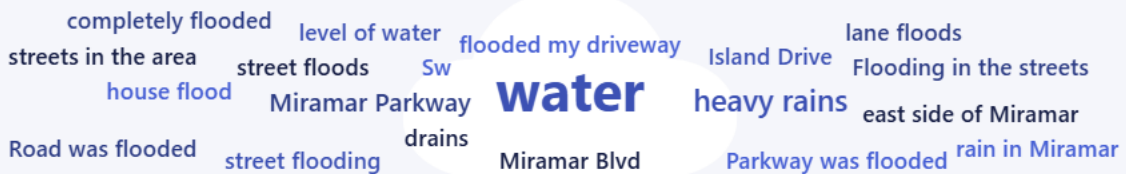
Latest Responses

"DURING HEAVY RAIN MY STREET WAS FLOODED HALF WAY UP MY DRIVEWAY AN..."

"N/A"

...

21 respondents (32%) answered water for this question.



Below is a list of responses to question #3:

1	My backyard gets flooded when there are heavy rains and is because the house is lower than my neighbors and the backyard doesn't have enough drainage
2	Sw 48 street/160th. Road was flooded with heavy rains. Bass creek road by the schools, the road floods.
3	Areas in my community flooded from just couple hours of rain to the point where some cars can't drive through. My location is Sherman Circle/ Montegobay
4	I live in historic Miramar and we deal with flooding every time it rains.
5	I live on LaSalle Blvd East of Island Drive and experience high level of water on my street, on Island drive and in my back yard at times up to the door and on Miramar Parkway East of University Drive
6	The residential streets in the area around my house flood any time we get a lot of rain.
7	I live in Montego Bay Townhomes off Fogg Road and every time we have a heavy down pour of rain the entire street floods . The sewer gets backed up and it takes up to 8hrs to recede.
8	A sudden downpour came out of nowhere and Miramar Boulevard was suddenly flooded up to the door of my car.
9	November of 2020, there was a rain event that dropped about 18 inches of rain over a few days. Our Silverlakes subdivision was flooded (SW 178th Ave and SW 30th Street). Houses were okay but the water covered the half the driveway. The entrance to the subdivision was impassable.
10	"I have, but most areas have since had stormwater drains installed.
11	Exception would be Mirabella at Palm Ave and Miramar Blvd, the streets flood when there is significant rainfall, and takes days to disappear.
12	Also eastbound Miramar Blvd just before Douglas Road - there's a section before the storm drain where the water accumulates in the right lane forcing traffic into the left. "
13	Came up from the lake during a rain storm to the level of the underground pool @ 3808vS Lake Ter
14	Sewers backed up and street flooded. SW 28 st and 178abe
15	In our community silver shores
16	It floods bad on any long rainy day in my neighborhood
17	Flooding in the streets of FAIRWAY and ACAPULCO DRIVE. POOR DRAINAGE SYSTEM.
18	I live on Miramar parkway ( 7929 Miramar parkway) during heavy rain I witnessed flooding of the streets, water came up to the driveway and porch.
19	High waters in western Miramar making roads difficult to traverse
20	Water came up and flooded my driveway.
21	Sherman Circle and Montego Bay Townhomes
22	Along Miramar Parkway close to 67th Ave., water rises to levels cars have a difficult time passing. In Island Dr. the retention pond area gets at the same level as the water on the main road and it is a dangerous situation.
23	On the east side of Miramar when it rains heavy the area from SW 62 to SW 68 Street, south of Miramar Parkway and at times Miramar Parkway as well.
24	"I live on a lake in the trilogy neighborhood.
25	A couple of years ago the water came up unusually high. "
26	I was heading west from 411 to university Dr and the street was completely flooded with water up to my tires
27	Water entering a bedroom in my home
28	After a storm and multiple days of rain the Fountains of Miramar Mall, specifically 29th Street, was flooded. At the time, it was where my business was located.
29	street flooding on Miramar Boulevard
30	Flooding in my neighborhood on the street to leave where I live in Country Club Ranches. Some of my neighbors couldn't leave their houses for almost two days due to the canals overflowing onto streets.
31	Flooding in Sherman Circle

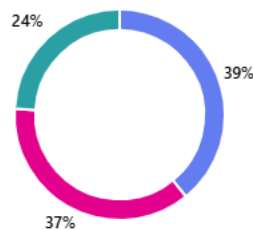
32	I live off of 67th Ter, the street always floods and it does not help that the fire station is on a hill so water from them rolls into the street and straight into my driveway.
33	When entering the neighborhood of Water use Foxcroft, there is extreme flooding in some areas.
34	Most likely the flooding is cause by palm prawns blocking the drains. Monarch Lakes area.
35	East of University and Miramar Parkway was flooded last year and I couldn't even drive through the water with my SUV
36	Flooding on Island Dr. Drains seem to not be working.
37	Bahama Drive intersecting with Miramar Parkway always floods with heavy rains all the time. People driving south on Bahama Drive to the parkway create a wake and that is why I am concerned about flooding at my home and was flooded once because of this.
38	Several years ago, Miramar Parkway flooded from Douglas to Fairmont. The lake rose about 3 feet.
39	Silver Lakes neighborhood within sub community Crystal Sound
40	The canal flooding due to improper drainage during storms. Flooding my patio up to my doors overflowing the previously lowered pool. When called about it to Storm Drain Service was told we just have to wait for it to go down thru evaporation. This is unacceptable. A confusing situation within the department if the canal is drained and maintained via Dade or Broward controls.
41	lake in back of my home has risen with heavy rains in past and flooding my back yard very near to home.
42	I reside on the older area of Miramar, Miramar Park, the subdivision between the turnpike to the south and east and Miramar pkwy and University dr. And on an regular raining day, as well as after tropical storm or hurricane, the streets in the area can get flooded quickly. Heavy rain can fill the streets in a matter of minutes, even flooding driveways as high as the threshold to some peoples front porches. I've had neighbors park near my home and walk to their homes located further back, because the water is too high for them to make it to their homes. With the elementary school, Fairway Elementary, the street is completely flooded in front of the school. As a parent and neighbor I feel this is definitely an issue for the children walking to and from elementary school. As well the middle and high school students waiting at their respective bus stop near the school and park.
43	Street floods when we have heavy rain
44	Refuse to leave my home because of flooding between Island Drive and along Miramar Blvd. Between Island and Oleander, and at the intersection of Kismet and Everglades.
45	"Flooded streets;
46	9000 blk Miramar Blvd, EB right lane floods entirely, and drivers have to move over to the left lane. Pedestrians would get soaked, as the sidewalk is extremely close to the street. Storm drain is located feet away from where the water accumulates.
47	9900 blk Miramar Blvd., EB right lane floods entirely, and drivers have to move over to the left lane. No storm drain at this location.
48	Mirabella Plaza & Homes at Palm Ave & Miramar Blvd floods really badly. SW 24 St, SW 24 Ct & SW 99 Way. Storm drains don't seem to be present in this community."
49	MIRAMAR PARKWAY FLOODS TERRIBLY
50	Pembroke Road in between 184 Ave and 178 the 2 lakes had flooded and crossed over to the street (pembroke road) you could not see the roads
51	When leaving the neighborhood and the trees /palm tree branches clogs up the drains. It flood and cars/trucks drive through and splash on other vehicles which could be dangerous for non seasoned drivers.
52	When trying to enter my neighborhood from Honeyhill Rd/202nd St going west from Flamingo, there is major flooding that causes backup towards the intersection. It's very dangerous. It's also near a canal. I've never seen the canal overflow but it gets close when it rains hard.

53	Localized street flooding
54	Island Dr and Fairway Blvd if there's very heavy rains
55	Sherman Circle/ Montego Bay Townhomes roads flood with heavy downpours . The sewage drains are not draining fast enough causing water to build and flood driveways and streets.
56	On 33 St the water use to be very high
57	During past indexed hurricanes and out severe weather. Areas affected, Fairway elementary area, the streets behind Keystone supermarket on Miramar parkway, Riviera Blvd, close to the Mobil head station, etc.
58	flooding on street, crossroad is Island drive and miramar blvd, vehicle cannot be driven.
59	The street in front of my house flooded once when the drain was clouded
60	I live on Pembroke Rd. In heavy rains the water washes from the road whenever a vehicle gpes by & over the sidewalk onto our private Cedar Villas common area where it pools up to my doorway. Our drains, which already over worked ,must contend with street water as well as out own. Many of our drains are already filled with tree roots from trees on the swale planted by some government agency (not our HOA).
61	Flooding on Miramar Parkway west in front of Monarch Lakes and East of Flamingo near Fire station inadequate drainage system major road flooding creating hazardous driving conditions on a major roadway.
62	Miramar Isles 67 terrace 3837SW. The canal over flows onto my property up to 12 inches in the back also the front lawn about 6in of water when it rains. The water in the back creeps up to the side of the house so I lay some sand bags in the area. I would like to get some assistance to build up a sea wall along the canal.
63	Water intrusion at my home after a major storm due to flooding. Also street flooding on the East side of Miramar, poor drainage system especially from Island Drive area toward east of 68th
64	On Island Drive
65	From the backyard. The water went into my garage.
66	Entrance & Exit to Cul de Sac is flooded
67	My block floods when there's a heavy rain.
68	"During heavy rain my street was flooded half way up my driveway and the corner was flooded over my lawn on west side.

4. How concerned are you about the possibility of your community being impacted by flooding?

[More details](#)

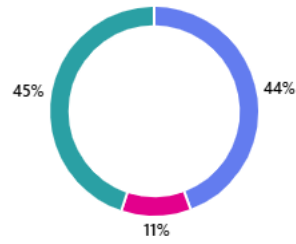
- Very concerned 65
- Somewhat concerned 61
- Not concerned 40



5. Is your home located in a Federal Emergency Management Agency (FEMA) mapped floodplain?

[More details](#)

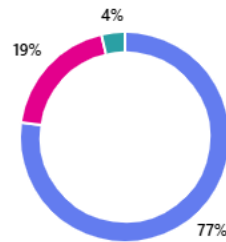
● Yes	74
● No	18
● I don't know	75



6. Do you have flood insurance for your home and/or personal property?

[More details](#)

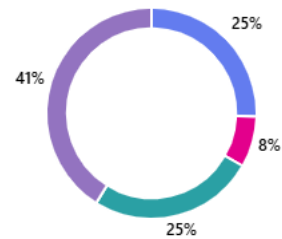
● Yes	129
● No	32
● I don't know	6



7. If you do NOT have flood insurance, what is the reason?

[More details](#)

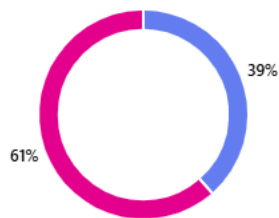
● It's too expensive	13
● I never really considered it	4
● I don't need it because my home is elevated or otherwise protected	13
● Other	21



8. Have you taken any actions to protect your home from flood damage?

[More details](#)

● Yes	64
● No	102



9. If you answered "Yes" to question 8, what actions have you implemented?

[More details](#)

60  
Responses

Latest Responses

"raised soil level with gravel to elevate levels around fence. will have new drive way ... "  
"I had to purchase Flood Insurance even though my community has never been flo... "

...

14 respondents (23%) answered Sand bag for this question.



Below is a list of responses to question #3:

1	I have done drainage improvements to the backyard by digging a trench, placing tubing and drains around the patio and on the side f the house to the street. However, there is still some water coming into the patio.
2	Sand bag
3	New roof and gutters
4	"Added dirt around the foundation.
5	Storm impact windows and doors."
6	Multiple sandbags for back door which is the only area that flood water could enter the home.
7	Keeping area clear of debris
8	Sand Bags
9	Storm windows
10	We try not to have our pool topped off in order for excess water to flow in.
11	Nothing on the floor that are valuable
12	Flood insurance, is required in my zone since last year. I've been at this address for 6 years and never experience any flooding.
13	Keep the yard as clean as possible from leaves and other items that may clog the city drains.
14	Storm impacts windows and doors, added dirt and fillers around the home, new roof
15	Sand bag
16	I have flood insurance and I make sure my drain in front of my house is clean from debris
17	Impact windows
18	Used sandbag.
19	Making sure the drain is clear.
20	Insurance
21	PROPER GUTTERS INSTalled
22	Coverage with insurance
23	Sandbags
24	Towels under door.
25	Yes, we have purchased sand bags and also created a drain field for the excess water of the gutter. We also raised the front porch and pool area floor 3 inches.
26	Hurricane shutters; proper drainage to lead excess water off property into the drainage

27	Sand bags I got from the city of Miramar
28	Flood insurance, sand bags.
29	Placement of bags to the doors.
30	Sandbags
31	Flood insurance
32	have flood shutters
33	Sand bags
34	Sandbags
35	new roof. insuring about impact windows
36	Sandbags when necessary.
37	I have sandbags and water barriers I put out when I know we are to get substantial amounts of rain.
38	Insurance and constantly lowering the pool then the expense of refilling and maintenance of that.
39	have placed sand bags around the openings in back yard
40	Storm windows, sand bags,
41	Sand bags
42	Flood insurance , New Roof , lower pool level when rains are announced
43	Sloping front yard; replace gutters; acquire sand bags.
44	I am insured, I have built a higher border from the lake.
45	Sandbags when extreme weather is forecasted such as hurricanes
46	Keep drainage free of debris.
47	Get sand bags from the City of Miramar whenever they distribute
48	Sand bags and Flood insurance
49	Creation of a drainage percolation area. With that water isn't retained around my property after a storm, for long, compared to my neighbors.
50	hurricane shutters
51	Pains are cleaned regularly by HAO
52	Purchased flood insurance
53	I purchased a mandated Flood policy by FEMA. The remapping of the flood zones unbeknownst to our community was wrong and tailored towards FEMA and not the homeowners in my community. We are now purchasing flood insurance that's not needed to covers others that are in flood zones and perhaps filed false claims.
54	Got insurance, and make sure the drain line is clean
55	Maintain sand bags available at all times and make sure that the storm drain is free of debris.
56	Maintain proper drainage on either side of property , no obstruction in path of drainage. This is maintained as designed by Silver Lakes plants strategically to help with water retention in yard
57	I have lived in Miramar over 25 years and have gotten sandbags twice and they ended up not being needed, Thank GOD!
58	Installed drainage that leads away from the foundation. I invested in foundation support around the perimeter of my property.
59	I installed the French drain in the backyard.
60	I had to purchase Flood Insurance even though my community has never been flooded or come close to flooding. FEMA came in and stated that, after conducting their inspection, my community is now considered a flood zone. The builder of our community constructed its elevation high enough to prevent flooding in our community. I've lived in my neighborhood for 13 years, and it has never flooded. "Make it make Sense". Now that FEMA has been disbanded?! Who am I paying flood insurance too?
61	raised soil level with gravel to elevate levels around fence. will have new drive way with raised level done soon.

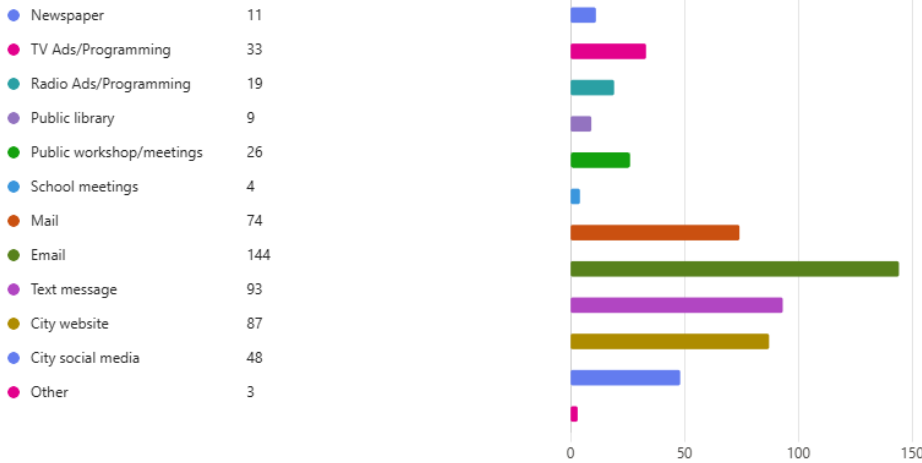
10. Do you know what government agency/office to contact regarding the risks associated with flooding?

[More details](#)



11. What is the best way for you to receive information about how to make your home or neighborhood more resistant to flood damage? Please check all that apply.

[More details](#)



12. What are some steps the City could take to reduce the risk of flooding in your neighborhood?

[More details](#)

131 Responses

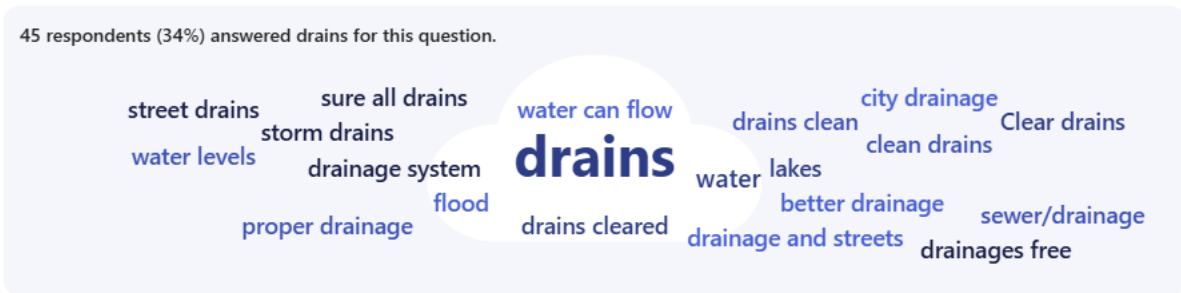
Latest Responses

"Fix the drain infrastructure throughout the City so that excess water has somewhere..."

"I do not know"

...

45 respondents (34%) answered drains for this question.



