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Town of Cutler Bay, FL Flood Mitigation Plan



September 2021

Executive Summary

The purpose of this Flood Mitigation Plan is to reduce or eliminate risk to people and property from flood hazards. Every community faces different hazards and every community has different resources to draw upon in combating problems along with different 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. The plan provides a framework for all interested parties to work together and reach consensus on how to move forward. A well-prepared flood mitigation plan will ensure that all possible activities are reviewed and implemented so that the problem is addressed by the most appropriate and efficient solutions. It can also ensure that activities are coordinated with each other and with other goals and activities, preventing conflicts and reducing the costs of implementing each individual activity.

The Town of Cutler Bay (Town) followed the planning process prescribed by the Federal Emergency Management Agency (FEMA), and this plan was developed under the guidance of a Flood Mitigation Planning Committee (FMPC) comprised of representatives of Cutler Bay Departments, citizens and other stakeholders. The FMPC conducted a risk assessment that identified and profiled flood hazards that pose a risk to the Town, assessed the Town's vulnerability to these hazards, and examined the capabilities in place to mitigate them. The flood hazards profiled in this plan include:

- ▶ Climate Change and Sea Level Rise
- ▶ Coastal/Canal Bank Erosion
- ▶ Dam/Levee Failure
- ▶ Flood: 100/500 year
- ▶ Flood: Stormwater/ Localized Flooding
- ▶ Hurricane and Tropical Storms (including Storm Surge)

This plan identifies activities that can be undertaken by both the public and the private sectors to reduce safety hazards, health hazards, and property damage caused by floods. Based on the risk assessment developed for each of the flood hazards identified above, the FMPC identified goals and objectives for reducing the Town's vulnerability to the hazards. The goals and objectives are summarized as follows:

Goal 1 – Protect the public health, life, safety and welfare by increasing public awareness and education of the flood hazard by encouraging collective and individual responsibility for mitigating the flood risk.

- ▶ Objective 1.1: Promote flood insurance as a property protection measure against potential flood damage.
- ▶ Objective 1.2: Encourage residents to assume an appropriate level of responsibility for their own flood protection.
- ▶ Objective 1.3: Develop a public education program for the local schools.

Goal 2 – Improve technical capability (including administrative resources, tools, data and equipment) to implement hazard mitigation and respond to flood events.

- ▶ Objective 2.1: Seek county, state and federal support for mitigation projects.
- ▶ Objective 2.2: Acquire additional tools and training to support mitigation.

Goal 3 – Minimize the flood threat to life and property by protecting vulnerable populations, buildings, and critical facilities through the implementation of cost-effective and technically feasible mitigation actions.



- ▶ Objective 3.1: Reduce flood damage to insurable buildings and public infrastructure through stormwater improvement projects.
- ▶ Objective 3.2: Prioritize critical and essential facilities in need of protection from potential flood damage.
- ▶ Objective 3.3: Leverage local, state and federal grant funding to target repetitive loss properties for mitigation actions such as elevation, acquisition, or floodproofing.
- ▶ Objective 3.4: Target repetitive loss properties for implementation of mitigation projects.

Goal 4 – Incorporate resiliency into future growth by ensuring that flood risk is considered for both new development and post-disaster redevelopment and recovery.

- ▶ Objective 4.1: Promote higher development and design standards to protect new buildings from flood damage.
- ▶ Objective 4.2: Preserve open space areas, especially where there are sensitive natural areas.

In order to meet the identified goals, this plan recommends 12 mitigation actions, which are summarized in the table that follows.



Summary of Cutler Bay Mitigation Actions

Action	Related to Goal(s)	Address Current Development	Address Future Development	Continued Compliance with NFIP	Mitigation Category
1. Ensure that storm drains are cleaned on a regular and consistent bi-annual basis in order to maintain adequate stormwater drainage as they were designed.	3	Y	Y	Y	Prevention, Property Protection
2. Improve drainage along the C-100 canal through a dredging project in order to mitigate flooding in the sub-basin that currently outfalls to the canal	3	Y	Y	Y	Prevention, Property Protection, Structural Projects
3. Continue implementation of drainage system maintenance on all surface water channels, canals and ditches to ensure proper storage, disposal, and water quality treatment of runoff.	3	Y	Y	Y	Prevention, Property Protection
4. Promote an Enviro Scope model to elementary school students to help them understand sources of flooding and prevention of water pollution.	1	N	N	N	Public Information and Outreach
5. Work with local, state and federal partners to target repetitive loss properties for acquisition or elevation to eliminate potential for future flooding.	3, 4	Y	N	Y	Property Protection
6. Promote public outreach encouraging retrofitting techniques where residents can help themselves to potentially eliminate damage from low level flooding to their structure.	1	Y	N	Y	Property Protection
7. Promote the purchase of flood insurance to residents and businesses to increase policy base and ensure protection from flood losses.	1	Y	Y	Y	Property Protection, Public Information and Outreach
8. Protect the natural floodplain functions within the Town including the Cutler Wetlands.	4	Y	Y	Y	Natural Resource Protection
9. Increase awareness of the flood hazard through development of a PPI.	1	Y	N	Y	Public Information and Outreach
10. Work with Miami-Dade County Emergency Management on identifying vulnerable populations who may need assistance for evacuations.	2	Y	N	N	Emergency Services, Public Information and Outreach



Action	Related to Goal(s)	Address Current Development	Address Future Development	Continued Compliance with NFIP	Mitigation Category
11. Work with Miami-Dade County Emergency Management, state and federal governments, to protect vulnerable critical facilities to ensure they can operate properly during flooding conditions.	3	Y	N	N	Emergency Services
12. Complete the Cutler Bay Wetlands Restoration Project Plan to prevent flood damages and restore mitigation property to a world-class birding sanctuary. Share information about this project with stakeholders and the public.	4	Y	Y	Y	Natural Resource Protection, Public Information and Outreach
13. Acquire or redevelop parcels for recreational open space and natural and beneficial functions.	3, 4	Y	Y	Y	Property Protection, Natural Resource Protection
14. Educate repetitive loss property owners on ways to protect their building from flood damage.	1, 3, 4	Y	N	Y	Property Protection, Public Information and Outreach

This plan has been formally adopted by the Town and will be updated every five years at a minimum. This plan fulfills the requirements of Section 104 of the Disaster Mitigation Act of 2000 and qualifies for FEMA's National Flood Insurance Program's Community Rating System (CRS) credit. 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
1. Organize to prepare the plan.	
a. Involvement of office responsible for community planning	Section 3.2 / page 22
b. Planning committee of department staff	Section 3.2 / page 22
c. Process formally created by the community's governing board	Section 3.2.1 / page 21-22
2. Involve the public.	
a. Planning process conducted through a planning committee	Section 3.2 / page 22; Section 3.2.1 / Table 3.2
b. Public meetings held at the beginning of the planning process	Section 3.2.1 / Table 3.5
c. Public meeting held on draft plan	Section 3.2.1 / Table 3.5
d. Other public information activities to encourage input	Section 3.2.1 / page 24-25
3. Coordinate with other agencies.	
a. Review of existing studies and plans	Section 3.2.1 / Table 3.7
b. Coordinating with communities and other agencies	Section 3.2.1 / page 25-26
4. Assess the hazard.	
a. Plan includes an assessment of the flood hazard with:	
(1) A map of known flood hazards	Section 4.4.1 / Figure 4.6; Section 4.4.4 / Figure 4.18, Figure 4.24; Section 4.4.5 / Figure 4.28; Section 4.4.6 / Figure 4.32
(2) A description of known flood hazard	Section 4.4.1 / page 45-55; Section 4.4.4 – Section 4.4.6 / page 67-132; "Hazard Description", "Extent"
(3) A discussion of past floods	Section 4.4.4 – Section 4.4.6 / page 67-132; "Past Occurrences"
b. Plan includes assessment of less frequent floods	Section 4.4.2 / page 56; Section 4.4.3 / page 60
c. Plan includes assessment of areas likely to flood	Section 4.5.2 / page 133
d. The plan describes other natural hazards	
5. Assess the problem.	
a. Summary of each hazard identified in the hazard assessment and their community impact	Section 4.4.1 – Section 4.4.6 / page 45-132; "Vulnerability Assessment"
b. Description of the impact of the hazards on:	
(1) Life, safety, health, procedures for warning and evacuation	Section 4.5.4 / page 134-137
(2) Public health including health hazards to floodwaters/mold	Section 4.5.4 / page 135
(3) Critical facilities and infrastructure	Section 4.3.1 / page 35-37; Section 4.4.4 / page 83-85
(4) The community's economy and tax base	Section 2.4

CRS Step	Section/Page
(5) Number and type of affected buildings	Section 4.3 / page 35; Section 4.4.4 / page 80-82; Section 4.4.4 / page 87-89
c. Review of all damaged buildings/flood insurance claims	Section 4.4.4 / page 87-93
d. Areas that provide natural floodplain functions	Section 4.3.2 / page 38-39
e. Development/redevelopment/Population Trends	Section 4.3.3 / page 41-43
f. Impact of future flooding conditions outline in Step 4, item c	Section 4.5.3 / page 134
6. Set goals.	Section 6.2 / page 160-163
7. Review possible activities.	
a. Preventive activities	Appendix C / page C.2-C.8
b. Floodplain Management Regulatory/current & future conditions	Appendix C / page C.5-C.6
c. Property protection activities	Appendix C / page C.8-C.12
d. Natural resource protection activities	Appendix C / page C.12-C.18
e. Emergency services activities	Appendix C / page C.18-C.23
f. Structural projects	Appendix C / page C.23-C.25
g. Public information activities	Appendix C / page C.26-C.28
8. Draft an action plan.	
a. Actions must be prioritized	Section 6.3 / page 162-164
(1) Recommendations for activities from two of the six categories	Section 6.4 / page 164-167
(2) Recommendations for activities from three of the six categories	Section 6.4 / page 164-167
(3) Recommendations for activities from four of the six categories	Section 6.4 / page 164-167
(4) Recommendations for activities from five of the six categories	Section 6.4 / page 164-167
b. Post-disaster mitigation policies and procedures	Appendix C / page C.22
c. Action items for mitigation of other hazards	--
9. Adopt the plan.	Section 7 / page 168
10. Implement, evaluate and revise.	
a. Procedures to monitor and recommend revisions	Section 8.2 / page 171-173
b. Same planning committee or successor committee that qualifies under Section 511.a.2 (a) does the evaluation	Section 8.1 / page 169-171



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1 Introduction

Section 1 provides a general introduction to hazard mitigation and an overview of the purpose, background, and scope of the Town of Cutler Bay Flood Mitigation Plan. It contains the following subsections:

- ▶ 1.1 Purpose
- ▶ 1.2 Background and Scope
- ▶ 1.3 Plan Organization

1.1 PURPOSE

The purpose of this plan is to identify and assess flood risk and recommend mitigation activities to better protect the people and property of the Town of Cutler Bay from the effects of flood hazards. Information in this plan will be used to help guide and coordinate mitigation activities and decisions for local land use, capital improvements, and other development policy in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to communities and their residents by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruptions. The planning area has been affected by hazards in the past and is thus committed to reducing future impacts from hazard events and maintaining eligibility for mitigation-related federal funding.

This plan was developed in a joint and cooperative venture by members of the Cutler Bay Flood Mitigation Planning Committee (FMPC) to ensure Cutler Bay's continued eligibility for federal disaster assistance including the Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC), and the Flood Mitigation Assistance Program (FMA). Completion of this plan also earns credits for the National Flood Insurance Program (NFIP) Community Rating System (CRS), which allows for discounted flood insurance premiums for residents and property owners in the Town. This plan has been prepared in compliance with Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act or the Act), 42 U.S.C. 5165, enacted under Section 104 of the Disaster Mitigation Act of 2000, (DMA 2000) Public Law 106-390 of October 30, 2000, as implemented at CFR 201.6 and 201.7 dated October 2007.

1.2 BACKGROUND AND SCOPE

The Town of Cutler Bay is a participant in both the NFIP and the CRS Program, and is currently rated as a Class 4 community in the CRS Program. 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. As part of the CRS program requirements for a Class 4 rating, the Town must demonstrate action taken to eliminate or minimize future flood losses by adopting and implementing a floodplain management plan. The Town must accurately identify flood hazards, analyze their impacts on people and property, and identify ways to reduce those impacts through hazard mitigation.

As defined by FEMA, "hazard mitigation" means any sustained action taken to reduce or eliminate the long-term risk to life and property for 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. This plan documents Cutler Bay's hazard mitigation planning process and identifies relevant flood hazards and vulnerabilities and strategies the Town will use to decrease vulnerability and increase resiliency and sustainability.



1.3 PLAN ORGANIZATION

The Cutler Bay Flood Mitigation Plan is organized as follows:

- ▶ Section 1: Introduction
- ▶ Section 2: Community Profile
- ▶ Section 3: Planning Process
- ▶ 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: Program for Public Information (PPI)
- ▶ Appendix B: Planning Process
- ▶ Appendix C: Mitigation Alternatives
- ▶ Appendix D: References



2 Community Profile

2.1 OVERVIEW OF THE COMMUNITY

The Town of Cutler Bay, Florida, is located along Biscayne Bay in southern Miami-Dade County. The Town comprises approximately 9.8 square miles and is home to over 44,800 residents. The Town was incorporated on November 8, 2005. The Town was substantially built-out at the time of its incorporation. Due to its recent incorporation as a municipality, Miami-Dade County remains an extensive source of data and historic information for the Town. Cutler Bay is currently an active participant in the Miami-Dade County Local Mitigation Strategy (LMS).

The boundaries of the Town are approximately as follows: on the North by SW 184 Street (Eureka Drive) from the Florida Turnpike to Biscayne Bay; on the West from SW 184 Street following US 1 to SW 112 (Allapattah Road) and then along SW 126 (Hanlin Mills Drive); on the South by SW 216 Avenue and along historic Old Cutler Road, taking a right on SW 224 Street going east to Biscayne Bay. The Eastern Border follows the coastline of Biscayne Bay from SW 184 Street to SW 224 Street. The Town of Cutler Bay is shown in Figure 2.1 and Figure 2.2.

Figure 2.1 – Cutler Bay Location Map

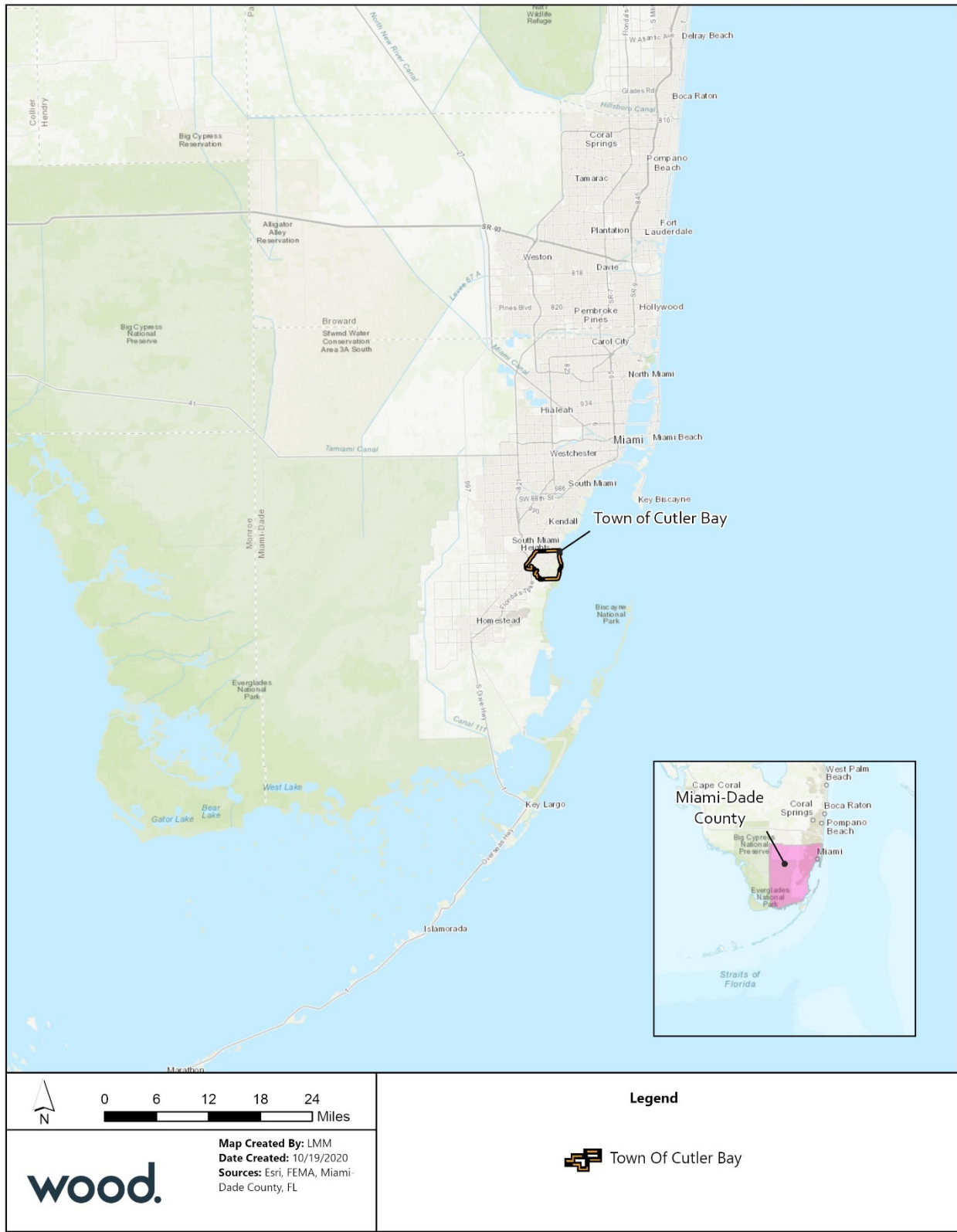
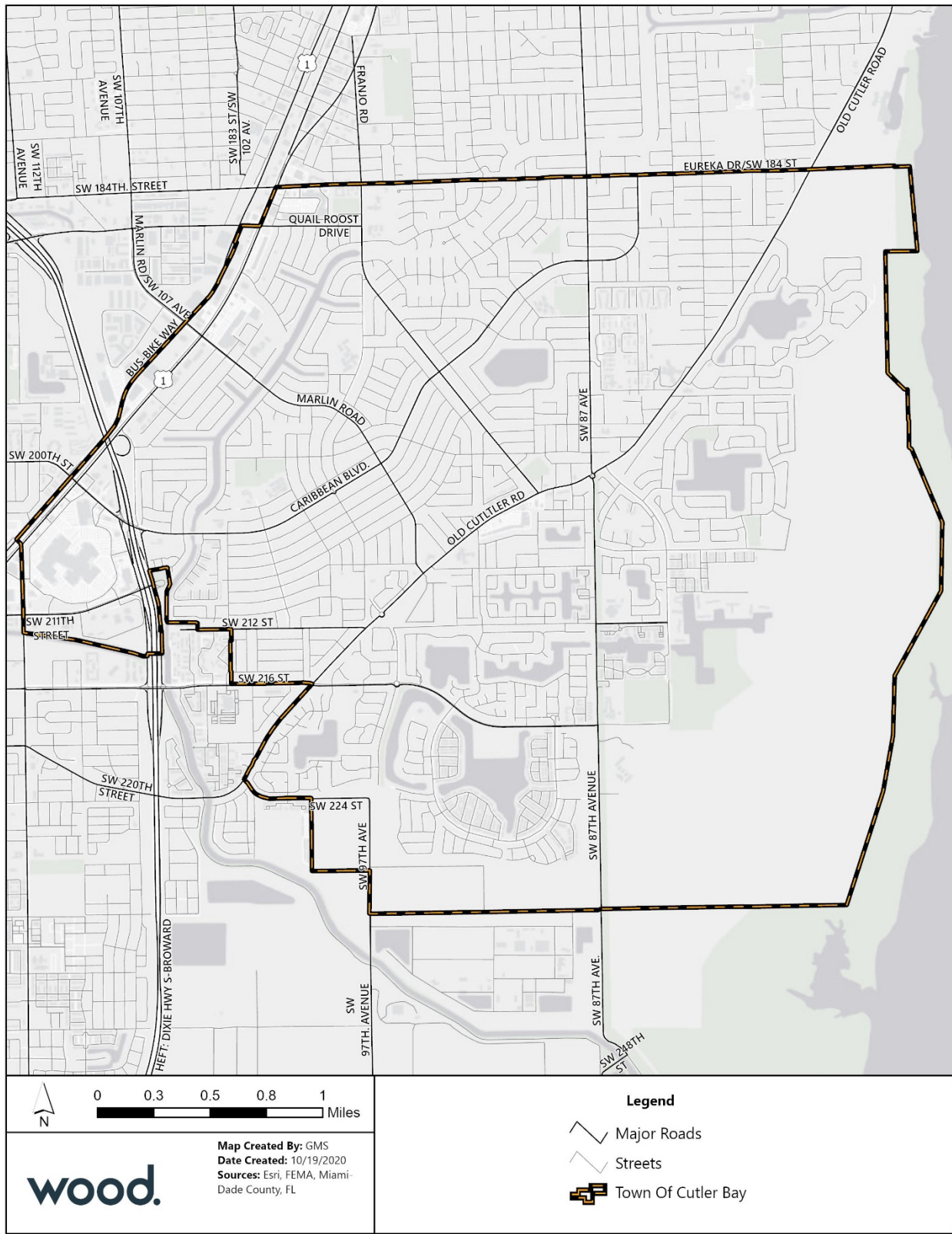