Responses to question 12 are listed in the table below :

1	I live in west Miramar just west of I-75. In the 30 years I have lived in this home I never ever have gotten close to flooding , yet last year FEMA decided to declare this a flood area and now i have to carry flood insurance. It rained 21 inches in a 2 day span and the roads were dry. Our sewer/drainage system is grey out west. Why doesn't the city fight for us and tell FEMA this is ridiculous. We are paying flood insurance to cover the cost for insurance companies and FEMA! A bunch of BS!
2	No idea
3	Keep water levels in check around lakes, keep drains clean so water can flow to the lakes and help us owners improve drainage between our homes in our communities.
4	Clean gutters of excess leaves and trash
5	Regular clearing of drains , especially before a known storm approaches.
6	No idea
7	Correctly identify the flood zone and make residents insurance affordable if they want to have it!
8	Lower lake levels, clean drains, trim trees
9	"Drain runoff
10	Help home owners increase their home elevation."
11	Ensure we have better drainage, the drains in my area are not clear this makes it more likely for the area to flood. Also the swale by the lake is overgrown with grass and debris so the water doesn't pass through as rapidly as it should.
12	Better drainage. The problem began when the city added more hydrants and whatever work was being done at that time.
13	Better drainage and maintenance of roads.
14	By making sure the Lake is lowered prior to Storms /Hurricanes so the sewers in the Community don't become backlogged.
15	More shutters
16	Clear drains during/after heavy rains
17	Make sure canals are lowered, drainage and streets are clear of debris
18	Making sure the sewer system is clean to allow water to flow easily
19	None, we never experience any flooding
20	By properly maintaining the streets' drainage system.
21	Ensure proper drainage, proactively clean drainage pipes.
22	"Stop residents from increasing the height of their lawns that results in runoff of neighboring properties and pooling into the roadway.
23	Stop residents from increasing the size of their driveway to the extent that there is no porous surfaces for water to be absorbed, but run off into the roadway and neighboring properties.
24	Implement zoning guidelines to grade streets & parking lots so that the water flows towards storm drains.
25	Remember, pooling water increases the risk of mosquito breeding, so this is a health risk."
26	Check drains where tree leaves are lodged. Ask homeowners to cover such the drainage manhole with mesh.
27	Home elevations, sewer and drain storm upgrades or maintenance, Everglades preservation, create water drain offs
28	Drainage
29	Have sandbags already filled and ready to pick up.
30	Have the city of Miramar review my property
31	Lower lake levels, clean palm fronds , keep trees pruned, keep drains clean . Alerts when a storm is coming
32	Lower the water in collection areas when rain is expected. Have better drainage on the streets.
33	Clean out street drains
34	Make sure sewers are cleaned and clear
35	Clean the drainage every year

36	Get the drains cleared. Fix local flooding from rain
37	Our neighborhood does not have any flooding issues that I am aware of.
38	Maintain drains and remove rotten trees.
39	More routine drainage cleaning inspections.
40	"Making sure storm drains are clear.
41	Cleaning the storm drains
42	I consider a very important measure keeping the street drainages free of leaves and dirt in all neighborhoods.
43	make sure all drainage are clean
44	Put drains on streets that have none. For example Dilido blvd.
45	Better sewer drainage system . Making sure the lake drainage system is lowered and clear of debris as not to cause back flow into neighborhoods around Sherman Circle
46	Start talking with expert people and look for answer
47	Sand bags and barriers
48	Keep drains cleared.
49	Drain canals a bit if needed.
50	Improve drainage system
51	Improve the storm drains by adding more. I live in. Huntington and when it rains, 148 Ave south of Miramar pwky is flooded. It has been in this condition for years . Add more drainage.
52	Sandbags. Cut down on tree limbs to prevent clogging from the leaves that drains into sewage drain
53	Need more sand bags has to be placed on the brim of lakes
54	Keep storm water sewer clean and work with South Florida Water Management to keep canal levels low.
55	"Build a retention wall along my lake so I'll stop losing land. Do a better job with cleaning the lake so it will flow and not come over during heavy rain.
56	Ensure that drainage systems are up to date and frequently cleared.
57	Lower the water level in the ponds within our community! Have Communities cut down old trees as well as those overhanging utilities poles and fences within my neighborhood
58	"Making sure all drains are clear
59	Make sure there are no blockages in the canals"
60	Maybe install pump stations and better drainage equipment
61	Check correctly the zones because my house has an elevation and I have to pay for flood insurance for me don't have reasons reasonable.
62	Putting some kind of barriers to keep the water in the lake from rising and also to help with land erosion.
63	Add more drains and cover all potholes
64	Have proper drainage systems, provide
65	Maintenance of the storm drains
66	Keep drains clear
67	quick and proper repair of roads, early warning, free supply of materials
68	clear drains more frequently
69	Better drainage, Bring sand bags in trucks to homes for delivery, Warning system via email/text
70	Clean the swale around sherman circle
71	Better drainage
72	provide resources like grants to assist homeowners to install impact windows and new roof. Assist with myfloridasafehome application
73	Trim trees, clear debris, add drains where possible, provide assistance with sand if need be.
74	Send out notices to residents asking, if their homes are near a water sewerage, please make sure drains are clear and free of debris so the water doesn't overflow onto their property and flood the street. However, the City workers should be the first to address this potential problem in advance. Also distribute sand bags.

75	Drainage
76	Drainage
77	Drainage enhancements. French drain is great until the ground is saturated - then it doesn't work. More drainage outfalls to canals that are controlled by active pumping.
78	They should have more drains that are able to move water down quickly
79	Fix the irrigation
80	Provide a better drainage system
81	To clean out all the lakes. Especially in country club ranches all the weeds and trash that's over flowing. The city wants to take part of residence easement and etc. the least they can do is clean the lakes in canals for free
82	Regular drain maintenance.
83	Keep all storm drains clear of debris on a regular basis and especially before a major storm is predicted. Improve the storm drainage system in the entirety of East Miramar.
84	More drainage
85	Drainage system, water pumps, currently cars can stall when flooding occurs
86	Do something more about the canals
87	provide resources, offer solutions to residents, and educate us on this as we are not experts in this field and rely on city for guidance
88	Ground elevation, training on house and ground elevation.
89	Lower Lake levels, Clean Drains from debris , trim trees . Improve drainage
90	Keep drains free of debris; proper drainage systems.
91	Better drainage system installed to clear the rain when there is flood
92	Clean the canals of trash and other items so water can be redirected away from homes and streets
93	Have an assessment done immediately after significant rainfall, to determine which streets flood. Determine if storm drains need to be installed, storm drains need to be cleaned more frequently, or if street needs to be resurfaced so that water is pitched towards the storm drains.
94	I don't know
95	Clean drains
96	Not sure how the city controls the levels of the lakes around this area
97	Drainage systems
98	Lower canals and lakes
99	Make sure trees are cut so branches aren't covering up the drains. Post signs to remind us to clean our areas before and during hurricane season, provide sandbags if necessary to avoid inside flooding etc.
100	Keep the drain lines flowing
101	Constantly check the road drains to ensure there not blocked or clogged.
102	More storm water mitigation
103	Make sure the drains are cleaned.
104	Keep all drainage free of debris.
105	Limit man made lakes and improve drainage by putting more tributaries in places identified as flood zones
106	With monetary assistance to homeowners with changing the driveways from asphalt. In my opinion I see that whenever it rains the asphalt driveways are more flooded than others
107	Make sure canals are kept at a regulated level based on weather forecasts . City needs to maintain pumps are working efficiently at all times
108	Keep drain clean, about 3 years ago they did a big construction on the street put in new pipe but that didn't help the street does fill with water
109	You are spending money on drainage and now I see water in the streets that weren't there before. To me it made it worse.
110	Improving and maintaining the overall city drainage system. Maintenance of the lakes and canals ( I commend the City of Miramar for doing a great job in this area), also by trimming

	overgrown trees extending beyond the boundaries of some properties well into the lake especially around Alhambra Blvd and Grenada Blvd., respectively. Storm wall reinforcement with concrete, instead of the geosack (?), inter alia.
111	more drainage for street flooding
112	Keep the street drains clean
113	Help with these trees on the scale whose roots are damaging our drains. This is becoming a major part of our budget, even though we did Not plant them and have no idea who owns them.
114	Improve drainage within residential areas and main roads, make sure pumps are working correctly.
115	"1. Improve Stormwater Drainage Infrastructure 2. Invest in Green Infrastructure 3. Implement Stricter Zoning and Building Codes 4. Expand Flood Mitigation Projects 5. Promote Community Awareness and Preparedness 6. Leverage Technology and Data 7. Apply for State and Federal Funding In addition, I believe cloud seeding is taking place in Miramar, which cause flooding and requires residents to purchase flood insurance."
116	My area doesn't flood. At least I haven't seen any flooding.
117	Keep drain clean an open
118	Improve drainage, monitor lake volumes for rising water levels
119	I don't see much flooding in my area of Miramar, fortunately. I live in Riviera Isles and rarely see any flooding in this south end of Dykes Road, thankfully.
120	Year's a go they did construction of new pipe but really that didn't work, when it rain hard the street does fill with water
121	Conduct ongoing site risk analysis to determine possible risk and hazards pertaining to flooding evolutions.
122	Improve road drainage system Roads are not paved to encourage water flows to the sides and into a drainage system . A well thought out Plan for overflow of system , where water can safely be pumped out . We also need replanting of water intensive plants that absorb excess moisture . This was part of water management in our history that has been lost with development and construction. Conservation is a key to a sustainable future.
123	Proper drainage
124	Make sure storm drains are cleaned out
125	Install more drainages. Also stop allowing residents to concrete their entire yard.
126	Implementing better drainage systems
127	Make sure city drainage is functioning properly and cleaned of debris regularly
128	Keeping and maintaining the drainage system.
129	Frequently checking and cleaning drainage systems.
130	My neighborhood is not prone to flooding and has never flooded
131	None...Already upgraded drainage system in my area and it's working...
132	"Code enforcement Officers ensure residents adhere to City code.
133	Emails sent to residents reminding them of Do's and don'ts for garbage disposal and hurricane preparedness."
134	My neighborhood has an impecable run off system that pushed into a retention pond located in the neighborhood south of my community.
135	Updating older and outdated structures.
136	I do not know
137	Fix the drain infrastructure throughout the City so that excess water has somewhere to egress, or is held in underground tanks for irrigation, fire suppression, or the Fire Department, or used to fill dried lake beds, etc.

CITY WEBSITE

BUILDING, PLANNING, AND ZONING PAGE

## Building & Planning Services

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**Community  
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**Floodplain  
Management**

**Comprehensive  
Plan**


### We Need Your Input!

City of Miramar is preparing a Floodplain Management Plan (FMP) and we need your input! The public is invited to participate in this planning effort by completing a survey. Information from the survey responses will be analyzed and incorporated into the FMP. Public input will help the planning committee to identify flood risks, understand local vulnerabilities, and select appropriate and achievable mitigation strategies to protect the City and its residents from flood impacts.

Click [HERE](#) to complete the survey

### How to Reach Us

FLOODPLAIN MANAGEMENT WEBSITE



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**In This Section**

- Office of the City Manager
- Building Planning & Zoning
- Building, Permits & Inspections
- Planning & Zoning
- Miramar Maps/GIS

## Floodplain Management

### Floodplain Management Plan - Take the Survey

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FLOODPLAIN MANAGEMENT PLAN FLYER

# CITY OF MIRAMAR, FLORIDA FLOODPLAIN MANAGEMENT PLAN



**What Is a Floodplain Management Plan?  
Why is it Important to Me?**

A Floodplain Management Plan (FMP) is the result of a 10-step planning process to identify flood-related hazards, develop strategies to reduce or eliminate the loss of life and property damage resulting from these hazards, and educate community members about these hazards and loss reduction strategies. Preparing and adopting a Floodplain Management Plan makes the City eligible for federal disaster funding and provides Community Rating System (CRS) credit. It is important for residents to become involved in mitigation planning in their community. The planning committee needs your input on the types of flooding that are your priority concern and your opinion on ways to prevent or lessen the impacts of floods.



**What is the Community Rating System (CRS)?**

The CRS is a national program developed by the Federal Emergency Management Agency (FEMA) to encourage communities to reduce flood risk. The CRS rewards the efforts communities take to go above and beyond the minimum requirements of the National Flood Insurance Program (NFIP) by providing discounts on flood insurance premiums. The City of Miramar is currently a Class 8 in the CRS, which provides a 10% discount on flood-insurance premiums to policyholders in the Special Flood Hazard Area.

**Which Hazards are Addressed by the Plan?**

The following hazards may be evaluated in the City of Miramar FMP update:

- Coastal Flooding
- Stormwater and Localized Flooding
- Dam and Levee Failure
- Tropical Cyclone

**How Can I Participate?**

**Respond to the survey.** Use this QR code to respond to the public survey and help the planning committee understand flood risks and mitigation needs. The survey should only take about five minutes to complete. Respond ASAP to ensure your input is captured!



**Send us information or comments.** If you have additional information to share for inclusion in the plan, please contact the City's planning consultant from WSP at: [Abigail.moore@wsp.com](mailto:Abigail.moore@wsp.com).

**Review the Draft Plan.** A final public meeting will be held toward the end of the planning process in early 2026 to present the draft plan. Keep an eye out for announcements to join the meeting and provide feedback.

FACEBOOK, X, AND INSTAGRAM POSTS

**City of Miramar** Marketing and Communications Dept Miramar OMC · Just now

We are developing a Floodplain Management Plan and we need your input on flooding in the City of Miramar! Fill out this survey to share your experiences with flooding and help the planning committee understand and mitigate local flood risk.

Link to survey: <https://forms.office.com/e/2tq3q12ur7>

Microsoft Forms · forms.office.com

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Posted to Subscribers of City of Miramar

**City of Miramar** Published by Bradley Franklin · 10m

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12:22 95

Your story 25s

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Forms.office.com

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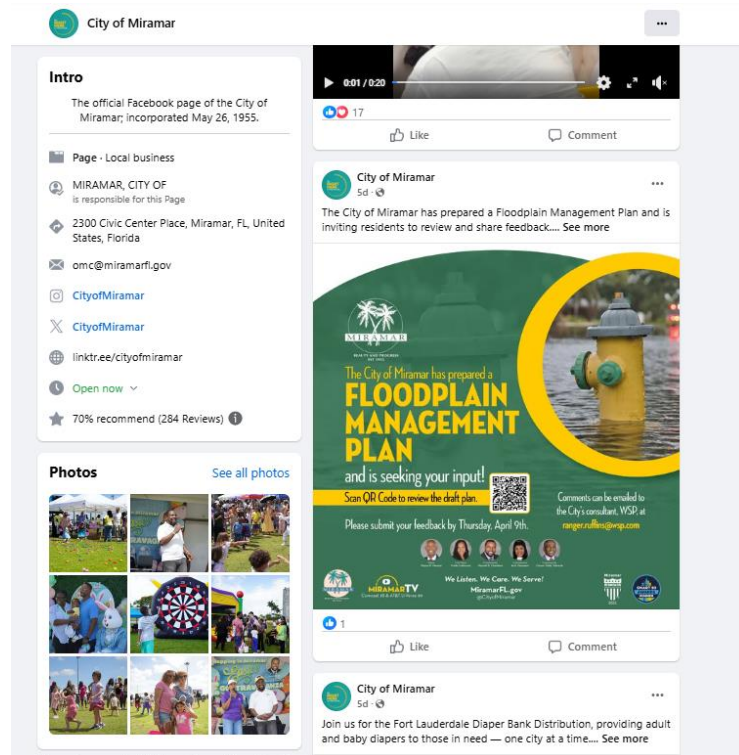
## Meeting Presentations and Minutes

**Floodplain Management Plan** (PDF, 14MB)

### 2026



**ASK MIRA!**



The screenshot shows the Facebook profile for the City of Miramar. The profile includes an 'Intro' section with the official page information, contact details (2300 Civic Center Place, Miramar, FL), and social media links. Below the intro is a 'Photos' section with a grid of images. The main content area shows a post from the City of Miramar dated April 4, 2026, featuring a green and yellow graphic for the 'Floodplain Management Plan' and a QR code for public input. The post text reads: 'The City of Miramar has prepared a Floodplain Management Plan and is inviting residents to review and share feedback... See more'. The post has 17 likes and a comment.



The screenshot shows a specific Facebook post from the City of Miramar. The post is dated April 4 and features a green and yellow graphic for the 'Floodplain Management Plan'. The text of the post is: 'The City of Miramar has prepared a FLOODPLAIN MANAGEMENT PLAN and is seeking your input! Scan QR Code to review the draft plan. Please submit your feedback by Thursday, April 9th. Comments can be emailed to the City's consultant, WSP, at rangecru@wsp.com'. The post has 1 comment and is liked by 'yvettecolbourne and others'. Below the post, there is a section for 'Liked by yvettecolbourne and others' and a link to 'cityofmiramar The City of Miramar has prepared a Floodplain Management Plan and is inviting residents to review and share feedback... more'.

PUBLIC REVIEW COMMENTS

No public comments received.

## A.3 PLANNING STEP 3: COORDINATE

### STAKEHOLDER LETTER

This planning step credits the incorporation of other agencies’ plans and efforts into the development of the Floodplain Management Plan. Other agencies and organizations must be contacted to determine if they have studies, plans and information pertinent to the Floodplain Management Plan, to determine if their programs or initiatives may affect the community’s program, and to see if they could support the community’s efforts. To incorporate stakeholder input into this plan, the City and the FMPC identified a variety of stakeholders and emailed a letter inviting each stakeholder to provide data or information relevant to the planning process, review draft plan documents, and provide feedback and comments. The emailed coordination letter sent to stakeholders is provided below. A list of the stakeholders who were contacted is provided on the following pages.

City of Miramar Floodplain Management Plan - Stakeholder Input



Ruffins, Ranger

To

Cc [Lebrun, Nixon](#); [Moore, Abigail](#); [Johnson, Judeen](#)

Bcc [josett.valdez2@redcross.org](#); [paula.prendergast@redcross.org](#); [mmtoole@cfbroward.org](#); [LALPERT.FOA@GMAIL.COM](#); [kcannon@unitedwaybroward.org](#); [gsbaugh@ulbcfl.org](#); [excomleah@gmail.com](#); [res4resilience@gmail.com](#); **+22 others**

Business Confidential/Internal and External

Summarize

Reply Reply All Forward ...