Figure 2.2 – Cutler Bay Base Map



2.2 TOPOGRAPHY AND CLIMATE

Cutler Bay is flat and low with elevations generally below 10 feet National Geodetic Vertical Datum of 1929 (NGVD). The Town is traversed by a canal system that directs drainage into Biscayne Bay and the Atlantic Ocean. The topography of the Town can be seen in Figure 2.5.

The climate is subtropical marine, characterized by a long, warm summer with abundant rainfall followed by a mild, dry winter. The wet season begins in May, ending in mid-October. The average annual temperature is approximately 76°F, and the average annual precipitation for Cutler Bay is 56 inches. Average annual temperature and precipitation for Miami-Dade County are shown in Figure 2.3 and Figure 2.4 according to data from the National Oceanic and Atmospheric Administration (NOAA). Per this data, average annual temperature has been trending upward by approximately 0.3 per decade.

Figure 2.3 – Average Annual Temperature, Miami-Dade County

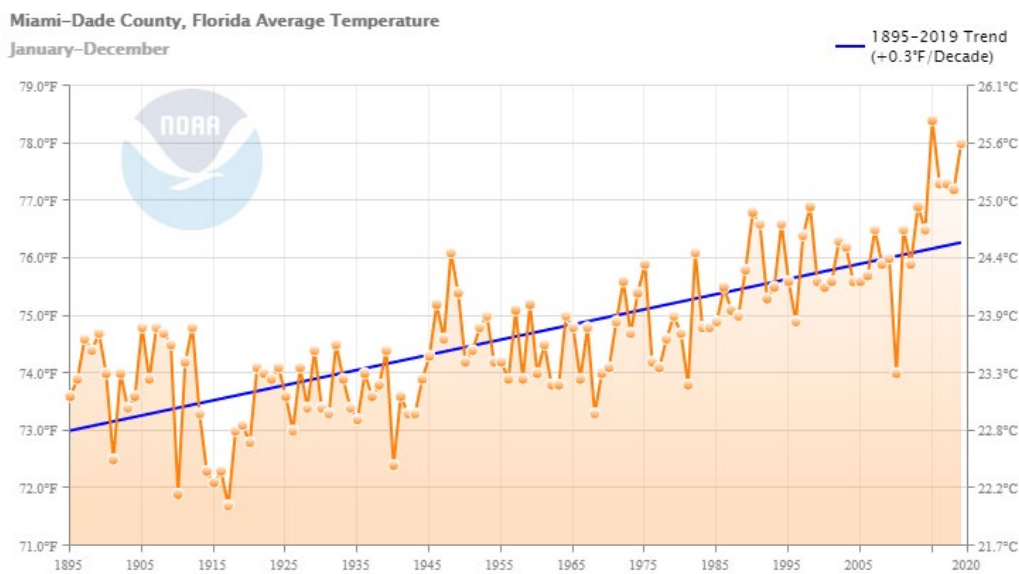


Figure 2.4 – Average Annual Precipitation, Miami-Dade County

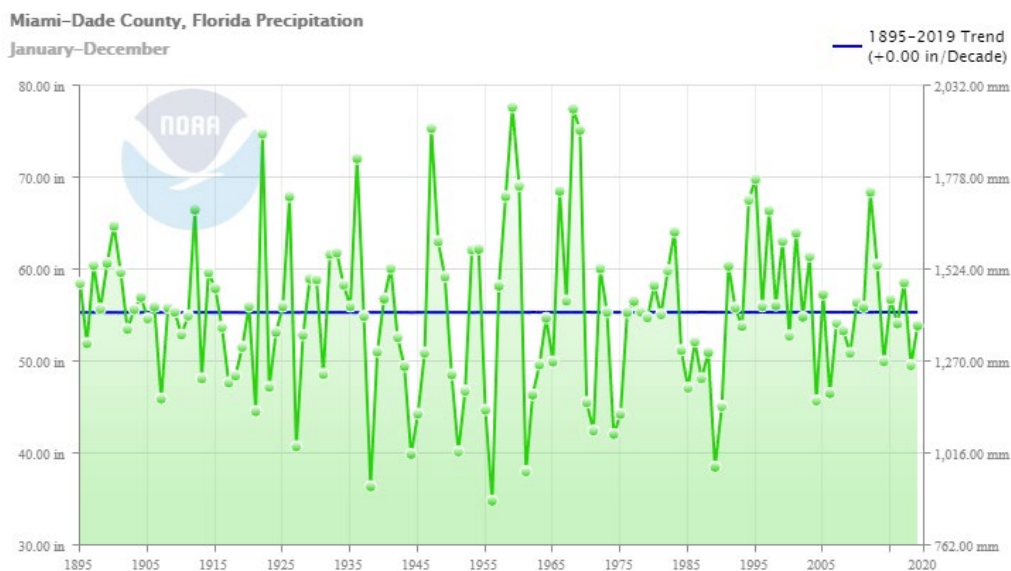
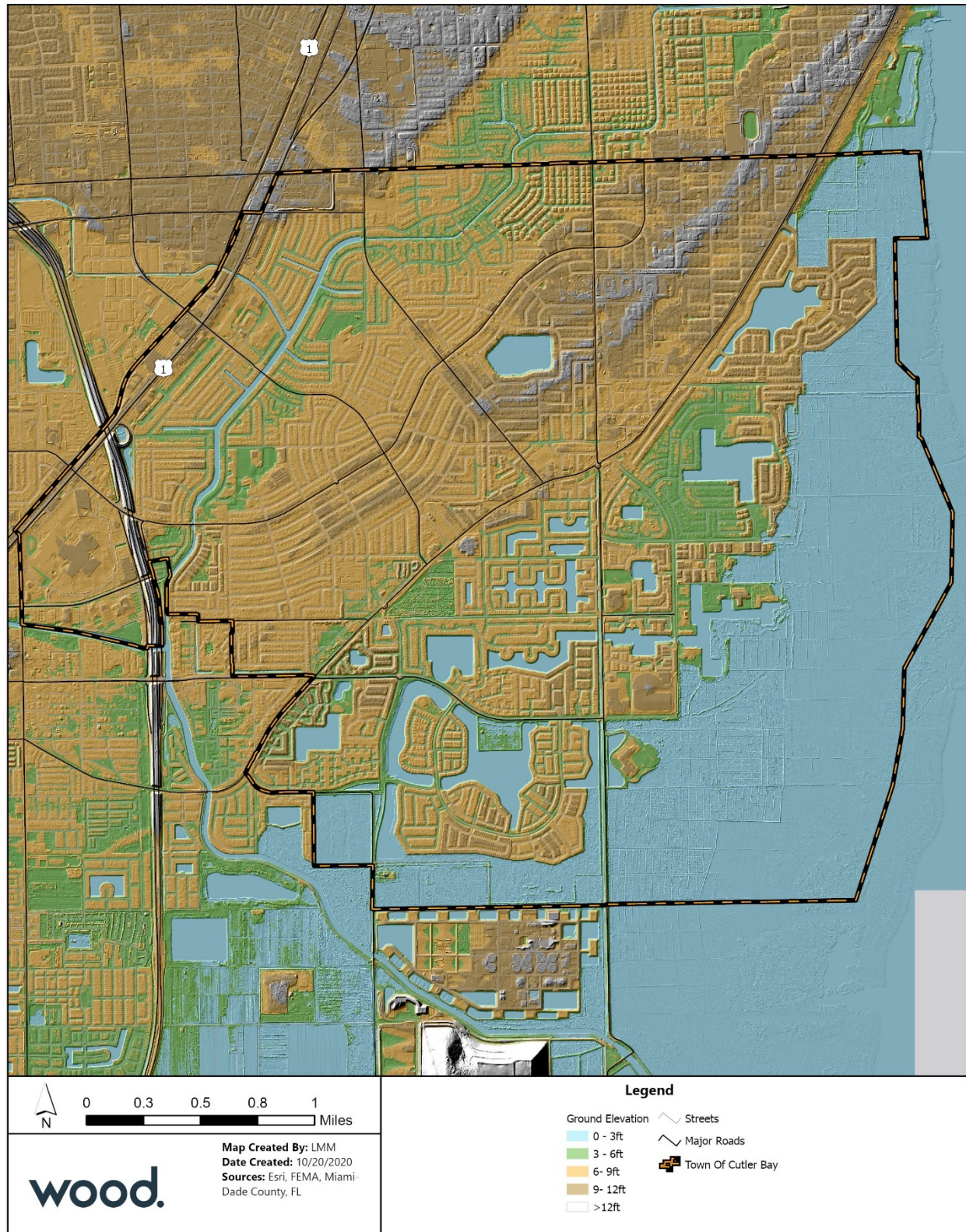


Figure 2.5 – Cutler Bay Topography



2.3 HISTORY

The Cutler Bay area was originally inhabited by Tequesta Native Americans. Native Americans and early Caucasian settlers referred to the present Cutler Bay area as the Hunting Ground. The area was officially part of the Perrine Grant awarded to Dr. Henry Perrine, in 1838. Dr. William C. Cutler, a leading practitioner of medicine and surgery in Chelsea, Massachusetts, bought a 600-acre tract of this land for \$1.25 per acre and wanted to establish a fruit and vegetable plantation.

One of Dr. Cutler's friends, William Fuzzard, became a permanent resident of the area. On his first trip to the area in 1882, twenty-year-old William stayed in Coconut Grove while he explored the area. He returned in 1883, setting up a tent before building a wooden two-story home. One of Mr. Fuzzard's greatest contributions to the Cutler area was the path he cut through the wilderness. The road, which was eventually widened to a wagon trail, went from Coconut Grove to his home. This trail was the beginning of what is now called Old Cutler Road. It ran north from Fuzzard's home, went east and joined what is now Coral Reef Drive; Fuzzard's path was declared a public road in 1895. What was once the path traveled by Fuzzard's white mule, Samson, became the beginning of what is now the State Historic Highway of Old Cutler Road. The present Old Cutler Road, which follows a somewhat altered course, was declared a State Historic Highway in May 1974, by the Florida Legislature.

It was not until Mr. David Blumberg began developing the land that Cutler Ridge became an organized community. In the early 1950's Blumberg and his partner, Joe Segal, convinced owner Walter Blumberg to sell him 1,400 acres of undeveloped land. Blumberg named the area after Dr. Cutler and the limestone ridge on which the land sits. The first housing development went up in 1954, and the Cutler Ridge Mall opened in 1960. Street names in Cutler Ridge came from holidays and the ports of call Mr. Blumberg visited as a sailor. The area around the mall was called Seminole Plains. What is now Lakes by the Bay was called Lincoln City as the streets and parks were laid out. Black Point was the first post office south of Cutler, opening on February 15, 1904.

In the winter of 1904-05, Wilford B. Focht arrived in Cutler and stayed at the Richmond Inn. He was a cousin of Mr. John H. Earhart, who owned 2,000 acres, which included a small farming community called Franjo, after John Earhart and his brother, Francis. Franjo Road (SW 97 Avenue) gets its name from this community.

In 1992, Hurricane Andrew made landfall near what was then known as Cutler Ridge and caused severe destruction to the area. The incorporation of the Town was spurred, in part, by efforts to recover from Hurricane Andrew. In November 2005, voters approved the Town's charter and chose the name "Cutler Bay."

2.4 ECONOMY

According to the U.S. Census Bureau, the median household income for Cutler Bay from 2014-2018 was \$72,226. An estimated 9.7% of the population is considered to be living below the poverty level. Table 2.1 shows key employment statistics for the Town and Table 2.2 summarizes employment by occupation classification.

Table 2.1 – Employment Statistics, Cutler Bay, 2018

Employment Status	Estimate	Percentage
Employed	22,526	64.8
Unemployed	1,047	3.0
Not in Labor Force	11,150	32.1

Source: U.S. Census Bureau, 2014-2018 American Community Survey 5-Year Estimates; note: employed population estimate based on population 16 years and older.

**Table 2.2 – Occupation Statistics, Cutler Bay, 2018**

Occupation	Estimate	Percentage
Management, business, science and arts	8,460	37.6
Service	3,580	15.9
Sales and office	6,462	28.7
Natural resources, construction and maintenance	1,966	8.7
Production, transportation and material moving	2,058	9.1

Source: U.S. Census Bureau, 2014-2018 American Community Survey 5-Year Estimates

Major employers for Cutler Bay are listed in Table 2.3. As of 2018, 11.5% of workers living in Cutler Bay also worked in the Town, while 88.5% worked outside of Cutler Bay. However, 97.6% of workers work within Miami-Dade County. Table 2.4 lists the major private and public employers in Miami-Dade County.

Table 2.3 – Major Employers in Cutler Bay, 2020

Corporation/Organization	# of Employees
Alorica	648
Publix Supermarkets	311
East Ridge Retirement Village, Inc.	287
Encompass Health Rehabilitation	147
Mercedes-Benz of Cutler Bay	143

Source: Town of Cutler Bay

Table 2.4 – Major Employers in Miami-Dade County

Company	No. of Employees	Industry
Private Employers		
Baptist Health South Florida	11,353	Health Care
University of Miami	12,818	Education
American Airlines	11,031	Aviation
Florida Power & Light Company	3,011	Utility
Carnival Cruise Lines	3,500	Hospitality and Tourism
Mount Sinai Medical Center	3,321	Health Care
Miami Childrens Hospital	3,500	Health Care
Royal Caribbean International/Celebrity Cruises	2,989	Hospitality and Tourism
Bank of America Merrill Lynch	2,000	Banking and Finance
Wells Fargo	2,050	Banking and Finance
LATAM Airlines/Lan Cargo	900	Aviation
AAR Corp.- Aircraft Services	1,160	Aviation
N.C.L. Corporation	1,049	Hospitality and Tourism
Federal Express	1,161	Trade and Logistics
Eulen America	1,205	Professional Services
Ryder Integrated Logistics	1,106	Trade and Logistics
Miami Herald Publishing Co.	635	Publishing
CitiBank	1,000	Banking and Finance
Fountainbleau Miami Beach	1,987	Hospitality & Tourism
Burger King Corporation	1,885	Hospitality & Tourism
Mercy Hospital	1,400	Health Care
JP Morgan Chase	1,300	Banking and Finance
United Home Care	810	Health Care
Loews Miami Beach Hotel	809	Hospitality & Tourism
B/E Aerospace	650	Aviation
Ocean Bank	690	Banking and Finance



Company	No. of Employees	Industry
Private Employers		
Perry Ellis	650	Creative Design
Seaboard Marine	646	Trade & Logistics
MasTec, Inc.	605	Information Technology
Biltmore Hotel	563	Hospitality & Tourism
Mandarin Oriental	530	Hospitality & Tourism
Intercontinental Miami	503	Hospitality & Tourism
Discovery Networks Latin America	490	Creative Design
SunTrust Bank	500	Banking and Finance
Public Employers		
Miami-Dade County Public Schools	33,477	Education
Miami-Dade County	25,502	Local Government
Federal Government	19,200	National Government
Florida State Government	17,100	State Government
Jackson Health System	9,797	Health Care
Florida International University	3,534	Education
Miami Dade College	2,390	Education
City of Miami	3,997	Local Government
Homestead AFB	3,250	Military
Miami VA Healthcare System	2,500	Health Care
City of Miami Beach	1,971	Local Government
U.S. Southern Command	1,600	Military
City of Hialeah	1,578	Local Government
City of North Miami Beach	420	Local Government
City of Coral Gables	730	Local Government

Source: Miami-Dade Beacon Council, 2015

2.5 POPULATION

The Town of Cutler Bay has an estimated 44,801 residents, according to the U.S. Census Bureau 2018 5-Year Estimates. Table 2.4 provides detail for Cutler Bay's demographics.