Fri 7/11/2025 1:41 PM

Good afternoon,

My name is Ranger Ruffins and I’m a consultant working for the City of Miramar, FL.

The City of Miramar is developing a Floodplain Management Plan (FMP). The purpose of the plan is to address flood hazard risks and vulnerabilities and identify achievable mitigation actions to make the community safer and more resilient to flooding. To assist with this process, the City and Floodplain Management Planning Committee (FMPC) are seeking stakeholder input and expertise to support the planning effort.

Our objective in reaching out to other agencies and stakeholders is to coordinate with those who may bring additional information to the planning process regarding flood risks and vulnerability issues within the City of Miramar. Any information, studies, etc. that may supplement the work of the established FMPC would be welcomed.

We also invite you to attend a public meeting which will be held on **July 17<sup>th</sup> from 6:00pm – 7:00pm** in the [Commission Chambers at Miramar City Hall](#), located at [2300 Civic Center Place](#). This meeting will provide an overview of the plan’s purpose and an opportunity to weigh in on flood risks, vulnerabilities, and mitigation priorities that should be incorporated into the plan.

If you have any questions, would like to submit data or information for the FMPC’s consideration, or would like to receive a notice about opportunities to attend future planning meetings, please contact the City’s planning consultant for this project, Abigail Moore with WSP, at [abigail.moore@wsp.com](mailto:abigail.moore@wsp.com).

We thank you for your support of this important planning process.

**Ranger Ruffins**  
Hazard Mitigation & Resilience Planner  
*She/Her*

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## STAKEHOLDER LIST

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Fred	Harris	Advocacy Committee, Broward County Black Chamber of Commerce	info@browardcountyblackchamberofcommerce.com

# APPENDIX B MITIGATION STRATEGY

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## B.1 ALTERNATIVE MITIGATION MEASURES

This section presents a summary review of the mitigation measures that were considered by the FMPC. The CRS Credit Sections are based on the 2025 CRS Coordinator's Manual.

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### *B.1.1 PREVENTATIVE AND REGULATORY MEASURES*

Preventative measures are designed to keep a problem - such as flooding - from occurring or from getting worse. The objective of preventative measures is to ensure that future development is not exposed to damage and does not cause an increase in damages to other properties. Building, zoning, planning and code enforcement offices usually administer preventative measures. Some examples of types of preventative measures include:

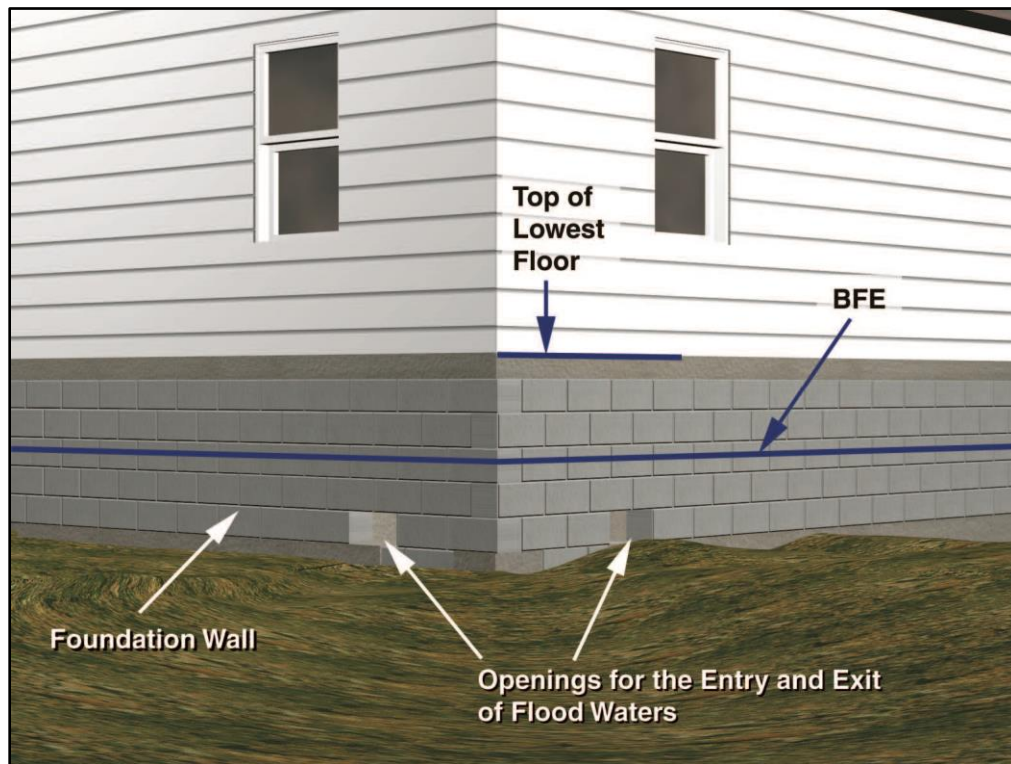
- Building codes
- Comprehensive and land use plan
- Zoning ordinance
- Open space preservation
- Floodplain regulations
- Stormwater management regulations

#### **BUILDING CODES**

Building codes provide one of the best methods for addressing natural hazards. Building codes provide guidance on how to build more safely in hazardous areas. When properly designed and constructed according to code, the average building can withstand many of the impacts of natural hazards. Hazard protection standards for all new and improved or repaired buildings can be incorporated into the local building code. Building codes can ensure that the first floors of new buildings are constructed to be higher than the elevation of the 100-year flood (the flood that is expected to have a one percent chance of occurring in any given year). This is shown in Figure B.1. The City of Miramar uses the Florida Building Code, which is based on the International Building Code.

Just as important as having code standards is the enforcement of the code. Adequate inspections are needed during the course of construction to ensure that the builder understands the requirements and is following them. Making sure a structure is properly elevated and anchored requires site inspections at each step.

ASCE 24 is a referenced standard in the International Building Code. Any building or structure that falls within the scope of the IBC that is proposed in a flood hazard area is to be designed in accordance with ASCE 24. Freeboard is required as a function of the nature of occupancy and the flood zone. Dwellings and most other buildings have 1-foot of freeboard; certain essential facilities have 2-3 feet; only agricultural facilities, temporary facilities and minor storage facilities are allowed to have their lowest floors at the BFE.

**Figure B.1 – Building Codes and Flood Elevations**

Source: FEMA Publication: *Above the Flood: Elevating Your Floodprone House, 2000*

#### COMPREHENSIVE OR LAND USE PLAN

Planning and zoning activities direct development away from hazardous areas, particularly floodplains and wetlands. They do this by designating land uses that are suitable to the natural conditions of land that is prone to flooding, such as open space or recreation. Planning and zoning activities can also prevent exposure to flood hazards by simply allowing developers more flexibility in arranging improvements on a parcel. Planned developments, cluster developments, and transfer of development rights are among the tools planners can use to encourage placement of structures outside of known hazard areas.

These tools can be coordinated with other development policies and goals as part of a community's comprehensive plan. A comprehensive plan, in broad terms, is a policy statement to guide the future growth of a community. It is the basis for a community's zoning, subdivision and design regulations and any amendments to those regulations.

The City of Miramar Comprehensive Plan was adopted in January 2021. The plan includes a Future Land Use Map which represents the City's long-term vision and serves as a decision-making tool to evaluate proposals for land use and zoning changes for their consistency with that vision. The plan also provides a framework for identifying and scheduling public and private capital projects. The plan is flexible and able to be amended as future conditions warrant.

#### ZONING ORDINANCE

Zoning enables a community to designate what uses are acceptable on a given parcel. Zoning can ensure compatibility of land use with the land's level of suitability for development. Planning and zoning activities can also provide benefits by allowing developers more flexibility in arranging improvements on a parcel of land through the planned development approach. Zoning regulations describe what type of land use and specific activities are permitted in each district, and how to regulate how buildings, signs, parking, and other construction may be placed on a lot. Zoning regulations also provide procedures for rezoning and

other planning applications. The zoning map and zoning regulations provide properties with certain rights to development.

The City of Miramar zoning ordinance is found in Chapter four of the Land Development Code. Miramar's zoning consists of an official zoning map and multiple zoning districts. The zoning regulations describe what type of land use and specific activities are permitted in each district, and how buildings and other construction may be sized and placed on a lot. The zoning regulations also provide procedures for rezoning and other planning applications. The zoning map and zoning regulations provide properties in Miramar with certain development rights. Several districts could be employed to support safe development in and around floodplain areas, including the Commercial Recreation Zoning District, the Planned Unit Development Districts, and the Planned Industrial Development District.

#### OPEN SPACE PRESERVATION

Keeping the floodplain and other hazardous areas open and free from development is the best approach to preventing damage to new developments. Open space can be maintained in agricultural use or can serve as parks, greenway corridors and golf courses.

Comprehensive and capital improvement plans should identify areas to be preserved by acquisition and other means, such as purchasing an easement. With an easement, the owner is free to develop and use private property, but property taxes are reduced or a payment is made to the owner if the owner agrees to not build on the part set aside in the easement.

Although there are some federal programs that can help acquire or reserve open lands, open space lands and easements do not always have to be purchased. Developers can be encouraged to dedicate park land and required to dedicate easements for drainage and maintenance purposes.

The City of Miramar has several parks and other public lands designated as open space as they work to provide a minimum of four acres of park and open space for each 1,000 residents. Many existing parks are already located in or near mapped floodplain areas.

#### FLOODPLAIN REGULATIONS

The NFIP is administered by FEMA. As a condition of making flood insurance available for their residents, communities that participate in the NFIP agree to regulate new construction in the area subject to inundation by the 1-percent-annual-chance (base) flood. The floodplain subject to these requirements is shown as an A or AE Zone on the FIRM.

There are five major floodplain regulatory requirements. Additional floodplain regulatory requirements may be set by state and local laws.

- 1) All development in the 1-percent-annual-chance floodplain must have a permit from the community. The NFIP regulations define "development" as any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.
- 2) Development along a river or other channel cannot obstruct flows so as to cause an increase in flooding on other properties. An analysis must be conducted to demonstrate that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.
- 3) New buildings may be built in the floodplain, but they must be protected from damage from the base flood. In riverine floodplains, the lowest floor of residential buildings must be elevated to be at or above the base flood elevation. Nonresidential buildings must be either elevated or floodproofed.
- 4) Under the NFIP, a "substantially improved" building is treated as a new building. The NFIP regulations define "substantial improvement" as any reconstruction, rehabilitation, addition, or other improvement of a

structure, the cost of which equals or exceeds 50% of the market value of the structure before the start of construction of the improvement. This requirement also applies to buildings that are substantially damaged.

5) Communities are encouraged to adopt local ordinances that are more comprehensive or provide more protection than the federal criteria. The NFIP's Community Rating System provides insurance premium credits to recognize the additional flood protection benefit of higher regulatory standards.

The City of Miramar meets the above requirements to maintain continued compliance with the NFIP and has exceeded the minimum requirements of the NFIP through some provisions of the current flood protection ordinance.

### STORMWATER MANAGEMENT REGULATIONS

Stormwater runoff is increased when natural ground cover is replaced by urban development. Development in the watershed that drains to a river can aggravate downstream flooding, overload the community's drainage system, cause erosion, and impair water quality. There are three ways to prevent flooding problems caused by stormwater runoff:

- 1 Regulating development in the floodplain to ensure that it will be protected from flooding and that it won't divert floodwaters onto other properties;
- 2 Regulating all development to ensure that the post-development peak runoff will not be greater than it was under pre-development conditions; and
- 3 Setting construction standards so buildings are protected from shallow water.

The City's comprehensive plan identifies stormwater management as a goal. This goal seeks to provide adequate stormwater management capacity to protect current and future residents, and to prevent public and private property damage due to flooding, to the maximum extent practicable.

### REDUCING FUTURE FLOOD LOSSES

Zoning and comprehensive planning can work together to reduce future flood losses by directing development away from hazard prone areas. Creating or maintaining open space is the primary way to reduce future flood losses.

Planning for open space must also be supplemented with development regulations to ensure that stormwater runoff is managed and that development is protected from flooding. Enforcement of the flood damage prevention ordinance and the flood protection elevation requirement provides an extra level of protection for buildings constructed in the planning area.

Stormwater management and the requirement that post-development runoff cannot exceed pre-development conditions is one way to prevent future flood losses. Retention and detention requirements also help to reduce future flood losses.

### LOCAL IMPLEMENTATION AND CRS CREDIT

The CRS encourages strong building codes. It provides credit in two ways: points are awarded based on the community's Building Code Effectiveness Grading Schedule (BCEGS) classification and points are awarded for adopting the International Code series. Miramar's BCEGS rating is a Class 1 for residential and a Class 3 for commercial. The City has adopted the 8<sup>th</sup> edition Florida Building Code which uses the latest amendments to the 2021 International Building Code (IBC) which is based on national consensus for building standards to protect public health and safety. The IBC is updated every three years.

CRS credits are available for regulations that encourage developers to preserve floodplains or other hazardous areas away from development. There is no credit for a plan, only for the enforceable regulations that are adopted pursuant to a plan. Miramar currently receives credit for Activity 430 – Higher Regulatory Standards for requiring freeboard, foundation protection, enforcing international building code, and local drainage protection. Additionally, Miramar currently receives credit for Activity 420 – Open Space Preservation. Preserving flood prone areas as open space is one of the highest priorities of the CRS. The

City also currently receives credit for Activity 450 – Stormwater Management for enforcing soil and erosion control regulations and water quality regulations. Adopting additional higher standards and stormwater management regulations and preserving more floodplain area as open space would further support preventative mitigation in the City. The FMPC recommended continued improvements to the City’s stormwater management program and additional open space preservation.

**CONCLUSIONS**

Future flood losses in Miramar will be reduced through the implementation of the International Building Code and the City’s regulations for flood protection, stormwater management, and erosion and sedimentation control. Zoning and comprehensive planning will also work together to prevent future flood losses by directing development away from hazard prone areas. Continued hazard mitigation planning can further identify specific projects to reduce risk. Maintaining these regulatory, administrative and technical capabilities, continuing to support plan integration, and working collaboratively with the County, surrounding communities, and the broader South Florida region will support the City’s ability to implement preventative mitigation measures. Additionally, creating or maintaining open space will expand opportunities for the public to benefit from education and recreation while limiting potential for future flood exposure.

**MITIGATION ALTERNATIVES EVALUATED**

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Recommended?
-	Perform a channel inventory including type, condition, and include in maintenance program	The City already has a well-established maintenance and inspection program that it will continue to implement.	No
14	Increase protection of residential areas and neighborhoods through the support of green design guidelines and LID requirements for new development and major renovation residential areas, historic neighborhoods, and areas vulnerable to flooding. Could provide development incentives and variances for participation.	Incentivizing LID techniques can support the slowing and infiltrating water into the ground, reduces the volume and speed of runoff, preventing overwhelmed municipal systems. It can also improve water quality and enhance aesthetics.	Yes
13	Coordinate open space opportunities with flood control needs for new developments, repetitive loss areas, or other localized flooding locations.	Pursuing open space acquisitions in areas of known high flood risk will provide the greatest benefit.	Yes

**B.1.2 PROPERTY PROTECTION MEASURES**

Property protection measures are used to modify buildings or property subject to damage. Property protection measures fall under three approaches:

- Modify the site to keep the hazard from reaching the building;
- Modify the building (retrofit) so it can withstand the impacts of the hazard; and
- Insure the property to provide financial relief after the damage occurs.

Property protection measures are normally implemented by the property owner, although in many cases technical and financial assistance can be provided by a government agency.

**KEEPING THE HAZARD AWAY**

Generally, floods do not damage vacant areas. As noted earlier, the major impact of hazards is to people and improved property. In some cases, properties can be modified so the hazard does not reach the damage-prone improvements. For example, a berm can be built to prevent floodwaters from reaching a house. There are five common methods to keep a flood from reaching and damaging a building:

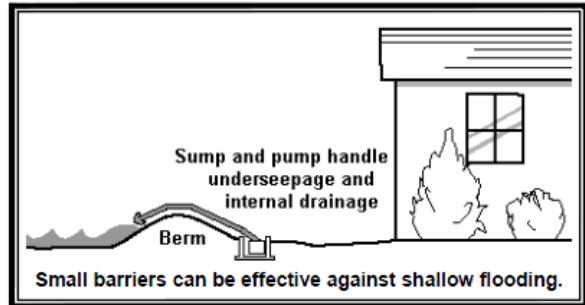
- Erect a barrier between the building and the source of the flooding.
- Move the building out of the flood-prone area.
- Elevate the building above the flood level.
- Demolish the building.
- Replace the building with a new one that is elevated above the flood level.

Demolition, elevation, reconstruction, and retrofitting are the most effective types to consider in Miramar.



**BARRIERS**

A flood protection barrier can be built of dirt or soil (a "berm") or concrete or steel (a "floodwall"). Careful design is needed so as not to create flooding or drainage problems on neighboring properties. Depending on how porous the ground is, if floodwaters will stay up for more than an hour or two, the design needs to account for leaks, seepage of water underneath, and rainwater that will fall inside the perimeter. This is usually done with a sump or drain to collect the internal groundwater and surface water and a pump and pipe to pump the internal drainage over the barrier.



Barriers can only be built so high. They can be overtopped by a flood higher than expected. Barriers made of earth are susceptible to erosion from rain and floodwaters if not properly sloped, covered with grass, and properly maintained.

**RELOCATION**

Moving a building to higher ground is the surest and safest way to protect it from flooding. While almost any building can be moved, the cost increases for heavier structures, such as those with exterior brick and stone walls, and for large or irregularly shaped buildings. Relocation is also preferred for large lots that include buildable areas outside the floodplain or where the owner has a new flood-free lot (or portion of the existing lot) available.

**BUILDING ELEVATION**

Raising a building above the flood level can be almost as effective as moving it out of the floodplain. Water flows under the building, causing little or no damage to the structure or its contents. Raising a building above the flood level is cheaper than moving it and can be less disruptive to a neighborhood. Elevation has proven to be an acceptable and reasonable means of complying with floodplain regulations that require new, substantially improved, and substantially damaged buildings to be elevated above the base flood elevation.