Table 2.5 – Cutler Bay Demographic and Social Characteristics, 2018

Demographic	Percentage
Gender/Age	
Male	48.7
Female	51.3
Median Age	37.3
Under 5 Years	7.7
65 Years and Over	13.2
Race/Ethnicity	
White	79.8
Asian	1.6
Black or African American	11.8
American Indian/Alaska Native	0.1
Hispanic or Latino, of any race	59.2
Education	
High School Graduate or Higher	89.9
Bachelor's Degree or Higher	32.2

Source: U.S. Census Bureau, 2014-2018 American Community Survey 5-Year Estimates

3 Planning Process

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan. In order 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 Flood Mitigation Plan was developed under the guidance of a Flood Mitigation Planning Committee (FMPC). The Committee's representatives included representatives of Cutler Bay Departments, citizens and other stakeholders.

This plan identifies activities that can be undertaken by both the public and the private sectors to reduce safety hazards, health hazards, and property damage caused by floods. The Plan fulfills the requirements of Section 104 of the Disaster Mitigation Act of 2000, qualifies for CRS credit, and most importantly provides Cutler Bay with effective actions for reducing flood hazard impacts on people and property.

3.1 LOCAL GOVERNMENT PARTICIPATION

The DMA planning regulations and guidance stress that local governments 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 FMPC;
- ▶ Detail where within the planning area the risk differs from that facing the entire area;
- ▶ Identify potential mitigation actions; and
- ▶ Formally adopt the plan.

For the Cutler Bay FMPC, "participation" meant the following:

- ▶ Providing facilities for meetings;
- ▶ Attending and participating in the FMPC meetings;
- ▶ Completing and returning the Wood Data Collection Guide;
- ▶ Collecting and providing other 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 governing board of the Town.

The Town met all of these participation requirements. Key representatives from the Town of Cutler Bay included the Town Manager, Department of Community Development, and Public Works Department.

The FMPC also included representatives from the insurance and real estate industries as well as Town residents. Details on the FMPC membership and meetings are provided in Section 3.2.1 below.

This Section and Appendix B provide additional information and documentation of the planning process that was implemented for the development of this FMP.

3.2 THE 10-STEP PLANNING PROCESS

The planning process for preparing the Cutler Bay Flood Mitigation Plan was based on DMA planning requirements and FEMA's associated guidance. This guidance is structured around a four-phase process:

- ▶ Planning Process;
- ▶ Risk Assessment;
- ▶ Mitigation Strategy; and
- ▶ Plan Maintenance.

Into this process, Cutler Bay integrated a more detailed 10-step planning process used for FEMA's CRS and FMA programs. Thus, the modified 10-step process used for this plan meets the requirements of six major programs: FEMA's HMGP, BRIC, CRS, FMA, and Severe Repetitive Loss Programs; and new flood control projects authorized by the U.S. Army Corps of Engineers.

Table 3.1 shows how the 10-step CRS planning process aligns with the four phases of hazard mitigation planning pursuant to the Disaster Mitigation Act of 2000.

Table 3.1 – Mitigation Planning and CRS 10-Step Process Reference Table

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

The development of this FMP involved a comprehensive review of all flood hazards specific to the Town of Cutler Bay, including an analysis of climate change impacts.

3.2.1 Phase I – Planning Process

Planning Step 1: Organize to Prepare the Plan

With Cutler Bay's commitment to participate in the DMA planning process and the CRS Program, Town 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. At the beginning of the original planning process, the Town of Cutler Bay passed a resolution establishing the planning process and the FMPC. This resolution is included in Appendix B. For

this plan update process, changes were made to the FMPC membership as needed and were again formally approved by the Town Council.

The final list of participating FMPC representatives is provided in Table 3.2. This list details all FMPC members that attended one or more FMPC meetings, which are detailed in Table 3.4. Note that the FMPC includes representatives of key Town Departments as well as citizens and other stakeholder representatives.

Table 3.2 – FMPC Members

Representative	Department/Position	Town Staff	Outside Stakeholder
Rafael Casals	Cutler Bay, Town Manager	x	
Alfredo Quintero, CFM	Cutler Bay Public Works Department, Director	x	
Jared E. Munster	Cutler Bay Community Development, Director	x	
Yenier Vega, CFM	Cutler Bay Public Works Department, Stormwater Utility Manager	x	
Michael Callahan	Cutler Bay, Vice Mayor	x	
Janice Rowton	Cutler Bay Resident and Insurance Industry Representative (State Farm)		x
Luis Badillo	Cutler Bay Resident and Real Estate Industry Representative (Keller Williams)		x
Craig Emmanuel	Real Estate Agent		x
Jorge Acevedo, PE	Cutler Bay Resident		x
Danielle Maschinot	Cutler Bay Resident		x

In addition to the formal FMPC membership, Maria Herrera-Mendoza (Cutler Bay Public Works Department Administrative Assistant) supported the planning process and committee proceedings but was not a member of the planning committee.

The Town representatives participating in the FMPC and guiding the development of this plan are experienced in the six CRS mitigation categories (Prevention, Property Protection, Natural Resource Protection, Emergency Services, Structural Flood Control Projects and Public Information). Table 3.3 demonstrates the FMPC's expertise in these six mitigation categories, summarized by each department represented. The Town of Cutler Bay Department of Community Development which is responsible for community land use and comprehensive planning was an active participant on the FMPC and provided data and information to support development of the plan.

Table 3.3 – Cutler Bay Staff Capability with Six Mitigation Categories

Community Department	Prevention	Property Protection	Natural Resource Protection	Emergency Services	Structural Flood Control Projects	Public Information
Town Management: <ul style="list-style-type: none"> Rafael Casals Michael Callahan 				✓		✓
Community Development: <ul style="list-style-type: none"> Jared E. Munster 	✓		✓			
Public Works <ul style="list-style-type: none"> Alfredo Quintero 	✓	✓	✓		✓	

• Yenier Vega						
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During the planning process, the FMPC communicated through formal face-to-face meetings, email, telephone conversations, and a file transfer protocol (ftp) website. Draft documents were posted on the Town's website so that the FMPC members could easily access and review them. This coordination was essential for facilitating discussion, gaining consensus, and initiating data collection efforts with local government staff, community officials, and other identified stakeholders. More importantly, the formal FMPC meetings prompted continuous input and feedback from relevant participants throughout the drafting stages of the Plan. The meeting dates, locations, and topics discussed are summarized in Table 3.4. All FMPC meetings were open to the public. More details on each FMPC meeting, including agendas, minutes, and sign-in sheets, are included in Appendix B.

Table 3.4 – FMPC Meetings

Meeting Type	Meeting Topic	Meeting Date	Meeting Location
FMPC #1 (Kick-off)	1) Introduction to DMA, CRS and the planning process 2) Organize resources: the role of the FMPC, planning for public involvement, and coordinating with other agencies and stakeholders 3) Introduction to hazard identification	February 25, 2020 5:30pm	Town of Cutler Bay, 2nd Floor Conference Room 220
FMPC #2	1) Review and update of FMP goals 2) Review existing project implementation status 3) Review localized flooding areas of concern 4) Overview of Program for Public Information (PPI) 5) Discussion of Repetitive Loss properties and Repetitive Loss Area Analysis (RLAA)	August 11, 2020 5:30pm	Town of Cutler Bay, 2nd Floor Conference Room 220 & Adobe Connect
FMPC #3	1) Review of Flood Risk Assessment (Assess the Hazard) 2) Review of Vulnerability Assessment (Assess the Problem) 4) Discussion of mitigation goals, objectives, and action alternatives	October 22, 2020 5:30pm	Town of Cutler Bay, 2nd Floor Conference Room 220 & Adobe Connect
FMPC #4	1) Review of the draft plan	May 18, 2021 5:30pm	Town of Cutler Bay, 2nd Floor Conference Room 220 & Zoom Video Conference Call

Planning Step 2: Involve the Public

Discussions with Cutler Bay personnel established the plan for public involvement. Public participation is essential to mitigation planning because individual citizen and community-based input provides the entire planning team with a greater understanding of local concerns and increases the likelihood of successfully implementing mitigation actions by developing community “buy-in” from those directly affected by the decisions of public officials. As citizens become more involved in decisions that affect their safety, they are more likely to gain a greater appreciation of the flood hazards present in their community and take the steps necessary to reduce their impact.

Public involvement activities for this plan update included press releases, stakeholder and public meetings, a public survey, collection of public and stakeholder comments on the draft plan, and a variety



of public education and outreach efforts to increase participation in these activities. The formal public meetings for this project are summarized in Table 3.5, and additional public outreach activities are summarized in Table 3.6.

Table 3.5 – Public Meetings

Meeting Type	Meeting Topic	Meeting Date	Meeting Locations
Public Meeting #1	1) Introduction to DMA, CRS and the planning process 2) Overview of Program for Public Information (PPI)	February 25, 2020 7:00pm	Town of Cutler Bay, 2nd Floor Conference Room 220
Public Meeting #2	1) Review of the draft plan	June 3, 2021	Zoom Video Conference Call


Table 3.6 – Public Outreach Efforts

Project/Event	Message	Frequency
Cutler Bay Website	Flood Awareness Webpage	Continuous
Cutler Bay Website	Meeting Announcements and Calendar	Monthly
Newspaper Ad	Plan Update Information and Meeting Announcement	Feb. 2020
Public Works Flyer	Plan Update Information and Meeting Announcement	Feb. 2020
Cutler Bay Website	Announcement about the plan update and survey, with web link to online survey inviting public input in the plan update	Dec 2020
Press Release	Announcement about the plan update and public survey	Dec. 2020
Online Public Survey	Public input requested via online survey	Dec. 2020 – Apr. 2021
Full Draft Plan Online	Full draft of the plan document made available on the Cutler Bay website for public and stakeholder review and comment	June 2021
Full Draft Plan Hard Copy	Hard copy of the full draft plan made available at the Public Works Department office for public and stakeholder review and comment	June 2021

Public Survey

One of the most important outreach efforts employed for this planning process was the public survey, which the Town of Cutler Bay distributed requesting public input into the flood mitigation plan planning process and the identification of mitigation activities that could lessen the risk and impact of future flood hazard events. The survey was provided on the Town website and made available in hard copy format as shown in Figure 3.1, however hard copy distribution was limited by the COVID-19 pandemic. A total of 51 responses were received. A summary of the completed survey results has been included in Appendix B.

Figure 3.1 – Public Survey

<div style="text-align: center;">  FLOOD MITIGATION PLAN QUESTIONNAIRE </div> <p>We need your help! The Town of Cutler Bay is working to become less vulnerable to flooding, and your participation is important to us! The Town is updating its <i>Flood Mitigation Plan</i>. This Plan will identify and assess our community's flood hazard risks and determine how to best minimize or manage those risks and what outreach materials may be necessary to better communicate those risks.</p> <p>This survey is an opportunity for you to share your opinions and participate in the mitigation planning process. The information you provide will help us better understand your hazard concerns and can lead to mitigation activities that help lessen the impacts of future hazard events.</p> <div style="background-color: #800080; color: white; padding: 2px; text-align: center;">BACKGROUND INFORMATION</div> <p>1. Do you live or own property in the Town of Cutler Bay?</p> <p><input type="checkbox"/> Yes – If yes, in what neighborhood? _____</p> <p><input type="checkbox"/> No</p> <div style="background-color: #800080; color: white; padding: 2px; text-align: center;">FLOOD INFORMATION</div> <p>2. Have you ever experienced or been impacted by high water or flooding in Cutler Bay?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p> <p>If "Yes," please explain: _____</p> <p>3. How concerned are you about the possibility of your community being impacted by flooding?</p> <p><input type="checkbox"/> Extremely concerned</p> <p><input type="checkbox"/> Somewhat concerned</p> <p><input type="checkbox"/> Not concerned</p> <p>4. Is your home located in a Federal Emergency Management Agency (FEMA) mapped floodplain?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> I don't know</p> <p>5. Do you have flood insurance for your home/personal property?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> I don't know</p> <p>If "No," why not?</p> <p><input type="checkbox"/> My home is not in a floodplain <input type="checkbox"/> It's too expensive</p> <p><input type="checkbox"/> I rent <input type="checkbox"/> I don't need it because my home is elevated or otherwise protected</p> <p><input type="checkbox"/> I never really considered it <input type="checkbox"/> I don't need it because it never floods</p> <p><input type="checkbox"/> Other (please explain): _____</p> <p style="text-align: right;">Page 1 of 2</p>	<div style="background-color: #800080; color: white; padding: 2px; text-align: center;">MITIGATION ACTIONS</div> <p>6. Have you taken any actions to protect your home from flood damage?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p> <p>If "Yes," please explain: _____</p> <p>7. Do you know what government agency/office to contact regarding the risks associated with flooding?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p> <p>8. What is the most effective way for you to receive information about how to make your home or neighborhood more resistant to flood damage?</p> <table border="0"> <tr> <td><input type="checkbox"/> Newspaper</td> <td><input type="checkbox"/> Mail</td> </tr> <tr> <td><input type="checkbox"/> Television advertising or programs</td> <td><input type="checkbox"/> Email</td> </tr> <tr> <td><input type="checkbox"/> Radio advertising or programs</td> <td><input type="checkbox"/> Text message</td> </tr> <tr> <td><input type="checkbox"/> Public workshops/meetings</td> <td><input type="checkbox"/> Town of Cutler Bay website</td> </tr> <tr> <td><input type="checkbox"/> School meetings</td> <td><input type="checkbox"/> Town social media</td> </tr> </table> <p><input type="checkbox"/> Other (please explain): _____</p> <p>9. What are some steps your local government could take to reduce the risk of flooding in your neighborhood?</p> <p>_____</p> <p>_____</p> <p>_____</p> <div style="text-align: center;"> <p>THANK YOU FOR YOUR PARTICIPATION!</p> <p><small>This survey may be submitted anonymously; however, if you provide us with your name and contact information below we will have the ability to follow up with you to learn more about your ideas or concerns and inform you of future opportunities to participate (optional):</small></p> </div> <p>Name: _____</p> <p>Address: _____</p> <p>Phone: _____ E-mail: _____</p> <p style="text-align: right;">Page 2 of 2</p>	<input type="checkbox"/> Newspaper	<input type="checkbox"/> Mail	<input type="checkbox"/> Television advertising or programs	<input type="checkbox"/> Email	<input type="checkbox"/> Radio advertising or programs	<input type="checkbox"/> Text message	<input type="checkbox"/> Public workshops/meetings	<input type="checkbox"/> Town of Cutler Bay website	<input type="checkbox"/> School meetings	<input type="checkbox"/> Town social media
<input type="checkbox"/> Newspaper	<input type="checkbox"/> Mail										
<input type="checkbox"/> Television advertising or programs	<input type="checkbox"/> Email										
<input type="checkbox"/> Radio advertising or programs	<input type="checkbox"/> Text message										
<input type="checkbox"/> Public workshops/meetings	<input type="checkbox"/> Town of Cutler Bay website										
<input type="checkbox"/> School meetings	<input type="checkbox"/> Town social media										

Draft Plan

The complete draft of the plan was provided to the FMPC in May 2021. A final public meeting was conducted on June 3, 2021 to review the draft plan and collect comments. The public meeting was advertised in the local newspaper, the Miami Herald, and on the Town's Facebook and Instagram accounts. Documentation of outreach in support of the final public meeting can be found in Appendix B.

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 other local, state and federal agencies and organizations to participate in the process to ensure a variety of viewpoints were informing the FMPC. Invitations to participate in the planning process were extended to Town officials, citizens, and federal, state, and local stakeholders that might have an interest in participating in the planning process, including the following:

Town of Cutler Bay:

- ▶ Mayor's Office
- ▶ Fire Department
- ▶ Police Department
- ▶ Planning and Zoning
- ▶ Public Works
- ▶ Parks and Recreation
- ▶ Board of Alderman

Neighboring Communities:



- ▶ Miami-Dade County
- ▶ City of Coral Gables
- ▶ City of Homestead
- ▶ City of Miami
- ▶ Village of Palmetto Bay
- ▶ Village of Pinecrest

Other Government and Stakeholder Representatives:

- ▶ Miami-Dade County Regulatory and Economic Development Agency
- ▶ Miami-Dade County Regulatory and Economic Resources Department
- ▶ Miami-Dade County Office of Emergency Management
- ▶ Miami-Dade Transportation & Public Works
- ▶ Miami-Dade Public Schools
- ▶ South Florida Regional Planning Council
- ▶ South Florida Water Management District
- ▶ Florida Division of Emergency Management
- ▶ Florida Department of Environmental Protection
- ▶ Florida Department of Transportation
- ▶ FEMA Region IV
- ▶ US Fish and Wildlife Service
- ▶ NOAA Southeast Fisheries Science Center
- ▶ National Weather Service
- ▶ US Army Corps of Engineers
- ▶ Key Biscayne National Park
- ▶ American Red Cross, South Florida Region
- ▶ Fortis College
- ▶ CBT College

Coordination involved contacting these agencies through a variety of mechanisms and informing them on how to participate in the plan development process, including inviting their participation at FMPC and/or public meetings. Coordination with these groups included, holding face-to-face meetings, sending outreach letters, some with follow up phone calls; and making phone calls alone to out of area agencies. All of these groups and agencies were solicited asking for their assistance and input and telling them how to become involved in the plan development process. More detail on stakeholder outreach and coordination, including a sample information request letter, is provided in Section B.3 of Appendix B.