## DEMOLITION

Some buildings, especially heavily damaged or repetitively flooded ones, are not worth the expense to protect them from future damages. It is cheaper to demolish them and either replace them with new, flood protected structures, or relocate the occupants to a safer site. Demolition is also appropriate for buildings that are difficult to move, such as larger, slab foundation or masonry structures, and for dilapidated structures that are not worth protecting.



Demolishing a repetitively flooded home

## PILOT RECONSTRUCTION

If a building is not in good shape, elevating it may not be worthwhile or it may even be dangerous. An alternative is to demolish the structure and build a new one on the site that meets or exceeds all flood protection codes. FEMA funding programs refer to this approach as "pilot reconstruction." It is still a pilot program, and not a regularly funded option. Certain rules must be followed to qualify for federal funds for pilot reconstruction.

## RETROFITTING

An alternative to keeping the hazard away from a building is to modify or retrofit the site or building to minimize or prevent damage. There are a variety of techniques to do this, as described below.

### Dry Floodproofing

Dry floodproofing means making all areas below the flood protection level watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings, such as doors, windows and vents, are closed, either permanently, with removable shields, or with sandbags. Dry floodproofing of new and existing nonresidential buildings in the regulatory floodplain is permitted under state, FEMA and local regulations. Dry floodproofing of existing residential buildings in the floodplain is also permitted as long as the building is not substantially damaged or being substantially improved. Owners of buildings located outside the regulatory floodplain can always use dry floodproofing techniques.

Dry floodproofing is only effective for shallow flooding, such as repetitive drainage problems. It does not protect from the deep flooding along lakes and larger rivers caused by hurricanes or other heavy rainstorms.

### Wet Floodproofing

The alternative to dry floodproofing is wet floodproofing: water is let in and everything that could be damaged by a flood is removed or elevated above the flood level. Structural components below the flood level are replaced with materials that are not subject to water damage. For example, concrete block walls are used instead of wooden studs and gypsum wallboard. The furnace, water heater and laundry facilities are permanently relocated to a higher floor. Where the flooding is not deep, these appliances can be raised on blocks or platforms.

## INSURANCE

Technically, insurance does not mitigate damage caused by a natural hazard. However, it does help the owner repair, rebuild, and hopefully afford to incorporate some of the other property protection measures in the process. Insurance offers the advantage of protecting the property, so long as the policy is in force, without requiring human intervention for the measure to work.

### Private Property

Although most homeowner's insurance policies do not cover a property for flood damage, an owner can insure a building for damage by surface flooding through the NFIP. Flood insurance coverage is provided for buildings and their contents damaged by a "general condition of surface flooding" in the area. Most people purchase flood insurance because it is required by the bank when they get a mortgage or home improvement loan. Usually, these policies just cover the building's structure and not the contents. Contents coverage can be purchased separately. Renters can buy contents coverage, even if the owner does not buy structural coverage on the building. Most people don't realize that there is a 30-day waiting period to purchase a flood insurance policy and there are limits on coverage.

**Public Property**

Governments can purchase commercial insurance policies. Larger local governments often self-insure and absorb the cost of damage to one facility, but if many properties are exposed to damage, self-insurance can drain the government's budget. Communities cannot expect federal disaster assistance to make up the difference after a flood.

**LOCAL IMPLEMENTATION AND CRS CREDIT**

The CRS provides the most credit points for acquisition and relocation under Activity 520, because this measure permanently removes insurable buildings from the floodplain. Miramar does not currently receive credit for Activity 520 – Acquisition and Relocation. The FMPC recommended that the City pursue the acquisition and demolition of repetitive loss properties and other buildings which are subject to flood damage. The City does not currently receive credit for Activity 530 – Flood Protection, which credits barriers and elevating existing buildings based on the combination of flood protection techniques used and the level of flood protection provided. Bonus points are provided for the protection of repetitive loss buildings and critical facilities.

City staff have the technical expertise to conduct site visits to properties and advise property owners who may want to floodproof or otherwise protect their home or business. If implemented, the City would receive credit for these efforts under Activity 360 Flood Protection Assistance.

Flood insurance information for the City is provided in Section 4.4.1. Miramar publicizes flood insurance through direct mailings and information on the City’s website.

There is no credit for purchasing flood insurance, but the CRS does provide credit for local public information programs that explain flood insurance to property owners and prepares plans to increase coverage. The CRS also reduces the premiums for those people who do buy NFIP coverage. Miramar is developing a Program for Public Information (PPI) in conjunction with this planning process. Once completed, the City will receive PPI credit under Activity 330 – Outreach Projects.

**CONCLUSIONS**

There are several ways to protect properties from flood damage. The advantages and disadvantages of each should be carefully examined for each situation.

Property owners can implement some property protection measures at little cost, especially for sites in areas of low-level flooding. The City can promote and support this type of property protection through outreach, advice and assistance, and financial incentives.

**MITIGATION ALTERNATIVES EVALUATED**

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Recommended?
8	Develop a voluntary property acquisition plan and program for repetitive loss areas	Federal grant funding is available to support this activity and it will mitigate risk from the most vulnerable buildings.	Yes
14	Increase protection of residential areas and neighborhoods through the support of green design	Incentivizing LID techniques can support the slowing and infiltrating water into the ground, reduces the volume and speed of runoff,	Yes

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Recommended?
	guidelines and LID requirements for new development and major renovation residential areas, historic neighborhoods, and areas vulnerable to flooding. Could provide development incentives and variances for participation.	preventing overwhelmed municipal systems. It can also improve water quality and enhance aesthetics.	
-	Explore development of a program to assist property owners with elevation projects.	The State's Elevate Florida Program now assists home owners with elevation projects. Inquiries and funding are handled through this state-run program.	No

**B.1.3 NATURAL RESOURCE PROTECTION**

Resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. These activities enable the naturally beneficial functions of fields, floodplains, wetlands, and other natural lands to operate more effectively. Natural and beneficial functions of watersheds, floodplains and wetlands include:

- Reduction in runoff from rainwater and stormwater in pervious areas
- Infiltration that absorbs overland flood flow
- Removal and filtering of excess nutrients, pollutants and sediments
- Storage of floodwaters
- Absorption of flood energy and reduction in flood scour
- Water quality improvement
- Groundwater recharge
- Habitat for flora and fauna
- Recreational and aesthetic opportunities

As development occurs, many of the above benefits can be achieved through regulatory steps for protecting natural areas or natural functions. This section covers the resource protection programs and standards that can help mitigate the impact of natural hazards, while they improve the overall environment. Six areas were reviewed:

- Wetland protection
- Erosion and sedimentation control
- Stream/River restoration
- Best management practices
- Dumping regulations
- Farmland protection

### WETLAND PROTECTION

Wetlands are often found in floodplains and topographically depressed areas of a watershed. Many wetlands receive and store floodwaters, thus slowing and reducing downstream flows. They also serve as a natural filter, which helps to improve water quality, and they provide habitat for many species of fish, wildlife and plants.



### EROSION AND SEDIMENTATION CONTROL

Farmlands and construction sites typically contain large areas of bare exposed soil. Surface water runoff can erode soil from these sites, sending sediment into downstream waterways. Erosion also occurs along stream banks and shorelines as the volume and velocity of flow destabilize and wash away the soil. Sediment suspended in the water tends to settle out where flowing water slows down. This can clog storm drains, drain tiles, culverts and ditches and reduce the water transport and storage capacity of river and stream channels, lakes and wetlands.

There are two principal strategies to address these problems: minimize erosion and control sedimentation. Techniques to minimize erosion include phased construction, minimal land clearing, and stabilizing bare ground as soon as possible with vegetation and other soil stabilizing practices. Sedimentation controls include sedimentation ponds, silt fences, and other temporary barriers that allow sediment to settle out of runoff.

### STREAM/RIVER RESTORATION

There is a growing movement that has several names, such as "stream conservation," "bioengineering," or "riparian corridor restoration." The objective of these approaches is to return streams, stream banks and adjacent land to a more natural condition, including the natural meanders. Another term is "ecological restoration," which restores native indigenous plants and animals to an area.

A key component of these efforts is to use appropriate native plantings along the banks that resist erosion. This may involve retrofitting the shoreline with willow cuttings, wetland plants, or rolls of landscape material covered with a natural fabric that decomposes after the banks are stabilized with plant roots.

In all, restoring the right vegetation to a stream has the following advantages:

- Reduces the amount of sediment and pollutants entering the water
- Enhances aquatic habitat by cooling water temperature
- Provides food and shelter for both aquatic and terrestrial wildlife
- Can reduce flood damage by slowing the velocity of water
- Increases the beauty of the land and its property value
- Prevents property loss due to erosion
- Provides recreational opportunities, such as hunting, fishing and bird watching
- Reduces long-term maintenance costs

The City of Miramar's Public Works Department implements a canal/lake embankment restoration program that assists property owners with erosion mitigation by stabilizing the shorelines of eroded embankments and adding vegetation to return the eroded slop to it's natural state.

### BEST MANAGEMENT PRACTICES

Point source pollutants come from pipes such as the outfall of a municipal wastewater treatment plant. They are regulated by the US EPA. Nonpoint source pollutants come from non-specific locations and harder to regulate. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, other chemicals, animal wastes, oils from street surfaces and industrial areas, and sediment from agriculture, construction,

mining and forestry. These pollutants are washed off the ground's surface by stormwater and flushed into receiving storm sewers, ditches and streams.

The term "best management practices" (BMPs) refers to design, construction and maintenance practices and criteria that minimize the impact of stormwater runoff rates and volumes, prevent erosion, protect natural resources and capture nonpoint source pollutants (including sediment). They can prevent increases in downstream flooding by attenuating runoff and enhancing infiltration of stormwater. They also minimize water quality degradation, preserve beneficial natural features onsite, maintain natural base flows, minimize habitat loss, and provide multiple usages of drainage and storage facilities.

#### DUMPING REGULATIONS

BMPs usually address pollutants that are liquids or are suspended in water that are washed into a lake or stream. Dumping regulations address solid matter, such as shopping carts, appliances and landscape waste that can be accidentally or intentionally thrown into channels or wetlands. Such materials may not pollute the water, but they can obstruct even low flows and reduce the channels' and wetlands' abilities to convey or clean stormwater.

Many cities have nuisance ordinances that prohibit dumping garbage or other "objectionable waste" on public or private property. Waterway dumping regulations need to also apply to "non-objectionable" materials, such as grass clippings or tree branches, which can kill ground cover or cause obstructions in channels. Regular inspections to catch violations should be scheduled.

Many people do not realize the consequences of their actions. They may, for example, fill in the ditch in their front yard without realizing that is needed to drain street runoff. They may not understand how regarding their yard, filling a wetland, or discarding leaves or branches in a watercourse can cause a problem to themselves and others. Therefore, a dumping enforcement program should include public information materials that explain the reasons for the rules as well as the penalties.

Miramar prohibits dumping of refuse, fill, garbage, grass clippings, brush, waste concrete, or other objectionable material in existing drainage facilities including swales, ditches, storm drains, inlets, watercourses, gutters, or culverts as part of the stormwater management ordinance.

#### FARMLAND PROTECTION

Farmland protection is an important piece of comprehensive planning and zoning throughout the United States. The purpose of farmland protection is to provide mechanisms for prime, unique, or important agricultural land to remain as such, and to be protected from conversion to nonagricultural uses.

Frequently, farm owners sell their land to residential or commercial developers and the property is converted to non-agricultural land uses. With development comes more buildings, roads and other infrastructure. Urban sprawl occurs, which can lead to additional stormwater runoff and emergency management difficulties.

Farms on the edge of cities are often appraised based on the price they could be sold for to urban developers. This may drive farmers to sell to developers because their marginal farm operations cannot afford to be taxed as urban land. The Farmland Protection Program in the United States Department of Agriculture's 2002 Farm Bill (Part 519) allows for funds to go to state, tribal, and local governments as well as nonprofit organizations to help purchase easements on agricultural land to protect against the development of the land.

#### LOCAL IMPLEMENTATION AND CRS CREDIT

Miramar currently receives credit for Activity 420 – Open Space Preservation for preserving open space and for open space recommendations in the comprehensive plan. Credit for preserved areas is based on the percentage of the floodplain that can be documented as protected from development by ownership or local regulations.

Credit is available for the Erosion and Sediment Control (ESC) element under Activity 450 for regulating activities throughout the watershed to minimize erosion on construction sites that could result in sedimentation and water pollution. Miramar currently receives credit for soil and erosion control regulations and water quality regulations included under the City’s subdivision ordinance and stormwater management ordinance.

**CONCLUSIONS**

Flood hazard mitigation projects can achieve multiple benefits by using resource protection programs to support protecting natural features that also mitigate the impacts of flooding.

The City of Miramar’s code of ordinances prohibits dumping in waterways and sets standards for erosion and sedimentation control and water quality. The City already preserves floodplain areas as open space and will continue to pursue further preservation, as it will benefit the natural resource areas, support natural floodplain functions, and help to protect certain species of plants and animals.

**MITIGATION ALTERNATIVES EVALUATED**

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Recommended?
12	Create a plan for improved vegetative management around canals/lake to improve water quality. Include a public outreach educational component that describes benefits of increased vegetation around these waterways	This action can improve water quality, recharge and infiltration, habitat preservation, and reduce flooding.	Yes
13	Coordinate open space opportunities with flood control needs for new developments, repetitive loss areas, or other localized flooding locations. Establish coordination between Parks and Recreation Department, Public Works, and Building, Planning and Zoning	Pursuing open space acquisitions in areas of known high flood risk will provide the greatest benefit.	Yes
15	Seek additional funding for the Embankment Restoration Program. Promote and publicize program to residents in high-risk areas.	This action keeps stormwater channels at optimum capacity and can minimize costly maintenance. This benefits adjacent property owners that have lost land due to erosion.	Yes

**B.1.4 EMERGENCY SERVICES MEASURES**

Emergency services measures protect people during and after a disaster. A good emergency management program addresses all hazards, and it involves all local government departments. This section reviews emergency services measures following a chronological order of responding to an emergency. It starts with identifying an impending problem (threat recognition) and continues through post-disaster activities.

**THREAT RECOGNITION**

The first step in responding to a flood is to know when weather conditions are such that an event could occur. With a proper and timely threat recognition system, adequate warnings can be disseminated.

The National Weather Service is the prime agency for detecting meteorological threats. Severe weather warnings are transmitted through NOAA's Weather Radio System. Local emergency managers can then provide more site-specific and timely recognition after the Weather Service issues a watch or a warning. A

flood threat recognition system predicts the time and height of a flood crest. This can be done by measuring rainfall, soil moisture, and stream flows upstream of the community and calculating the subsequent flood levels.

On smaller rivers and streams, locally established rainfall and river gauges are needed to establish a flood threat recognition system. The NWS may issue a "flash flood watch." This is issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area, but the occurrence is neither certain nor imminent. These events are so localized and so rapid that a "flash flood warning" may not be issued, especially if no remote threat recognition equipment is available. In the absence of a gauging system on small streams, the best threat recognition system is to have local personnel monitor rainfall and stream conditions. While specific flood crests and times will not be predicted, this approach will provide advance notice of potential local or flash flooding.

#### WARNING

The next step in emergency response following threat recognition is to notify the public and staff of other agencies and critical facilities. More people can implement protection measures if warnings are early and include specific detail.

The NWS issues notices to the public using two levels of notification:

- Watch: conditions are right for flooding, thunderstorms, tornadoes or winter storms.
- Warning: a flood, tornado, etc., has started or been observed.

A more specific warning may be disseminated by the community in a variety of ways. The following are the more common methods:

- CodeRED countywide mass telephone emergency communication system
- Commercial or public radio or TV stations
- The Weather Channel
- Cable TV emergency news inserts
- Telephone trees/mass telephone notification
- NOAA Weather Radio
- Tone activated receivers in key facilities
- Outdoor warning sirens
- Sirens on public safety vehicles
- Door-to-door contact
- Mobile public address systems
- Email notifications

Multiple or redundant systems are most effective; if people do not hear one warning, they may still get the message from another part of the system.

Just as important as issuing a warning is telling people what to do in case of an emergency. A warning program should include a public information component.

#### STORMREADY

The National Weather Service established the StormReady program to help local governments improve the timeliness and effectiveness of hazardous weather related warnings for the public. To be officially StormReady, a community must:

- Establish a 24-hour warning point and emergency operations center



- Have more than one way to receive severe weather warnings and forecasts and to alert the public
- Create a system that monitors weather conditions locally
- Promote the importance of public readiness through community seminars
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises

Being designated a StormReady community by the National Weather Service is a good measure of a community's emergency warning program for weather hazards. Broward County is currently credited by NOAA as a StormReady community.

#### RESPONSE

The protection of life and property is the most important task of emergency responders. Concurrent with threat recognition and issuing warnings, a community should respond with actions that can prevent or reduce damage and injuries. Typical actions and responding parties include the following:

- Activating the emergency operations center (emergency preparedness)
- Closing streets or bridges (police or public works)
- Shutting off power to threatened areas (utility company)
- Passing out sand and sandbags (public works)
- Holding children at school or releasing children from school (school superintendent)
- Opening evacuation shelters (the American Red Cross)
- Monitoring water levels (public works)
- Establishing security and other protection measures (police)

An emergency action plan ensures that all bases are covered and that the response activities are appropriate for the expected threat. These plans are developed in coordination with the agencies or offices that are given various responsibilities.

Emergency response plans should be updated annually to keep contact names and telephone numbers current and to ensure that supplies and equipment that will be needed are still available. They should be critiqued and revised after disasters and exercises to take advantage of the lessons learned and of changing conditions. The end result is a coordinated effort implemented by people who have experience working together so that available resources will be used in the most efficient manner possible.

#### EVACUATION AND SHELTER

There are six key components to a successful evacuation:

- Adequate warning
- Adequate routes
- Proper timing to ensure the routes are clear
- Traffic control
- Knowledgeable travelers
- Care for special populations (e.g., the handicapped, prisoners, hospital patients, and schoolchildren)

Those who cannot get out of harm's way need shelter. Typically, the American Red Cross will staff a shelter and ensure that there is adequate food, bedding, and wash facilities. Shelter management is a specialized skill. Managers must deal with problems like scared children, families that want to bring in their pets, and the potential for an overcrowded facility. Broward County has identified schools throughout the City that can serve as shelters if needed. Additionally, Broward County Emergency Management plans for evacuation routes and support for individuals with access and functional needs.