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. Cutler Bay uses a variety of planning mechanisms, such as comprehensive plans and ordinances, to guide growth and development. Integrating existing planning efforts and mitigation policies and action strategies into this plan establishes a credible and comprehensive 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 3.7.

Table 3.7 – Summary of Existing Studies and Plans Reviewed

Resource Referenced	Use in this Plan
Cutler Bay Comprehensive Land Use Plan, 2008	Used to develop the community profile and identify growth trends and development goals



Resource Referenced	Use in this Plan
Town of Cutler Bay Ordinances <ul style="list-style-type: none"> • Zoning Ordinance • Subdivision Ordinance • Flood Damage Prevention Ordinance • Building Code Ordinance 	Used to develop capability assessment and mitigation strategy
Miami-Dade County Local Mitigation Strategy, 2017	Used to identify flood hazards and to develop hazard profiles, capability assessment, and mitigation strategy
Miami-Dade and Incorporated Areas Flood Insurance Study (FIS), 2009	Used to develop flood hazard profile and identify flooding sources; DFIRM used to prepare the 100-/500-year flooding vulnerability assessment
Cutler Bay Repetitive Loss Area Analysis, 2012	Used to develop capability assessment and mitigation strategy
Cutler Bay Watershed Master Plan, 2018	Used to develop vulnerability assessment, capability assessment, and mitigation strategy
Cutler Bay Capital Improvement Plan, 2013	Used to develop capability assessment and mitigation strategy
Cutler Bay Community Rating System Verification Report, 2019	Used to develop capability assessment
Miami-Dade Sea Level Rise Task Force Report and Recommendations, July 2014	Used to develop climate change and sea level rise hazard profile and vulnerability assessment; used to develop mitigation strategy
State of Florida Hazard Mitigation Plan, 2018	Used to develop hazard identification and hazard profiles
State of Florida Critically Eroded Beaches Report, 2020	Used to develop erosion hazard profile and vulnerability assessment

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, vulnerability assessment, and capability assessment. The data was also used in updating the mitigation strategy. The source document is referenced where the data from the existing studies and reports is used in this plan.

3.2.2 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 including an evaluation of climate change and sea level rise. Data collection worksheets were developed and used in this effort to aid in determining hazards and vulnerabilities and where the risk varies across the planning area. Geographic information systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities.

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

3.2.3 Phase III – Mitigation Strategy

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

Wood 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.

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 and activities identified in Planning Steps 6 and 7. This complete draft was posted for FMPC review and comment on the Town's website. Other agencies were invited to comment on this draft as well. FMPC and agency comments were integrated into the second public review draft, which was advertised and distributed to collect public input and comments. Wood integrated comments and issues from the public, as appropriate, along with additional internal review comments and produced a final draft for the FDEM and FEMA Region IV to review and approve, contingent upon final adoption by the Town of Cutler Bay.

3.2.4 Phase IV – Plan Maintenance

Planning Step 9: Adopt the Plan

In order to secure buy-in and officially implement the plan, the plan was reviewed and adopted by the Town Council on the date included in the corresponding 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 hazard mitigation planning. This is Planning Step 10 of the 10-step planning process. Up to this point in the planning process, all of the FMPC's efforts have been directed at researching data, coordinating input from participating entities, and developing appropriate mitigation actions. Each recommended action includes key descriptors, such as a lead manager and possible funding sources, to help initiate implementation. Section 8 Plan Implementation and Maintenance provides an overview of the overall strategy for plan implementation and maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The Section also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

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.

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.

This section describes the risk assessment process for the development of the Town of Cutler Bay Flood Mitigation Plan. It describes how the Town 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 Town of Cutler Bay. The risk assessment identifies and profiles the relevant flood hazards for Cutler Bay and assesses the exposure of lives, property, and infrastructure to these hazards. This process allows for a better understanding of Cutler Bay’s potential risk to flood hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events. This risk assessment process 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 chapter:

- ▶ **Section 3.1: Hazard Identification** identifies the flood hazards that threaten the Cutler Bay planning area.
- ▶ **Section 3.2: Risk Assessment Methodology** reviews the methodology for evaluating risk and the outlines the organization of each hazard profile.
- ▶ **Section 3.3: Asset Inventory** summarizes overall asset exposure in Cutler Bay, including buildings; critical facilities; cultural, historic, and natural resources; and future growth and development.
- ▶ **Section 3.4: Hazard Profiles, Analysis, and Vulnerability** discusses the threat to the Cutler Bay planning area, describes previous occurrences of flood hazard events and the likelihood of future occurrences. For all moderate and high priority flood hazards, this section assesses the Cutler Bay planning area’s exposure and potential losses that may occur.
- ▶ **Section 3.5: Risk and Vulnerability Conclusions** summarizes areas likely to flood, discusses the potential impact of future flooding conditions, and evaluates health and safety consequences of the flood hazards.

For this plan update, the plan organization has been modified; the flood risk assessment and the vulnerability assessment have been consolidated in this section to better provide the full picture of risk for each hazard in one location.

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.

The Town of Cutler Bay's FMPC conducted a hazard identification study, summarized below, to determine the flood hazards that threaten the planning area.

4.1.1 Hazard Identification Methodology

Starting with the list of hazards identified in the 2015 Town of Cutler Bay Floodplain Mitigation Plan and using existing flood hazard data and input gained through planning meetings, the FMPC identified a list of flood hazards that could affect the Town of Cutler Bay.

The flood hazards identified in the 2015 Town of Cutler Bay FMP are listed in Table 4.1 along with their previously established ratings for frequency of occurrence, spatial extent, potential magnitude, and overall significance based on FMPC input. Criteria for these ratings are provided at the bottom of the table.

Table 4.1 – 2015 Flood Hazard Identification Summary

Hazard	Frequency of Occurrence	Spatial Extent	Potential Magnitude	Significance
Climate Change and Sea Level Rise	Highly Likely	Extensive	Catastrophic	Medium
Coastal/Canal Bank Erosion	Occasional	Limited	Negligible	Low
Dam/Levee Failure	Unlikely	Limited	Negligible	Low
Flood: 100-/500-year	Occasional	Extensive	Catastrophic	High
Flood: Stormwater/Localized Flooding	Highly Likely	Limited	Negligible	Medium
Hurricane and Tropical Storms (including Storm Surge)	Likely	Extensive	Catastrophic	High
<p><u>Guidelines:</u></p> <p>Frequency of Occurrence: Highly Likely: Nearly 100% probability within the next year. Likely: Between 10 and 100% probability within the next year. Occasional: Between 1 and 10% probability within the next year. Unlikely: Less than 1% probability within the next year.</p> <p>Potential Magnitude: Catastrophic: More than 50% of the area affected. Critical: 25 to 50% of the area affected. Limited: 10 to 25% of the area affected. Negligible: Less than 10% of the area affected.</p> <p>Spatial Extent: Limited: Less than 10% of planning area. Significant: 10-50% of planning area. Extensive: 50-100% of planning area.</p> <p>Significance: Low Medium High</p>				

Source: Wood Data Collection Guide

All hazards included in the 2015 plan were re-evaluated under expanded criteria for this plan update. Flood hazard data from the Miami-Dade County Local Mitigation Strategy (LMS), FEMA, the Florida Division of Emergency Management (FDEM), the National Oceanic and Atmospheric Administration (NOAA), the National Hurricane Center (NHC), the National Center for Environmental Information (NCEI), and many other sources were examined to assess the significance of these hazards to the Cutler Bay

planning area. Significance was measured in general terms and focused on key criteria such as frequency and resulting damage, including deaths and injuries as well as property damage and economic losses.

In keeping with the 2015 plan, the FMPC maintained that tsunamis are a non-prevalent hazard that should not be included in this plan update. Following is a brief description of the hazard and the reason for its exclusion:

- ▶ **Tsunamis:** Defined as a long-term (generally 15 to 60 minutes) wave caused by a large-scale movement of the sea floor due to volcanic eruption, marine earthquake or landslide. Barely noticeable at sea, the wave velocity may be as high as 400 knots so that it travels great distances and in shoal water reaches heights up to 15 meters. NOAA indicates that the risk of a tsunami in the Cutler Bay planning area is relatively low due to the absence of subduction zones at the edges of plate boundaries to spawn such waves except small subduction zones under the Caribbean and Scotia arcs. Based on historical data, 12% of the world's tsunamis have occurred in the Atlantic Ocean with the majority of those occurring in the northeast.

4.1.2 Disaster Declaration History

The FMPC researched past events that resulted in a federal disaster declaration or emergency declaration for Miami-Dade County, which approximates impacts on the Cutler Bay planning area, in order to identify known flood hazards. When a local government's response and recovery capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be 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. Federal 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.