### POST-DISASTER RECOVERY AND MITIGATION

After a disaster, communities should undertake activities to protect public health and safety and facilitate recovery. Appropriate measures include:

- Patrolling evacuated areas to prevent looting
- Providing safe drinking water
- Monitoring for diseases
- Vaccinating residents for tetanus and other diseases
- Clearing streets
- Cleaning up debris and garbage

Following a disaster there should be an effort to help prepare people and property for the next disaster. Such an effort would include:

- Public information activities to advise residents about mitigation measures they can incorporate into their reconstruction work.
- Evaluating damaged public facilities to identify mitigation measures that can be included during repairs.
- Identifying other mitigation measures that can lessen the impact of the next disaster.
- Acquiring substantially or repeatedly damaged properties from willing sellers.
- Planning for long-term mitigation activities.
- Applying for post-disaster mitigation funds.

### REGULATING RECONSTRUCTION

Requiring permits for building repairs and conducting inspections are vital activities to ensure that damaged structures are safe for people to reenter and repair. There is a special requirement to do this in floodplains, regardless of the type of disaster or the cause of damage. The NFIP requires that local officials enforce the substantial damage regulations. These rules require that if the cost to repair a building in the mapped floodplain equals or exceeds 50% of the building's market value, the building must be retrofitted to meet the standards of a new building in the floodplain. In most cases, this means that a substantially damaged building must be elevated above the base flood elevation.

### LOCAL IMPLEMENTATION AND CRS CREDIT

Flash flood warnings are issued by National Weather Service Offices, which have the local and county warning responsibility. Flood warnings are forecasts of coming floods and are distributed to the public by NOAA Weather Radio, commercial radio and television, and through local emergency agencies. The warning message tells the expected degree of flooding, the affected area, when and where flooding will begin, and the expected maximum flood height at specific forecast points during flood crest.

Miramar does not currently receive credit for Activity 610 – Flood Warning and Response, but credits are available based on the number and types of warning media that can reach the community's flood prone population. Depending on the location, communities can receive credit for the telephone calling system and more credits if there are additional measures, like telephone trees. Being designated as a StormReady community can provide additional credits.

### CONCLUSIONS

Emergency management functions for Miramar are provided by the City's Emergency Management Department and Broward County Emergency Management. These entities will continue to coordinate on emergency preparedness and response. Miramar can support improved emergency response capabilities with additional flood recognition and warning information.

**MITIGATION ALTERNATIVES EVALUATED**

Action #	Mitigation Action	Reason for Pursuing/Not Pursuing	Recommended?
-	Continue public information campaign to encourage participation in Code Red	The City promotes Alert Miramar and Alert Broward for emergency notifications	No
-	Explore installing "Street May Flood" signs to critical locations	Signage already exists in areas at risk of flooding.	No

**B.1.5 STRUCTURAL PROJECTS**

Four general types of flood control projects are reviewed here: levees, reservoirs, diversions, and dredging. These projects have three advantages not provided by other mitigation measures:

- They can stop most flooding, protecting streets and landscaping in addition to buildings.
- Many projects can be built without disrupting citizens' homes and businesses.
- They are constructed and maintained by a government agency, a more dependable long-term management arrangement than depending on many individual private property owners.

However, as shown below, structural measures also have shortcomings. The appropriateness of using flood control depends on individual project area circumstances.

**Advantages**

- They may provide the greatest amount of protection for land area used
- Because of land limitations, they may be the only practical solution in some circumstances
- They can incorporate other benefits into structural project design, such as water supply and recreational uses
- Regional detention may be more cost-efficient and effective than requiring numerous small detention basins

**Disadvantages**

- They can disturb the land and disrupt the natural water flows, often destroying wildlife habitat
- They require regular maintenance
- They are built to a certain flood protection level that can be exceeded by larger floods
- They can create a false sense of security
- They promote more intensive land use and development in the floodplain

**LEVEES AND FLOODWALLS**

Probably the best known flood control measure is a barrier of earth (levee) or concrete (floodwall) erected between the watercourse and the property to be protected. Levees and floodwalls confine water to the stream channel by raising its banks. They must be well designed to account for large floods, underground seepage, pumping of internal drainage, and erosion and scour.

**RESERVOIRS AND DETENTION**

Reservoirs reduce flooding by temporarily storing flood waters behind dams or in storage or detention basins. Reservoirs lower flood heights by holding back, or detaining, runoff before it can flow downstream. Flood waters are detained until the flood has subsided, and then the water in the reservoir or detention basin is released or pumped out slowly at a rate that the river can accommodate downstream.

Reservoirs can be dry and remain idle until a large rain event occurs. Or they may be designed so that a lake or pond is created as shown here in the image of the retention pond. The lake or pond may provide recreational benefits or water supply (which could also help mitigate a drought).



Flood control reservoirs are commonly built for one of two purposes. Large reservoirs are constructed to protect property from existing flood problems. Smaller reservoirs, or detention basins, are built to protect property from the stormwater runoff impacts of new development.

**DIVERSION**

A diversion is a new channel that sends floodwaters to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel. During floods, the floodwaters spill over to the diversion channel or tunnel, which carries the excess water to a receiving lake or river.

**LOCAL IMPLEMENTATION AND CRS CREDIT**

Miramar does not currently receive credit for Activity 530 – Flood Protection. Structural flood control projects that provide 100-year flood protection and that result in revisions to the Flood Insurance Rate Map are not credited by the CRS so as not to duplicate the larger premium reduction provided by removing properties from the mapped floodplain.

**CONCLUSIONS**

There are many areas identified throughout Miramar that experience flooding due to overburdened channels and/or inadequate drainage systems. The City’s CIP includes already identified structural improvements to the stormwater system that can alleviate some flood risk in the City.

**MITIGATION ALTERNATIVES EVALUATED**

Action #	Mitigation Action	Reason for Pursuing/Not Pursuing	Recommended?
1	Historic Miramar Infrastructure Improvement Project - Phases 5 and 6	The phased project addresses several interconnected stormwater projects that reduce flooding across the neighborhood.	Yes
6	Implement CIP projects identified in the City's Stormwater Master Plan	This action will allow the city to address stormwater issues through prioritized projects	Yes
7	Drainage improvements - Miramar Parkway from Canal Road to University Drive.	This action eliminates the problem of water retention on a regularly flooded road.	Yes

Action #	Mitigation Action	Reason for Pursuing/Not Pursuing	Recommended?
-	Identify opportunities for public and private (developer) partnerships to complete needed storm improvements	Stormwater improvements on new development can be better accomplished through an incentive program.	No

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### B.1.6 PUBLIC INFORMATION

#### OUTREACH PROJECTS

Outreach projects are the first step in the process of orienting property owners to the hazards they face and to the concept of property protection. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties.

Awareness of the hazard is not enough; people need to be told what they can do about the hazard. Thus, projects should include information on safety, health, and property protection measures. Research has shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions.

Community newsletters/direct mailings: The most effective types of outreach projects are mailed or distributed to everyone in the community. In the case of floods, they can be sent only to floodplain property owners. Miramar sends direct mailings to all City residents through utility mailers and sends additional targeted outreach to floodplain residents.

News media: Local newspapers, radio stations, and cable TV can be strong allies in efforts to inform the public. These media offer interview formats and cable TV may be willing to broadcast videos on the hazards.

#### LIBRARIES AND WEBSITES

Outreach activities tell people that they are exposed to a hazard. The next step is to provide information to those who want to know more. The community library and local websites are widely accessible places for residents to seek information on hazards, hazard protection, and protecting natural resources.

Books and pamphlets on hazard mitigation can be given to libraries, and many of these can be obtained for free from state and federal agencies. Libraries also have their own public information campaigns with displays, lectures and other projects, which can augment the activities of the local government. Websites provide fast access to a wealth of public and private sites for information. Through links to other websites, there is almost no limit to the amount of information that can be accessed on the Internet. In addition to online floodplain maps, websites can link to information for homeowners on how to retrofit for floods or a website about flood education for children. Miramar maintains flood related information in the public library and on the community website.

#### TECHNICAL ASSISTANCE

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#### HAZARD INFORMATION

Residents and business owners that are aware of the potential hazards can take steps to avoid problems or reduce their exposure to flooding. Communities can easily provide map information from FEMA's FIRMS and Flood Insurance Studies. They may also assist residents in submitting requests for map amendments and revisions when they are needed to show that a building is located outside the mapped floodplain.

Some communities supplement what is shown on the FIRM with information on additional hazards, flooding outside mapped areas, and zoning. When the map information is provided, community staff can

explain insurance, property protection measures, and mitigation options that are available to property owners. They should also remind inquirers that being outside the mapped floodplain is no guarantee that a property will never flood.

**PROPERTY PROTECTION ASSISTANCE**

While general information provided by outreach projects or the library is beneficial, most property owners do not feel ready to retrofit their buildings without more specific guidance. Local building and engineering department staff are experts in construction and floodplain management. They can provide free advice, not necessarily to design a protection measure, but to steer the owner onto the right track. City staff can provide the following types of assistance:

- Visit properties and offer protection suggestions
- Recommend or identify qualified or licensed contractors
- Inspect homes for anchoring of roofing and the home to the foundation
- Explain when building permits are needed for home improvements.

The City of Miramar provides map information and property protection advice and assistance to City residents.

**PUBLIC INFORMATION PROGRAM**

A Program for Public Information (PPI) is a document that receives CRS credit for planning and coordinating a community’s flood related outreach. It is a review of local conditions, local public information needs, and a recommended plan of activities. A PPI frequently includes the following information, much of which is incorporated into this plan:

- The local flood hazard
- The property protection measures appropriate for the flood hazard
- Flood safety measures appropriate for the local situation
- The public information activities currently being implemented within the community, including those being carried out by non-government agencies
- Goals for the community's public information program
- The outreach projects that will be done each year to reach the goals
- The process that will be followed to monitor and evaluate the projects
- Local Implementation and CRS Credit

Miramar receives credit under Activity 350 – Flood Protection Information for outreach projects. The City is currently developing a PPI to further plan and coordinate outreach. Once complete, the City will receive credit under Activity 330 – Outreach Projects.

**CONCLUSIONS**

Miramar provides a variety of public outreach and has a Public Information Office to support outreach efforts. The City will continue existing annual outreach projects and has plans for new initiatives to reach additional audiences and involve stakeholders in disseminating outreach.

**MITIGATION ALTERNATIVES EVALUATED**

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Recommended?
9	Create a public information program for the public on the benefits of onsite retention. Highlight examples of LID techniques, the establishment of	This program will increase awareness and education of onsite retention while also encouraging residents to reduce flooding around their property.	Yes

APPENDIX B: MITIGATION STRATEGY

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Recommended?
	rain gardens, and the use of rain barrels to reduce flash flooding impacts.		
10	Promote and publicize the City's public flood risk website that allows property owners to access flood risk data for their individual properties. Prioritize Historical Miramar.	Many public survey responses indicated that residents didn't know where to learn about flood issues in the community. This will help residents learn about flooding in their community.	Yes
11	City staff provide advice and assistance to homeowners who want to flood proof their home or business. Publicize technical assistance for Activity 360 Flood Protection Assistance. Maintain records of assistance given to receive CRS credit.	This will help residents determine flood protection measures for their properties and help the community improve CRS credit.	Yes

## B.2 MITIGATION ALTERNATIVE SELECTION CRITERIA

The process for evaluating mitigation alternatives is described in Section 6.3. The following criteria were considered during the selection and prioritization of proposed mitigation measures:

### STAPLEE

- **Social:** Will the measure have equitable outcomes? Does it benefit vulnerable populations?
- **Technical:** Will it work? Does it solve the problem? Is it feasible?
- **Administrative:** Does the community have the capacity to implement and manage project?
- **Political:** Is there public and stakeholder support? Is political leadership willing to support?
- **Legal:** Does the community have the authority to implement it? Are there liability implications?
- **Economic:** Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development?
- **Environmental:** Does it comply with environmental regulations? Does it benefit or protect existing natural resources?

### OTHER

- Does measure address area with highest risk?
- Does measure protect...
  - The largest # of people exposed to risk?
  - The largest # of buildings?
  - The largest # of jobs?
  - The largest tax income?
  - The largest average annual loss potential?
  - The area most frequently impacted?
  - Critical infrastructure?
- When will funding be available?
- How visible is the project?
- Does the project have community credibility?

## APPENDIX C REFERENCES

- Broward County Local Mitigation Strategy, 2023.
- Centers for Disease Control and Prevention. Social Vulnerability Index.
- City of Miramar, 2045 Comprehensive Plan, 2025.
- City of Miramar Land Development Ordinance.
- City of Miramar Code of Ordinances.
- Federal Emergency Management Agency (FEMA). Flood Insurance Study Report: Broward County and Incorporated Areas. July 31, 2024.
- FEMA. Community Information System, 2025.
- FEMA. Disaster Declaration Summaries v2. Retrieved December, 2025.
- FEMA. Mitigation Ideas, January 2013.
- IPCC, 2014. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.
- IPCC, 2007a. Climate Change 2007: The Physical Science Basis, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. (Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor, and H. L. A-2 EC 1165-2-212 1 Oct 11 Miller, eds.).Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- IPCC, 2018: Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [V. Masson-Delmotte, P. Zhai, H. O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J. B. R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, T. Waterfield (eds.)]. In Press.
- IPCC, 2023: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 35-115, doi: 10.59327/IPCC/AR6-9789291691647.
- National Land Cover Database. 2021.
- National Oceanic and Atmospheric Agency (NOAA), Climate At a Glance.
- NOAA, National Centers for Environmental Information, Storm Events Database, 2025.
- National Park Service, National Register of Historic Places.
- State of Florida Enhanced Hazard Mitigation Plan, 2023.
- U.S. Army Corps of Engineers, National Inventory of Dams, 2025.
- U.S. Census Bureau, Census 2010.
- U.S. Census Bureau, American Community Survey 5-Year Estimates (2019-2023)
- U.S. Fish & Wildlife Service (USFWS), National Wetlands Inventory.
- USFWS Environmental Conservation Online System, Species Report.



2026



City of Miramar, FL

# PROGRAM FOR PUBLIC INFORMATION



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## BACKGROUND

This Program for Public Information (PPI) is part of the City of Miramar's floodplain management program and was developed as part of the City's participation in the Community Rating System (CRS). The CRS is a voluntary program that is part of the National Flood Insurance Program (NFIP). It provides reductions to flood insurance premiums in participating communities. Communities participate in the CRS by earning credit for implementing activities intended to manage floodplains, reduce flood risk, and minimize flood vulnerability. Creating a PPI to better inform the public on a range of flood-related topics is one way that communities can earn CRS credit.

The City of Miramar (the "City") has been an active participant of the CRS since 1993. The City is currently rated as a Class 8 which rewards residents with a 10 percent reduction in their flood insurance premiums. To keep this discount, the City must continue to implement its program and provide status reports to the NFIP each year.

A PPI is an ongoing effort to prepare, implement, and monitor a range of public information activities. The objective of CRS credit for a PPI is to allow communities to be creative in their approach to outreach concerning flooding. The CRS provides credit for comprehensive information programs that are designed to meet local needs, involve local stakeholders, and are monitored, evaluated, and revised to improve their effectiveness. The PPI planning process provides the ability for the City to consider options for disseminating messages about the flood hazard to the community and to leverage stakeholders through their messaging and materials. The City has developed its PPI in accordance with the CRS credit criteria found within Activity 330 of the 2017 CRS Coordinator's Manual. The City's outreach program includes a variety of outreach types.

Over the years, the City of Miramar, through various departments and in coordination with stakeholder groups and outside agencies, has already prepared multiple outreach messages to educate the public on the hazards associated with flooding.

The following document reviews the planning process used for the development of this PPI and details the target areas, target audiences, topics, messages, and outreach strategies that comprise the City's public information program.

## STEP 1: ESTABLISH A PPI COMMITTEE

A PPI should assess all the community's needs for flood-related information and coordinate all the resources that can deliver information. It should recommend a range of activities that convey information to residents, businesses, and other audiences in and around the community. It should have an objective review of what is being done and how public information activities could be improved. Therefore, a PPI needs to be developed by a committee that consists of members from both inside and outside local government. The committee could be an existing committee, such as a mitigation planning committee or advisory board, or a subcommittee of an existing group, as long as it meets the membership criteria found within Activity 330.

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### 1.1 MEMBERSHIP AND STAKEHOLDERS

The PPI Committee's membership must meet the following CRS criteria:

- There must be at least five people on the committee;
- There must be representation from the community's floodplain management office;
- There must be representation from the community's public information office (if one exists); and,

— At least half of the members must be from outside the local government (“stakeholders”).

The CRS encourages the inclusion of stakeholders that are outside the local government in planning and conducting outreach projects. As outlined above, at least one-half of the members of the PPI committee must be representatives from outside the local government. These could be members of the public, representatives of key community organizations, and/or agencies and organizations that would likely implement the recommended outreach projects.

The participants comprising the PPI Committee for the City were selected in accordance with the above CRS criteria and included the following:

- 1 Nixon Lebrun, City of Miramar Floodplain Administrator, Director of Building, Planning, & Zoning Department
- 2 Debon Campbell II, City of Miramar Public Information Officer
- 3 Tekisha Jordan, City of Miramar Assistant Director of Building, Planning, & Zoning Department
- 4 Marilyn Markwei, City of Miramar Building Coordinator
- 5 Josh Green, City of Miramar Emergency Management Planner
- 6 Leah DeRiel, City of Miramar Assistant City Engineer, Engineering Services Department
- 7 Alison Adams, Resident
- 8 Matthew Thompson, Resident and Planning & Zoning Board Member
- 9 Anneline Carter, Real Estate Agent
- 10 Rayon Angell, Angell’s Insurance Specialist, Inc.
- 11 Wendy Matos, Resident
- 12 Nari Tomlinson, Resident

## COMMITTEE MEETINGS

The PPI committee met three times during the planning process to develop the outreach program. During the planning process, the PPI Committee communicated through face-to-face meetings and emails. The meeting dates and topics discussed are detailed below in Table 1.

**Table 1 – Summary of PPI Committee Meeting Dates**

MEETING TOPIC		MEETING DATE
<b>PPI #1</b>	Introduction to CRS and the PPI process; Assessment of the flood hazard and the community’s current public information needs;	June 11, 2025
<b>PPI #2</b>	Assessment of exposed buildings and flood insurance coverage; Selection of target areas, target audiences, topics, messages, and outreach projects;	August 26, 2025
<b>PPI #3</b>	Final selection of outreach projects; Review of the draft PPI	October 21, 2025

## GOALS FOR THE PPI

The PPI committee developed three primary goals to guide the overall implementation of the City’s public information program.

Goal 1: Recognize the risk associated with flooding and what individuals can do to reduce damage to property and save lives.

Goal 2: Promote the purchase of flood insurance to ensure greater protection of property within the City.

Goal 3: Increase the preparedness capability of the public to respond to and recover from flood events.

## STEP 2: ASSESS THE COMMUNITY'S PUBLIC INFORMATION NEEDS

Public information needs are a factor of both the City's geography and flood hazards as well as the City's demographics. The City of Miramar is located in Broward County in southeastern Florida and is part of the Miami metropolitan area. Miramar has a total land area of 28.9 square miles as well as 2.2 square miles of water comprising numerous lakes, ponds and canals.

As of 2023, according to the American Community Survey (ACS) 5-Year Estimates, the population was 135,986. The average population density is 4,705 people per square mile. There are 44,446 occupied housing units in the city, of which about 70 percent are owner-occupied while 30 are renter-occupied. Homeowners may be more likely than renters to make structural improvements or investments in their homes to protect themselves from flooding. It will therefore be important to balance outreach on flood protection measures with information on how to know your flood risk, prepare for flooding, and protect yourself and your family from flooding. As residents do purchase homes, it is important to ensure that those involved in the process, such as real estate, lending, and insurance companies, have information on flood risk and are able to advise their clients accordingly.

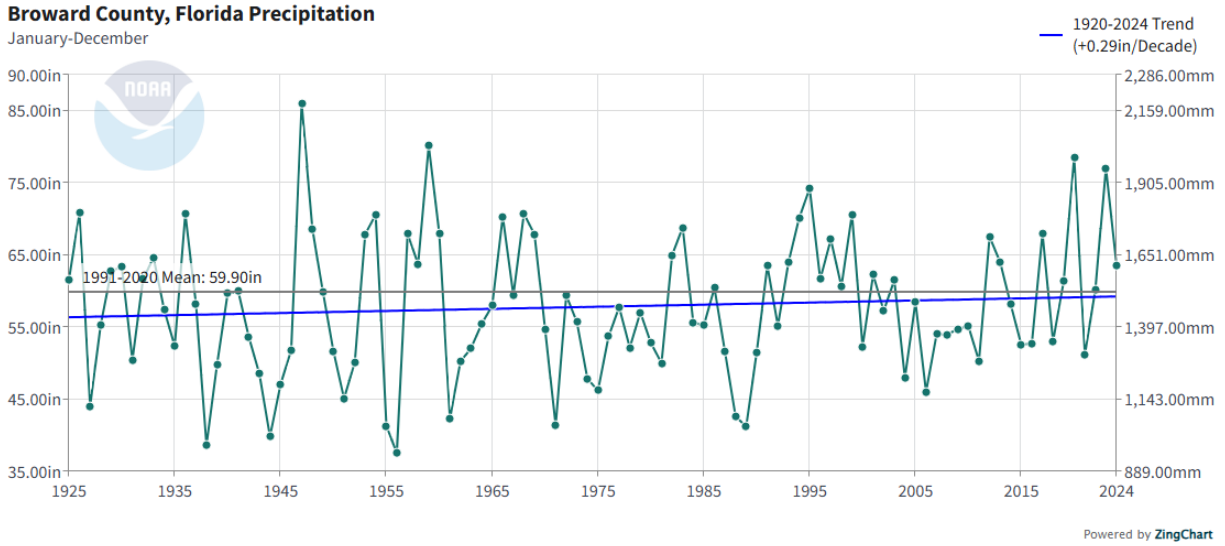
The median age in the city was 39.5 as of 2023. Approximately 5.3 percent of the population is under 5 years of age, and 12.5 percent of the population is over 65 years of age. In total, nearly 22 percent of the population is under 18 years of age. Therefore, outreach through schools and to school children may be effective.

An estimated 41.5 percent of the population is foreign-born, and over 49 of the population 5 years and over speak a language other than English at home. The PPI Committee noted that public information materials are needed in English, Spanish, and Haitian Creole in order to be accessible to most of the City's population.

An estimated 98.8 percent of households have computers and over 90 percent have broadband internet; therefore, online outreach can effectively reach the majority of City residents.

The floodplains of Miramar consist of low-lying areas adjacent to canals and ponds. The topography of Miramar is extremely flat and the city sits at a low elevation. Miramar's canals and waterways are maintained by several different entities. South Florida Water Management District has full responsibility for the C-9 and L-33 canals. South Broward Drainage District has primary responsibility for waterways from US-27 to University Drive, which encompasses most of the waterways in the City. City of Miramar has secondary responsibility for SBDD waterways and primary responsibility for waterways east of University Drive. Numerous lakes, ponds, and canals in the City are owned and maintained by private owners and homeowners associations.

Floods can occur in Miramar at any time during the year. However, flooding is most likely during the rainy season, which extends from June to October. According to data from the NOAA National Centers for Environmental Information, the average annual precipitation in Broward County from 1920 to 2025 is 59.9 inches. However, as shown in the graph below, in recent years the total annual rainfall has reached as much as 78 inches.



Source: NOAA National Centers for Environmental information, Climate at a Glance: County Time Series, Precipitation, retrieved July 2025

Flooding along canals and ponds is due to prolonged heavy rainfall over the drainage area. Flooding is more severe when the ground has been saturated due to previous heavy rainfall and can be affected by high tides causing a rise in the groundwater table. Due to the city’s low elevation and naturally high-water table, drainage capacity can become quickly overwhelmed. Major storms affecting the Miramar area reported by the Flood Insurance Study (FIS) for Broward County and NOAA’s National Centers for Environmental Information (NCEI) include summaries of storms that have caused flooding. Not only do hurricanes and tropical storms cause flooding, but they may cause erosion along the banks of canals.

## 2.1 DELINEATE TARGET AREAS

In order to develop an effective local outreach program that raises public awareness about flood related issues, it is necessary to identify and assess the areas within the community that are considered flood-prone. The PPI Committee identified the following target areas and concluded that outreach projects should be directed to all people and properties (residential, commercial and public) within these areas:

### TARGET AREA #1: SPECIAL FLOOD HAZARD AREAS

According to the effective FIS and Flood Insurance Rate Maps (FIRMs) prepared by FEMA, revised on July 31, 2024, approximately 83% of the City is located within a Special Flood Hazard Area (SFHA). Figure 1 on the following page reflects the mapped flood insurance zones for the City.

Table 2 is a summary table that shows the building count and improved value of parcels by FEMA flood zone using parcel data from City of Miramar and Broward County to estimate building counts and values. Based on this analysis, 23,922 buildings fall within the 1% annual chance floodplain with a total value of \$63,958,601,115.

**Table 2 - Building Count by FEMA Flood Zone**

Occupancy Type	Building Count Exposed	Total Building Value	Estimated Content Value	Total Value
Zone AE	23,744	\$39,884,014,450	\$23,812,498,500	\$63,696,512,950
Zone AH	178	\$157,568,160	\$104,520,005	\$262,088,165
Zone X (Shaded)	5,795	\$6,758,521,140	\$4,236,886,350	\$10,995,407,490

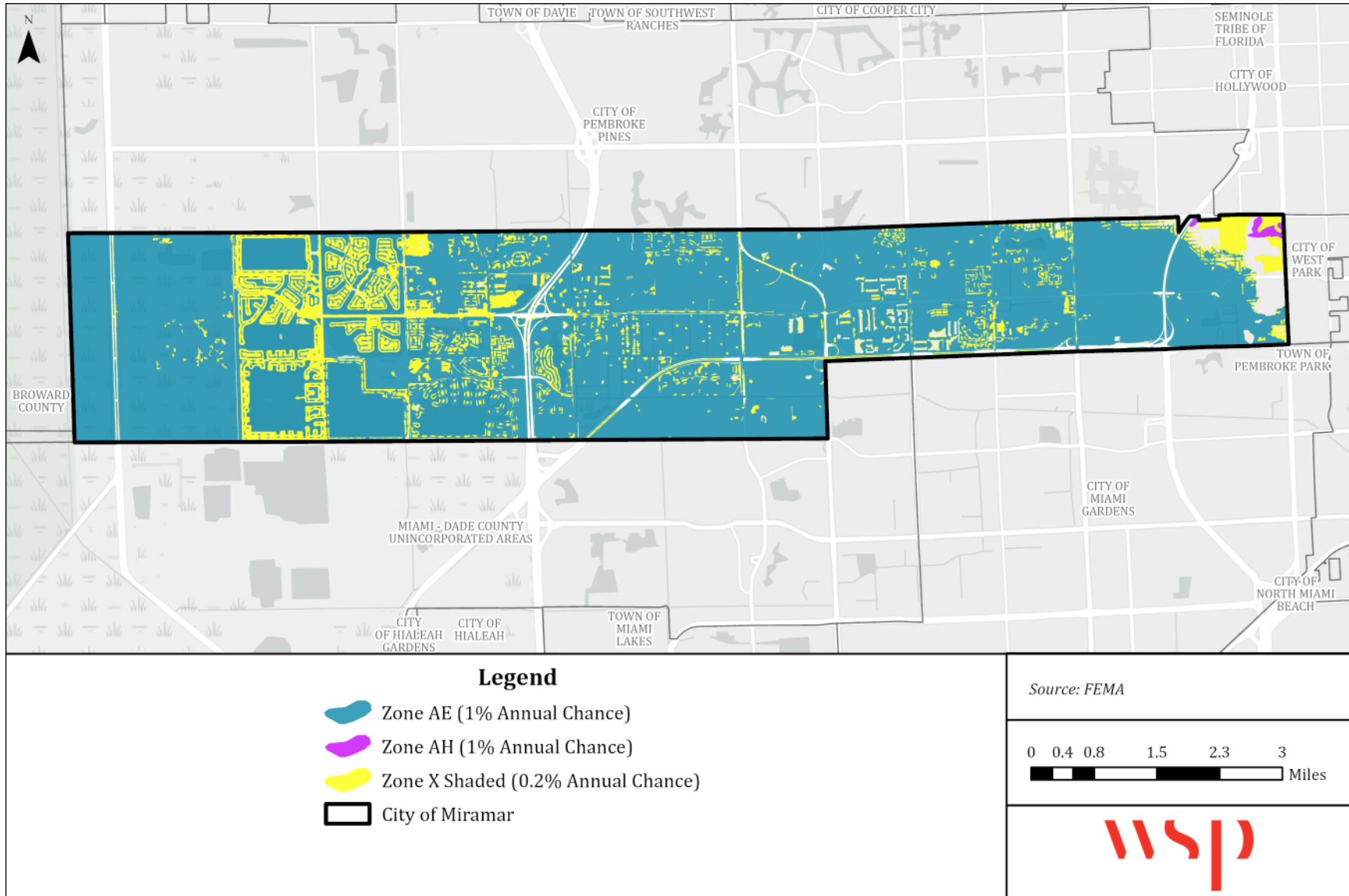
# Exhibit "B"

<b>Occupancy Type</b>	<b>Building Count Exposed</b>	<b>Total Building Value</b>	<b>Estimated Content Value</b>	<b>Total Value</b>
Zone X (Unshaded)	954	\$594,244,300	\$349,295,305	\$943,539,605

Source: City of Miramar building footprints, BCAD parcel data, 2023; FEMA Effective DFIRM

Note: Improved parcels indicate that a structure is present; however, the structure may or may not be insurable.

Figure 1 - City of Miramar Special Flood Hazard Areas



**TARGET AREA #2: REPETITIVE LOSS AREAS**

Repetitive loss properties are NFIP-insured structures with two or more claims resulting in claim payments (including building and contents) totaling more than \$1,000 per claim within in any 10-year period. Properties categorized as repetitive loss properties have a greater need for flood protection because they are known to be vulnerable to flooding.

An analysis of repetitive loss was completed to examine the number of repetitive loss properties in relation to FEMA flood zones and the extent to which these properties are insured. According to November 2025 NFIP records, there are 47 unmitigated repetitive loss properties in Miramar with a total payment of \$\$811,519. Of the 47 unmitigated repetitive loss properties in Miramar, 26 are insured. Table 3 details FEMA flood zones, insurance coverage, and total payment by property.

**Table 3 - Summary of Repetitive Loss Properties**

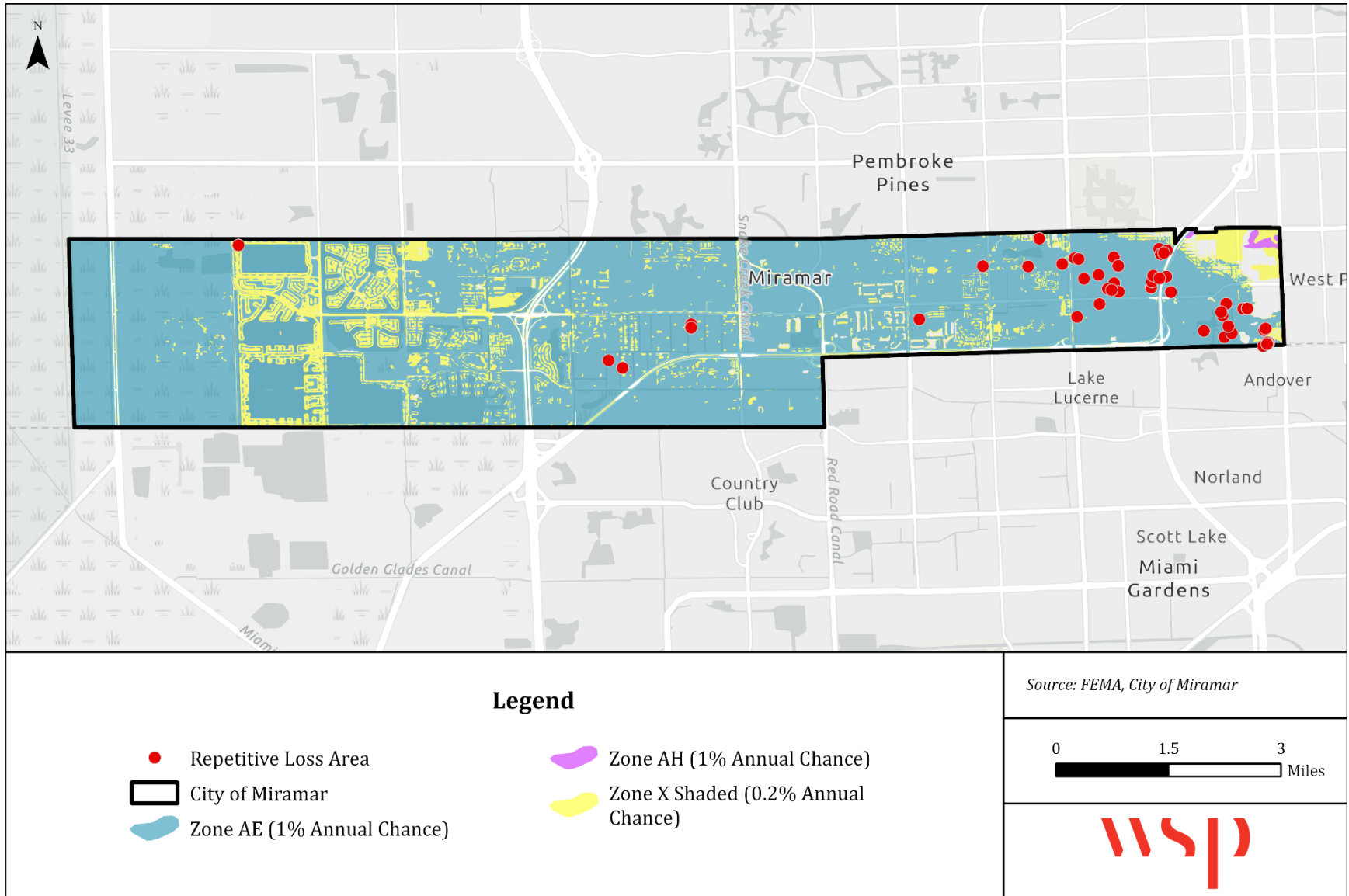
Flood Zone	Mitigation		Building Count		Total Building Payment	Total Content Payment	Total Paid
	Mitigated	Unmitigated	Insured	Uninsured			
AE		✓	✓		\$90,222	\$5,660	\$95,882
AE		✓	✓		\$78,541	\$2,286	\$80,827
AE		✓	✓		\$54,443	\$0	\$54,443
AE		✓		✓	\$46,502	\$52,984	\$99,486
AE		✓	✓		\$42,379	\$0	\$42,379
AE		✓	✓		\$22,298	\$1,534	\$23,832
AE		✓	✓		\$19,992	\$0	\$19,992
AE		✓	✓		\$18,635	\$1,589	\$20,224
AE		✓	✓		\$17,294	\$4,161	\$21,455
AE		✓		✓	\$15,533	\$0	\$15,533
AE		✓	✓		\$14,310	\$6,008	\$20,317
AE		✓	✓		\$14,168	\$3,481	\$17,648
AE		✓		✓	\$13,450	\$282	\$13,732
AE		✓		✓	\$13,405	\$4,721	\$18,126
AE		✓		✓	\$12,252	\$3,719	\$15,971
AE		✓	✓		\$11,823	\$0	\$11,823
AE		✓	✓		\$11,434	\$2,128	\$13,562
AE		✓		✓	\$11,282	\$68	\$11,350
AE		✓	✓		\$9,335	\$6,793	\$16,129
AE		✓		✓	\$9,286	\$3,027	\$12,313
AE		✓	✓		\$8,828	\$4,550	\$13,378
AE		✓		✓	\$8,612	\$0	\$8,612
X SHADED		✓		✓	\$8,109	\$2,430	\$10,539
AE		✓		✓	\$7,165	\$8,571	\$15,735
AE		✓		✓	\$6,764	\$0	\$6,764
AE		✓		✓	\$6,595	\$0	\$6,595
AE		✓	✓		\$5,628	\$3,260	\$8,888
AE		✓	✓		\$5,433	\$1,360	\$6,793
AE		✓		✓	\$5,383	\$0	\$5,383
AE		✓		✓	\$5,275	\$1,140	\$6,415

Flood Zone	Mitigation		Building Count		Total Building Payment	Total Content Payment	Total Paid
	Mitigated	Unmitigated	Insured	Uninsured			
X SHADED		✓		✓	\$5,081	\$0	\$5,081
AE		✓	✓		\$4,754	\$1,479	\$6,233
AE		✓		✓	\$4,548	\$889	\$5,438
AE		✓	✓		\$4,449	\$0	\$4,449
AE		✓	✓		\$4,230	\$3,641	\$7,871
AE		✓		✓	\$4,214	\$1,940	\$6,155
X SHADED		✓		✓	\$4,128	\$1,234	\$5,362
AE		✓		✓	\$3,757	\$0	\$3,757
AE		✓	✓		\$3,486	\$0	\$3,486
AE		✓		✓	\$3,458	\$1,640	\$5,098
AE		✓	✓		\$3,022	\$0	\$3,022
AE		✓	✓		\$2,179	\$9,144	\$11,323
AE		✓	✓		\$2,018	\$1,278	\$3,297
AE		✓	✓		\$1,734	\$801	\$2,534
AE		✓	✓		\$1,002	\$4,210	\$5,212
AE		✓		✓	\$795	\$9,050	\$9,845
X SHADED		✓	✓		\$0	\$9,230	\$9,230
<b>Total</b>	<b>0</b>	<b>47</b>	<b>26</b>	<b>21</b>	<b>\$647,231</b>	<b>\$164,288</b>	<b>\$811,519</b>

Source: NFIP Repetitive Loss Data. November 2025

Since FEMA wants communities to address their repetitive loss problems because of the large drain on the NFIP Fund, the PPI Committee wanted to take further action to specifically target repetitive loss areas for outreach. Miramar is also working to develop a Repetitive Loss Area Analysis (RLAA) which identifies repetitive loss areas within the City. These designated areas consist of repetitive loss properties, historical claims properties, and properties without any past claims but with similar flood conditions to the repetitive loss and historical claims properties. Figure 2 on the following page illustrates the general locations of the repetitive loss properties in relation to the mapped floodplains. The details of the repetitive loss areas are included within the City’s RLAA.

Figure 2 - Repetitive Loss Properties and FEMA Flood Zones



**TARGET AREA/AUDIENCE #3: REALTORS, LENDERS, AND INSURANCE AGENTS**

These groups play a key role in conveying information about flood insurance to homebuyers and homeowners. The PPI Committee will make sure this group is informed and equipped with the tools needed to convey flood risk and flood insurance information to home buyers. This group is already informed of the City’s map information service through CRS Activity 320. The 10-topic Flood Protection Brochure will be included in this annual mailing targeting real estate, lending, and insurance agents.

**TARGET AREAS SUMMARY**

An analysis of the three target areas described above concluded the following which was considered in the formulation of topics and messages for the PPI:

- 1 The SFHA covers 83% of the city’s total area. As the SFHA reflects high flood risk areas, the PPI should strive to reach all residents and businesses in this area, which includes nearly 24,000 buildings in the AE and AH zones.
- 2 Repetitive loss properties are distributed across flood zones. Most repetitive loss properties are located in the SFHA, but four of the City’s four repetitive loss properties are located outside of the SFHA in the Shaded X Zone (0.2%-annual-chance flood zone). Over half (55%) of the unmitigated repetitive loss properties are insured, but it is unknown whether other properties in repetitive loss areas carry flood insurance.
- 3 Real estate, lenders and insurance companies in the city are the three institutions which are most involved in the buying and selling of real estate. Providing these groups with more information about the flood risks that properties in the city are exposed to will benefit those purchasing property.

**2.2 ASSESS FLOOD INSURANCE COVERAGE**

Flood insurance data is a valuable source of information on local flood risk. Flood insurance is required as a condition of federal aid for a mortgage or loan that is federally insured for a building located in a FEMA flood zone. NFIP data for the City was analyzed to examine the following points:

- 1 Where do active flood insurance policies exist?
- 2 Where have flood insurance claims been paid in the past?
- 3 How many buildings are exposed to the flood hazard versus how many buildings have coverage?
- 4 How does the average amount of coverage compare to the amount of expected flood damage from the 1%-annual-chance flood?

This assessment uses data from FEMA’s Community Information System, which contains information on active flood insurance policies and past paid claims since the City joined the NFIP. However, some data related to the flood zone of active policies is missing; therefore, summary policy and claim counts by flood zone do not reflect the total policy coverage and claim history in the City. Still, this is the best available data for evaluating flood insurance coverage in Miramar.

Miramar has been a Regular participant in the NFIP since December 1977. The following tables reflect NFIP policy and claims data for the City categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

**Table 4 – NFIP Policy and Claims Data by Occupancy Type**

Occupancy	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	2,311	\$1,304,291	\$723,527,000	1,733	\$3,549,935.70
2-4 Family	19	\$8,834	\$4,662,000	19	\$17,225.78

Occupancy	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
All Other Residential	57	\$40,632	\$20,611,000	12	\$22,365.02
Non-Residential	83	\$93,634	\$44,535,000	11	\$63,006.90
<b>Total</b>	<b>2,470</b>	<b>\$1,447,391</b>	<b>\$793,335,000</b>	<b>1,775</b>	<b>\$3,652,533.40</b>

Source: FEMA Community Information System as of 07/02/2025

**Table 5 - NFIP Policy and Claims Data by Flood Zone**

Flood Zone	Number of Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	66	\$40,372	\$18,531,000	612	\$921,372.26
AH Zones	147	\$89,147	\$44,081,000	60	\$259,013.41
B, C & X Zone					
Standard	1,589	\$930,695	\$522,162,000	47	\$63,466.35
Preferred	0	\$0	\$0	94	\$304,910.62
<b>Total</b>	<b>1,802</b>	<b>\$1,060,214</b>	<b>\$584,774,000</b>	<b>813</b>	<b>\$1,548,762.64</b>

Source: FEMA Community Information System as of 07/02/2025

**Table 6 - NFIP Policy and Claims Data Pre-FIRM**

Flood Zone	Number of Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	31	\$19,628	\$8,519,000	474	\$761,147.86
AH Zones	84	\$51,254	\$22,334,000	41	\$205,424.72
B, C & X Zone					
Standard	316	\$210,297	\$98,155,000	44	\$63,466.35
Preferred	0	\$0	\$0	44	\$74,744.40
<b>Total</b>	<b>431</b>	<b>\$281,179</b>	<b>\$129,008,000</b>	<b>603</b>	<b>\$1,104,783.33</b>

Source: FEMA Community Information System as of 07/02/2025

**Table 7 - NFIP Policy and Claims Data Post-FIRM**

Flood Zone	Number of Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	35	\$20,744	\$10,012,000	138	\$160,224.40
AH Zones	63	\$37,893	\$21,747,000	19	\$53,588.69
B, C & X Zone					
Standard	1,273	\$720,398	\$424,007,000	3	\$0.00
Preferred	0	\$0	\$0	50	\$230,166.22
<b>Total</b>	<b>1,371</b>	<b>\$779,035</b>	<b>\$455,766,000</b>	<b>208</b>	<b>\$443,979.31</b>

Source: FEMA Community Information System as of 07/02/2025

Table 6 and Table 7 show that, based on the available data, post-FIRM buildings make up the majority of the City’s insured properties, accounting for 76 percent of active policies. While pre-FIRM properties account for only 24 percent of active policies they are responsible for over 74 percent of paid claims. However, on average, claims on post-FIRM policies are 16% more costly that claims on pre-FIRM properties.

Table 8 compares the current policies in force according to 2025 data from FEMA, with the number of buildings located within each flood zone. Based on these policy and building counts, an estimate of the percent of buildings insured is provided.

**Table 8 – Percentage of Buildings Insured**

Flood Zone	Number of Policies in Force	Number of Buildings	% Insured
A01-30 & AE Zones	66	23,744	0.3%
AH Zone	147	178	82.3%
B, C & X Zone	1,589	6,749	23.5%
<b>Total</b>	<b>2,470</b>	<b>30,671</b>	<b>8.1%</b>

Source: FEMA Community Information System as of 07/02/2025; City of Miramar building footprints, BCAD parcel data, 2023; FEMA Effective DFIRM

Note: The total policy count shown above reflects all policies reported in FEMA’s Community Information System; 668 policies are missing from the policy counts by flood zone.

The notable statistic in Table 8 is that while there are 23,922 buildings located within the 1-percent-annual-chance flood zone, there are only 213 active flood insurance policies for these buildings and/or their contents, which equates to 0.9% of buildings having coverage. There are 668 flood insurance policies in Miramar for which flood zone information is not reported in FEMA’s Community Information System; even if all these policies were attributed to the SFHA, only 3% of exposed buildings would be covered by an active policy.

Approximately 23% of buildings within the X Zone are insured. Flooding is not limited to the 1%-annual-chance flood zones as evidenced by the fact that about 17% of paid claims were made in the B, C, and X Zones.

Table 9 compares the number of buildings present, the number of policies in force, total coverage, and a loss estimate for the 1%-annual-chance flood. Losses were estimated using Hazus FAST tool and the effective 100-year depth grid. Note that because this loss estimate is for a modeled 1-percent annual chance flood it did not include any flooding in B, C, or X Zones. However, these areas are not without flood risk; a flood greater than the modeled 1% annual chance flood would likely cause damages in some of these areas.

**Table 9 – Building Values, Flood Insurance Coverage, and Flood Loss Estimate by Flood Zone**

Flood Zone	Number of Buildings	Number of Policies in Force	Total Value	Total Coverage	Loss Estimate
A01-30 & AE Zones	23,744	66	\$63,696,512,950	\$18,531,000	see total <sup>1</sup>
AH Zone	178	147	\$262,088,165	\$44,081,000	see total <sup>1</sup>
B, C & X Zone <sup>2</sup>	6,749	1,589	\$11,938,947,095	\$522,162,000	\$0
<b>Total</b>	<b>30,671</b>	<b>2,470</b>	<b>\$75,897,548,210</b>	<b>\$793,335,000</b>	<b>\$21,523,226,206</b>

Source: FEMA Community Information System as of 07/02/2025; City of Miramar building footprints, BCAD parcel data, 2023; FEMA Effective DFIRM

Note: The total policy count and total coverage shown above reflect all policies reported in FEMA’s Community Information System; 668 policies and associated data are missing from the policy counts by flood zone.

<sup>1</sup>Flood loss estimates were compiled for the entire SFHA and are not available by zone.

<sup>2</sup>Flood loss estimates are for the 1% annual chance flood and therefore do not include losses in the B, C, or X Zones.

An analysis of existing flood insurance coverage for Zones AE and AH shows that total building coverage is \$62,612,000, which is only 0.3% of the 1% annual chance flood loss estimate. In other words, current coverage is not sufficient to protect property owners from the impacts of the 1% annual chance flood. There are many uninsured properties in the city that would have no coverage in the event of a flood loss. There is a significant need to increase flood insurance coverage in the city by increasing the number of policyholders. Additionally, while building coverage appears adequate, there may be a need to increase contents coverage, particularly since about 30% of residents are renters.

## **INSURANCE ASSESSMENT CONCLUSIONS:**

1. Just over 8% of buildings across all flood zones Citywide are covered by a flood insurance policy; therefore, nearly 92% of buildings are not insured.
2. About 23% of the buildings in X Zones have a flood insurance policy. Buildings in the X Zone account for about 18% of losses.
3. Pre-FIRM properties are more likely to have paid claims. Post-FIRM property claims are likely to be more costly.
4. Of the city's 47 unmitigated repetitive loss properties, 43 are in the AE Zone and four are in the X Zone. All but one of the insured properties falls within the AE Zone – one insured property is in the X Zone.

## **INSURANCE ASSESSMENT RECOMMENDATIONS:**

1. Continue to encourage property owners in Zone AE and Zone AH to hold a flood insurance policy, as these structures are at the highest risk for flooding.
2. Encourage pre-FIRM property owners to maintain flood insurance coverage for their properties.
3. Encourage the purchase of contents coverage for renters and homeowners who currently only have building coverage or no current coverage.

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## **2.3 DETERMINE TARGET AUDIENCES**

Social and economic factors were considered by the PPI committee in order to identify target audiences and ensure that the right messages, tools, and resources are used to overcome obstacles. The committee also considered known flooding problems, such as localized stormwater flooding, and the already identified target areas to determine target audiences for outreach. The committee recognized that messages would need to be distributed in different forms and using different platforms to reach all target audiences. The following groups have been identified as target audiences who need special messages on flood protection:

### **TARGET AUDIENCE #1: HOMEOWNERS ASSOCIATIONS AND PROPERTY MANAGEMENT COMPANIES**

Homeowners associations and property management companies have access to residents of entire neighborhoods and often host neighborhood events. Educating and partnering with this audience would be an efficient way to reach large groups of residents at one time.

### **TARGET AUDIENCE #2: NON-ENGLISH-SPEAKING POPULATION**

With nearly half of the population speaking a language other than English at home, the PPI committee recognized that it will be important to provide Spanish and Haitian Creole materials to ensure that this large portion of the population does not miss important flood-related information due to a language barrier.

### **TARGET AUDIENCE #3: REALTORS, LENDERS, AND INSURANCE COMPANIES**

These groups play a key role in conveying information about flood insurance to homebuyers and homeowners. The PPI Committee will make sure this group is informed and equipped with the tools needed to convey flood risk and flood insurance information to home buyers. This group is already informed of the City's map information service through CRS Activity 320. The 10-topic Flood Protection Brochure will be included in this annual mailing targeting the real estate, lending and insurance companies.

**TARGET AUDIENCE #4: LANDSCAPERS**

Stormwater flooding has been a consistent problem in the city. Landscapers frequently deal with yard debris and can affect the city’s drainage system by sweeping vegetation/debris into nearby storm drains which clogs the system and causes stormwater to back-up and overflow into the surrounding area. Ensuring that landscapers understand this problem and know the proper way to dispose of yard waste can have a large impact on keeping the drainage system clear.

**2.4 INVENTORY OF OTHER PUBLIC INFORMATION EFFORTS**

A key part of developing a public information program is becoming aware of other public information activities targeted at City residents. The information in Table 10 came from PPI Committee members and research. Knowing what messages are currently reaching residents is essential in determining what types of projects or messages are effective, which ones may need to be revised, and what new projects are necessary to encourage residents and businesses to adopt behaviors to protect their property and their lives and to make the City more resilient.

**Table 10 - Existing Public Information Efforts**

<b>Organization</b>	<b>Project</b>	<b>Subject Matter</b>	<b>Frequency</b>
Building Planning & Zoning Department	Website	Various flood-related topics, including know your hazard, buy flood insurance, and build responsibly	Year-Round
Public Works Department	Website	Various flood-related topics, including know your hazard, protect natural floodplain functions, and reduce stormwater flooding	Year-Round
Broward County Public Library	Various Publications	Various flood-related topics	Year-Round
Broward County	Website	Know Your Hazard, Hurricane Preparedness, Reduce Stormwater Flooding, Flood Education	Year-Round
Florida Division of Emergency Management	Website	Hurricane Preparedness, Disaster Preparedness, Know Your Hazard, Flood Insurance, Protect Yourself & Your Family, Recovery and Mitigation and various flood-related topics	Year-Round
Florida Division of Emergency Management	Hurricane Guide	Hurricane Preparedness, Know Your Hazard, Protect Yourself and Your Family, Protect Your Property, Flood Insurance, Response & Recovery	Year-Round
Ready.Gov	Website	Hurricane Preparedness, Preparing Your Home, After a Hurricane, Hurricane Plan, Flood Safety, Flood Preparedness, Flood Plan, Flood Insurance	Year-Round

Examples of Existing Outreach Projects

**MIRAMAR, FLORIDA**  
BEAUTY AND PROGRESS  
EST 1955

COMMUNITY CITY GOVERNMENT DEPARTMENTS RENTAL FA

Home / Departments / Public Works / Stormwater Management / Flood M

## Flood Management

Information on conserving the natural water quality in the City of Miramar your neighborhood.

The National Flood Insurance Program recognizes and encourages flood insurance requirements. The City of Miramar...

### Goals

As a result, flood insurance community actions...

- Reduce flood damage
- Strengthen and support
- Encourage a comprehensive

Home / Plan & Prepare

## Plan & Prepare

While living in and visiting Florida offers many benefits and advantages, it is important to keep in mind severe weather hazards and potential threats. Every family and business should have predefined emergency plans and always keep an emergency supply kit ready and stocked.

Each Florida county has a designated emergency management program, and residents, businesses, and visitors should also visit their county's emergency management for the most up-to-date and locally significant information.

### DISASTER PREPAREDNESS ESSENTIALS

- MAKE AN EMERGENCY PLAN
- KNOW YOUR ZONE, KNOW YOUR HOME
- STOCK A DISASTER SUPPLY KIT
- HALFWAY FULL, HALFWAY THERE
- UPDATE INSURANCE
- KNOW EVACUATION ROUTES
- REINFORCE YOUR HOME
- DOCUMENT YOUR PROPERTY
- GATHER DOCUMENTS
- SIGN UP FOR WEATHER ALERTS

FLORIDADISASTER.ORG/PLANPREPARE

### Florida Hurricane Guide

**Preparing for the Hurricane Season**

**County Emergency Management**

**Disaster Supply Kit Checklist**

**Disaster Preparedness Maps**

**Access and Functional Needs Planning**

Make A Plan

- Importance of Registration with Your Local EOC
- Medication Requirements
- Preparedness Checklist

Evacuations and Shelters

- Evacuation Considerations
- Important Shelter Information
  - What to Take to a Shelter
  - What to Expect in a Shelter
  - Sheltering With Your Pet or Service

BROWARD.org

## Flood Rainfall and Urban Flooding

Broward.org > Flood

### Quick Links

- UPLOAD PHOTOS
- DOCUMENT THE FLOODS
- KNOW THE FLOODS
- HURRICANE PREPAREDNESS
- WATER RESOURCES AND PLANNING

### Emergency Management

Residents in Broward County experience flooding from either heavy rainfall or high tides. During these events the drainage systems may reach capacity due to the amount of rainfall received or because our stormwater...

### High Tides and Storms

Share your flood experience to help awareness of the impacts of flooding countywide.

BROWARD COUNTY THE OFFICIAL BROWARD COUNTY

# HURRICANE PREPAREDNESS GUIDE

BE READY. STAY SAFE.

Ready

Disasters and Emergencies >

## Hurricanes

Disasters and Emergencies

# FLORIDA HURRICANE GUIDE

Make a Plan  
Build a Disaster Supply Kit  
Know Your Home, Know Your Zone  
Stay Safe Before, During, & After a Storm

DOWNLOAD THE FULL GUIDE AT  
[FLORIDADISASTER.ORG/GUIDE](http://FLORIDADISASTER.ORG/GUIDE)

### STEP 3: FORMULATE MESSAGES

After reviewing the Community Needs Assessment, Target Areas and Audiences, and the existing outreach projects and their dissemination methods, the PPI Committee developed the following priority messages. Table 11 summarizes each message and the desired outcome. Topics A through F are the CRS Activity 330 Priority Topics and Topics G through J are the additional topics which were identified by the PPI Committee. The 10 topics identified below are covered by various projects which are listed in Table 12.

**Table 11 – Messages and Desired Outcomes**

Topic	Message	Outcome(s)
A. Know your flood hazard	1. Your property is subject to flooding	Increase number of FIRM inquires
	2. Your property is in a repetitively flooded area	Reduce future repetitive loss properties
B. Insure your property	1. You need to buy flood insurance	Increase number of flood insurance policies
	2. Your homeowner's policy does not cover flood damage	Increase number of flood insurance policies
	3. Buy renters contents insurance to protect your valuables from flood damage	Reduce damage to contents
C. Protect yourself and your family	1. Turn around don't drown	Reduce rescues and deaths
	2. Know the flood warning signals	Reduce rescues and deaths
D. Protect your property from the hazard	1. Elevate HVAC exterior units	Reduce number of flood damaged HVAC units
	2. Grant monies are available to help elevate your home	Increase mitigation implementation
E. Build responsibly	1. Get a permit before you start construction	Reduce citations
	2. Know the substantial damage rules	Reduce citations
	3. Keep areas open (setbacks) between homes and property lines	Maintain proper drainage
F. Protect natural floodplain functions	1. Report erosion control measures not working	Contain erosion on construction sites
	2. Don't disturb natural floodplain areas	Reduce grading, fill, and earth movement
G. Hurricane preparedness	1. Prepare a safety checklist and emergency supply kit	Protect family and reduce damage
H. General preparedness	1. Identify and document your personal belongings so they are protected	Reduce delays in receiving insurance payments and save important insurance, real estate, and other documents, pictures, etc.
I. Reduce stormwater flooding	1. Install Low Impact Development (LID) techniques on your property to reduce flooding	Reduce runoff to stormwater system
J. Flood education	1. Don't dump in storm drains, streams, or channels	Reduce pollution and overbank flow

## STEP 4: IDENTIFY OUTREACH PROJECTS TO CONVEY THE MESSAGES

The overall strategy is to make information available to target audiences in a manner that will encourage each audience to adopt behaviors to improve preparedness and decrease future flood damage. The PPI Committee identified 11 projects and initiatives that will be implemented during 2026-2027. These projects are organized by target area, audience, and message in Table 12.

Note that several projects indicate hard copy materials that will be made available in five different locations in the City. These locations are as follows:

- 1 Vernon E. Hargray Youth Enrichment Center: 7000 Miramar Parkway Miramar, FL 33025
- 2 Miramar Library: 2050 Civic Center Place Miramar, FL 33025
- 3 Alexandra P. Davis Multi-Service Complex: 6700 Miramar Parkway, FL 33023
- 4 Sunset Lakes Community Center: 2801 SW 186 Avenue Miramar, FL 33029
- 5 Development Services Building: 2300 Civic Center Place Miramar, FL 33025

In addition to projects that are implemented every year, the PPI Committee recommends Flood Response Projects which are projects that will be implemented during and after a flood. These projects are drafted and made ready for production and dissemination after a flood warning. These projects are listed at the end of Table 12.

## STEP 5: EXAMINE OTHER PUBLIC INFORMATION INITIATIVES

The PPI Committee and City staff worked together to identify other Public Information Initiatives (PII) which provide additional information to citizens in the city and to improve access to information and services provided by the City. These PII projects are listed at the bottom of Table 12. These other public information initiatives include:

**Activity 320:** The City will continue to provide information on areas that are at risk to flooding. The City will also publicize Activity 320 on its updated website to encourage more map inquiry requests from the public. The service will continue to be publicized annually in the updated 10-topic flood outreach brochure. See **PII #1** in Table 12.

**Activity 350:** The City will update its website to provide information on each of the six CRS Priority Topics as well as the City's four additional topics developed by the PPI Committee. The updated website will also include links to additional flood awareness and preparedness resources, including Floodsmart.gov, Broward County's Flood webpage, Florida Division of Emergency Management, and Ready.gov. See **PII #2** in Table 12.

**Activity 360:** The City provides one-on-one advice about property protection and will make site visits to assess a property owner's site-specific flood conditions. This service of property protection advice and property protection after a site visit will continue to be offered and will be publicized on the City's website and in the updated 10-topic flood outreach brochure to increase requests for assistance by the public. See **PII #3** in Table 12.

## STEP 6: IMPLEMENT, MONITOR AND EVALUATE THE PROGRAM

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### *ADOPTION*

This document will become effective when it is adopted by the City Commissions.

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### *EVALUATION*

The PPI Committee along with City staff will monitor the projects as they are developed, as well as the results. They will record input from PPI Committee members and suggestions from other City employees and stakeholders participating in the activities. That input will be sent by e-mail to committee members for consideration and evaluation.

The PPI Committee will meet once per year to review the implementation of these projects and initiatives. At that time, the status of the projects will be explained and progress toward the outcomes will be discussed. The Committee will recommend to the appropriate City offices and the stakeholders who implement projects whether the projects should be changed or discontinued. The Committee will meet and review the outcomes of each individual activity to change, add, or approve them. Table 12 will be revised as needed. A report will be submitted to the City Commission explaining the annual changes to the PPI projects, messages, and outcomes. The outcomes and revisions will be submitted as part of the City's annual recertification package to the Community Rating System and submitted to the City Commission for their review and consideration.

Table 12 – PPI Projects and Initiatives

Target Area / Audience(s)	Topic(s) (See Table 11)	Message(s) (See Table 11)	Project(s)	Assignment	Schedule	Stakeholder
<b>Outreach Projects</b>						
<b>Special Flood Hazard Area (SFHA)</b>	<b>Topic A</b> Know Your Flood Hazard <b>Topic B</b> Insure Your Property <b>Topic C</b> Protect Yourself and Your Family <b>Topic D</b> Protect Your Property from the Hazard <b>Topic E</b> Build Responsibly <b>Topic F</b> Protect Natural Floodplain Functions <b>Topic G</b> Hurricane Preparedness <b>Topic H</b> General Preparedness <b>Topic I</b> Reduce Stormwater Flooding <b>Topic J</b> Flood Education	A. 1, 2 B. 1, 2, 3 C. 1, 2 D. 1, 2 E. 1, 2, 3 F. 1, 2, 3 G. 1 H. 1 I. 1 J. 1	<b>OP #1</b> Mail the Flood Protection Brochure to all property owners in SFHA annually.	Building, Planning & Zoning Department	Annually	N/A
			<b>OP #2</b> Place the Flood Protection Brochure at five different locations (see page 15).	Building, Planning & Zoning Department	Year-Round	N/A
			<b>OP #3</b> Place English and Spanish versions of NFIP brochures on the benefits of flood insurance at five different locations (see page 15).	Building, Planning & Zoning Department	Year-Round	FEMA (NFIP), Realtors, Lenders, Insurance Agents
			<b>OP #4</b> Update City's website to include flood outreach information (10 topics), elevation certificates, LOMAs and Hurricane Preparedness page, links to Floodsmart.gov, Broward County Emergency Management, State of Florida Emergency Management, and FEMA.	Building, Planning & Zoning Department	Annually	State of Florida and FEMA
<b>Repetitive Loss Properties/ Areas</b>	<b>Topic A</b> Know Your Flood Hazard <b>Topic B</b> Insure Your Property <b>Topic C</b> Protect Yourself and Your Family <b>Topic D</b> Protect Your Property from the Hazard <b>Topic E</b> Build Responsibly <b>Topic F</b> Protect Natural Floodplain Functions <b>Topic G</b> Hurricane Preparedness <b>Topic H</b> General Preparedness <b>Topic I</b> Reduce Stormwater Flooding <b>Topic J</b> Flood Education	A. 1, 2 B. 1, 2, 3 C. 1, 2 D. 1, 2 E. 1, 2, 3 F. 1, 2, 3 G. 1 H. 1 I. 1 J. 1	<b>OP #5</b> Mail the Flood Protection Brochure to all property owners in <b>Repetitive Loss Areas</b> annually.	Building, Planning & Zoning Department	Annually	N/A

Target Area / Audience(s)	Topic(s) (See Table 11)	Message(s) (See Table 11)	Project(s)	Assignment	Schedule	Stakeholder
<b>Realtors, Lenders, and Insurance Agents</b>	<b>Topic A</b> Know Your Flood Hazard <b>Topic B</b> Insure Your Property <b>Topic C</b> Protect Yourself and Your Family <b>Topic D</b> Protect Your Property from the Hazard <b>Topic E</b> Build Responsibly <b>Topic F</b> Protect Natural Floodplain Functions <b>Topic G</b> Hurricane Preparedness <b>Topic H</b> General Preparedness <b>Topic I</b> Reduce Stormwater Flooding <b>Topic J</b> Flood Education	A. 1, 2 B. 1, 2, 3 C. 1, 2 D. 1, 2 E. 1, 2, 3 F. 1, 2, 3 G. 1 H. 1 I. 1 J. 1	<b>OP #6</b> Mail the Flood Protection Brochure annually with the CRS Activity 320 mailing to <b>real estate agents, lenders, and insurance companies.</b>	Building, Planning & Zoning Department	Annually	Real Estate Agents, Lenders, Insurance Agents
<b>Homeowners Associations</b>	<b>Topic A</b> Know Your Flood Hazard <b>Topic B</b> Insure Your Property <b>Topic C</b> Protect Yourself and Your Family <b>Topic D</b> Protect Your Property from the Hazard <b>Topic E</b> Build Responsibly <b>Topic F</b> Protect Natural Floodplain Functions <b>Topic G</b> Hurricane Preparedness <b>Topic H</b> General Preparedness <b>Topic I</b> Reduce Stormwater Flooding <b>Topic J</b> Flood Education	A. 1, 2 B. 1, 2, 3 C. 1, 2 D. 1, 2 E. 1, 2, 3 F. 1, 2, 3 G. 1 H. 1 I. 1 J. 1	<b>OP #7</b> Speak to a <b>Homeowner's Association</b> each year on all topics on the Flood Protection Brochure and distribute copies of brochure	Public Works Department	Annually	Homeowners Associations
			<b>OP #8</b> Distribute English and non-English versions of <b>Landscaping Brochure</b> at HOA meetings	Public Works Department	Annually	Landscapers and Property Managers; Homeowners Associations
<b>Non-English Population</b>	<b>Topic A</b> Know Your Flood Hazard <b>Topic B</b> Insure Your Property <b>Topic C</b> Protect Yourself and Your Family <b>Topic D</b> Protect Your Property from the Hazard <b>Topic E</b> Build Responsibly <b>Topic F</b> Protect Natural Floodplain Functions <b>Topic G</b> Hurricane Preparedness <b>Topic H</b> General Preparedness <b>Topic I</b> Reduce Stormwater Flooding <b>Topic J</b> Flood Education	A. 1, 2 B. 1, 2, 3 C. 1, 2 D. 1, 2 E. 1, 2, 3 F. 1, 2, 3 G. 1 H. 1 I. 1 J. 1	<b>OP #9</b> Place <b>non-English</b> language versions (Spanish and Creole) of the Flood Protection Brochure at five different locations (see page 15).	Building, Planning & Zoning Department; Marketing and Communications Department	Year-Round	Non-English-Speaking Population
			<b>OP #10</b> Place <b>non-English</b> language versions (Spanish and Creole) of the landscaping brochure from <b>OP #15</b> at five different locations.	Building, Planning & Zoning Department; Marketing and Communications Department	Year Round	Non-English-Speaking Population; Landscapers and Property Managers

Target Area / Audience(s)	Topic(s) (See Table 11)	Message(s) (See Table 11)	Project(s)	Assignment	Schedule	Stakeholder
Landscapers and Property Managers	<b>Topic A</b> Know Your Flood Hazard <b>Topic E</b> Build Responsibly <b>Topic F</b> Protect Natural Floodplain Functions <b>Topic J</b> Flood Education	A. 1 E. 3 F. 1, 2, 3 J. 1	<b>OP #11</b> Make informational brochure advising <b>Landscapers and Property Managers</b> not to blow grass clippings or leaves into storm drains. Email to property managers via distribution list.	Public Works Department; Utilities Department	Year-Round	Landscapers and Property Managers; Homeowners Associations
<b>Flood Response Projects</b>						
Flooded property owners and residents	<b>Topic A</b> Know Your Flood Hazard <b>Topic B</b> Insure Your Property <b>Topic C</b> Protect Yourself and Your Family <b>Topic D</b> Protect Your Property from the Hazard <b>Topic E</b> Build Responsibly <b>Topic F</b> Protect Natural Floodplain Functions <b>Topic G</b> Hurricane Preparedness <b>Topic H</b> General Preparedness <b>Topic I</b> Reduce Stormwater Flooding <b>Topic J</b> Flood Education	A. 1, 2 B. 1, 2, 3 C. 1, 2 D. 1, 2 E. 1, 2, 3 F. 1, 2, 3 G. 1 H. 1 I. 1 J. 1	<b>FRP #1</b> Provide "After a Flood: The First Steps" brochure to flooded property owners which provides information on the dangers of flood water, listen for local warnings, don't drive through flooded streets, stay healthy (emotional stress), and cleaning up and repairing your home	Building, Planning & Zoning Department	Ready to go before and after a flood	FEMA and American Red Cross
			<b>FRP #2</b> Provide copies of "Repairing your flooded home" FEMA 234 publication to flooded property owners which provides information on protecting your home from further damage, getting organized, drying out your flooded home, restoring utilities, clean up, rebuilding and preparing for the next flood.	Building, Planning & Zoning Department	Ready to go before and after a flood	FEMA and American Red Cross
			<b>FRP #3</b> Provide information on the City's Substantial Damage rules	Building, Planning & Zoning Department	Ready to go before and after a flood	N/A
			<b>FRP #4</b> Provide information on the need for a building permit on the City's website and on social media	Building, Planning & Zoning Department	Ready to go before and after a flood	N/A
			<b>FRP #5</b> Provide FEMA Brochures for residents and businesses on Flood Preparation and Safety, Nothing can Dampen the Joy of Home Ownership, Flood Insurance Requirements for Recipients of Federal Disaster Assistance, Increased Cost of Compliance Coverage, Preferred Risk Policy	Building, Planning & Zoning Department	Ready to go before and after a flood	FEMA and Flood Smart
			<b>FRP #6</b> Have Flood Protection Brochure copies available to handout before, during and after a flood	Building, Planning & Zoning Department	Ready to go before and after a flood	N/A
			<b>FRP #7.</b> Provide copies of the EPA Mold Guide to handout before, during and after a flood	Building, Planning & Zoning Department	Ready to go before and after a flood	FEMA' Center of Disease Control

Target Area / Audience(s)	Topic(s) (See Table 11)	Message(s) (See Table 11)	Project(s)	Assignment	Schedule	Stakeholder
			<b>FRP #8</b> Provide FEMA's Homeowner's Guide to Retrofitting including the flood hazards, protecting people, protecting property & building responsibly	Building, Planning & Zoning Department	Ready to go before and after a flood	FEMA
<b>Public Information Initiatives</b>						
<b>All City of Miramar Residents</b>	<b>Topic A</b> Know Your Flood Hazard <b>Topic B</b> Insure Your Property <b>Topic C</b> Protect Yourself and Your Family <b>Topic D</b> Protect Your Property from the Hazard <b>Topic E</b> Build Responsibly <b>Topic F</b> Protect Natural Floodplain Functions <b>Topic G</b> Hurricane Preparedness <b>Topic H</b> General Preparedness <b>Topic I</b> Reduce Stormwater Flooding <b>Topic J</b> Flood Education	A. 1, 2	<b>P11 #1</b> Publicize the Map Information Service (CRS Activity 320) on the updated Flood Brochure (OP #1) and on the enhanced website (P11 #3)	Building, Planning & Zoning Department	Year-Round	N/A
		B. 1, 2, 3				
		C. 1, 2	<b>P11 #2</b> Enhance website (Activity 350) to include updated information on the 6 Priority and 4 additional topics, and links to Floodsmart.gov, Broward County Emergency Management, Florida Division of Emergency Management, and FEMA	Building, Planning & Zoning Department	Update Annually	FDEM and FEMA
		D. 1, 2				
E. 1, 2, 3						
F. 1, 2, 3	<b>P11 #3</b> Continue to provide site visits and property protection advice (CRS Activity 360 PPA & PPV) and publicize this service on the City's website	Building, Planning & Zoning Department	Year-Round	N/A		
G. 1						
H. 1						
I. 1						
J. 1						

**End of Report**