Details on federal disaster declarations were obtained from FEMA and are compiled chronologically in Table 4.2 and Table 4.3. Table 4.2 displays flood-related FEMA major disaster declarations and emergency declarations that included Miami-Dade County or were declared statewide for Florida since 1953.

Table 4.3 summarizes the Individual Assistance and Public Assistance dollars obligated for each major disaster declaration received by Miami-Dade County since 2004, the first year when Miami-Dade County was specifically designated in a major disaster declaration. Note that disaster-related damage to people and property resulted from wind and flood damage associated with hurricanes and severe storms.

Table 4.2 – FEMA Major Disaster Declarations, Statewide and Miami-Dade County, 1953-2020

Disaster #	Dec. Date	Dec. Type	Incident Type	Event Title
12	1953-10-22	DR	Flood	Flood
106	1960-09-12	DR	Hurricane	Hurricane Donna
141	1962-12-17	DR	Flood	Abnormally High Tides
175	1964-09-08	DR	Hurricane	Hurricane Cleo
176	1964-09-10	DR	Hurricane	Hurricane Dora
3116	1995-08-03	EM	Hurricane	Hurricane Erin
1539	2004-08-13	DR	Hurricane	Tropical Storm Bonnie and Hurricane Charley
1545	2004-09-04	DR	Hurricane	Hurricane Frances
1561	2004-09-26	DR	Hurricane	Hurricane Jeanne
1602	2005-08-28	DR	Hurricane	Hurricane Katrina
1609	2005-10-24	DR	Hurricane	Hurricane Wilma
3220	2005-09-05	EM	Hurricane	Hurricane Katrina Evacuation
3259	2005-09-20	EM	Hurricane	Tropical Storm Rita
3288	2008-08-21	EM	Severe Storm(s)	Tropical Storm Fay



Disaster #	Dec. Date	Dec. Type	Incident Type	Event Title
3377	2016-10-06	EM	Hurricane	Hurricane Matthew
3385	2017-09-05	EM	Hurricane	Hurricane Irma
4337	2017-09-10	DR	Hurricane	Hurricane Irma
3419	2019-08-30	EM	Hurricane	Hurricane Dorian
3533	2020-08-01	EM	Hurricane	Hurricane Isaias

Source: FEMA

Table 4.3 – FEMA Major Disaster Declarations for Miami-Dade County, 1960-2020

Hazard	Disaster #	Date	IA Dollars Obligated ¹	PA Dollars Obligated ¹
Hurricane Charley and Tropical Storm Bonnie	DR-1539	08/13/2004	\$208,970,753.97	\$613,442,592.07
Hurricane Frances	DR-1545	09/04/2004	\$411,862,738.49	\$667,164,433.62
Hurricane Jeanne	DR-1561	09/26/2004	\$398,624,417.44	\$521,496,151.88
Hurricane Katrina	DR-1602	08/28/2005	--	\$194,516,321.23
Hurricane Wilma	DR-1609	10/24/2005	\$191,472,426.07	\$1,483,085,540.62
Hurricane Irma	DR-4337	09/10/2017	\$1,020,968,233.16	\$2,064,703,843.11
Total:			\$2,231,898,569.13	\$5,544,408,882.53

Source: FEMA, FDEM

¹Dollar damage values are for all Counties included in the disaster declaration.

4.1.3 Flood Event History

NOAA's NCEI has been tracking flood-related weather data 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. This database contains 291 flood-related weather events that occurred in Miami-Dade County between January 1, 1996 and December 31, 2019. Table 4.4 summarizes these events.

Table 4.4 – NCEI Severe Weather Reports for Miami-Dade County and Cutler Bay, 1996-2020

Type	# of Events	Property Loss	Deaths	Injuries
Coastal Flood	65	\$0	0	0
Flash Flood	31	\$101,551,000	0	0
Flood/Urban Flood	34	\$440,120,000	0	0
Heavy Rain	27	\$345,000	0	1
High Surf	1	\$600,000	0	0
Hurricane	10	\$253,010,000	10	0
Storm Surge/Tide	7	\$0	0	0
Tropical Depression	16	\$600,000	0	0
Tropical Storm	25	\$112,000	0	0
Waterspout	75	\$0	0	0
Total:	290	\$796,338,000	10	1

Source: NCEI Storm Events Database

Note: Losses reflect totals for all impacted areas within Miami-Dade County.

The FMPC previously supplemented NCEI data with data from SHELDUS™ (Spatial Hazard Events and Losses Database for the United States); however, for the sake of consistency, records on past occurrences were updated in this plan update using data from NCEI, which provides more differentiation and detail among event types and locations.

4.2 RISK ASSESSMENT METHODOLOGY

The hazards identified in Section 3.1 Hazard Identification, are profiled individually in Section 3.4 according to the following format:

Hazard Description

This section provides a description of the hazard followed by details specific to the Cutler Bay 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.

Past Occurrences

This section contains information on historical events, including the extent or location of the hazard within or near the Cutler Bay 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 hurricanes or tropical storms over a 30-year period equates to a 33 percent chance of experiencing a hurricane or tropical storm in any given year). The likelihood of future occurrences is categorized into one of the classifications as follows:

- ▶ **Highly Likely** – Near 100 percent chance of occurrence within the next year
- ▶ **Likely** – Between 10 and 100 percent chance of occurrence within the next year (recurrence interval of 10 years or less)
- ▶ **Occasional** – Between 1 and 10 percent chance of occurrence within the next year (recurrence interval of 11 to 100 years)
- ▶ **Unlikely** – Less than 1 percent chance of occurrence within the next 100 years (recurrence interval of greater than every 100 years).

This section also discusses the potential impacts of climate change on future probability of the hazard.

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 to five categories for each hazard (probability, impact, spatial extent, warning time, and duration). Each degree of risk was assigned a value (1 to 4) and a weighting factor as summarized in Table 4.5.

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 4.5.1.

Table 4.5 – Priority Risk Index

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

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

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

The purpose of the PRI is to categorize and prioritize all flood hazards as high, moderate, or low risk. Those hazards determined to be of high or moderate priority were characterized as significant hazards that required further evaluation through the development of a vulnerability assessment. This process and



these criteria allowed the FMPC to prioritize hazards of greatest significance and focus resources where they are most needed.

Vulnerability Assessment

The FMPC conducted a vulnerability assessment for the hazards identified as a moderate or high priority in order to assess the impact that each hazard would have on the Town. The vulnerability assessment quantifies, to the extent feasible using best available data, assets at risk to natural hazards and estimates potential losses.

Vulnerability assessments followed the methodology described in the FEMA publication *Understanding Your Risks—Identifying Hazards and Estimating Losses*. The vulnerability assessment describes the total vulnerability and values at risk, summarized in the Asset Inventory in Section 3.3, and then discusses vulnerability by hazard.

Data used to support this assessment included the following:

- ▶ County GIS data (hazards, base layers, and assessor's data)
- ▶ Hazard layer GIS datasets from federal agencies
- ▶ Written descriptions of inventory and risks provided by the Miami-Dade County Local Mitigation Strategy and State Hazard Mitigation Plan
- ▶ Other existing plans and studies provided by the Town

Vulnerability is measured in general, qualitative terms and is a summary of 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 nonexistent.
- ▶ **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 can also be 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 can be 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 the hazard area. Together, this information conveys the exposure and vulnerability of the planning area to that hazard.

4.3 ASSET INVENTORY

Miami-Dade County's parcel layer was used as the basis for the inventory of developed parcels. Table 4.6 shows the count, land value, improved value, content value and total value of parcels in Cutler Bay.

Table 4.6 – Cutler Bay Property Assets at Risk by Occupancy Type

Occupancy	Total Parcel Count	Improved Parcel Count	Land Value	Improved Value	Estimated Content Value	Total Value ¹
Commercial	230	102	\$240,259,333	\$137,853,108	\$137,853,108	\$275,706,216
Education	3	2	\$1,246,785	\$1,060,969	\$1,060,969	\$2,121,938
Government	111	34	\$69,105,329	\$96,942,689	\$96,942,689	\$193,885,378
Other	14	0	\$4,271,847	\$0	\$0	\$0
Religious	8	34	\$8,794,303	\$14,881,318	\$14,881,318	\$29,762,636
Residential	14,500	10,654	\$1,125,127,934	\$1,852,660,072	\$926,330,036	\$2,778,990,108
Total	14,866	10,826	\$1,448,805,531	\$2,103,398,156	\$1,177,068,120	\$3,280,466,276

Source: Miami-Dade County, 2019

¹Total value does not include land value.

4.3.1 Critical Facility Inventory

Of significant concern with respect to any disaster event is the location of critical facilities and infrastructure in the planning area. Critical facilities and infrastructure are often defined as those essential services, facilities, and structures 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 in Cutler Bay are summarized by type in Table 4.7 and shown in Figure 4.1. Critical infrastructure is shown in Figure 4.2.

Table 4.7 – Critical Facilities by Type

Type	Count of Facilities
Assisted Living Centers	26
Emergency Response Installations	1
Fire Stations	2
Government	2
Group Homes	10
Hazmat Installations	1
Hospitals	2
Police Stations	2
Schools	8
Sewer Pumping Stations	41
Total	95

Source: Cutler Bay

Figure 4.1 – Cutler Bay Critical Facilities

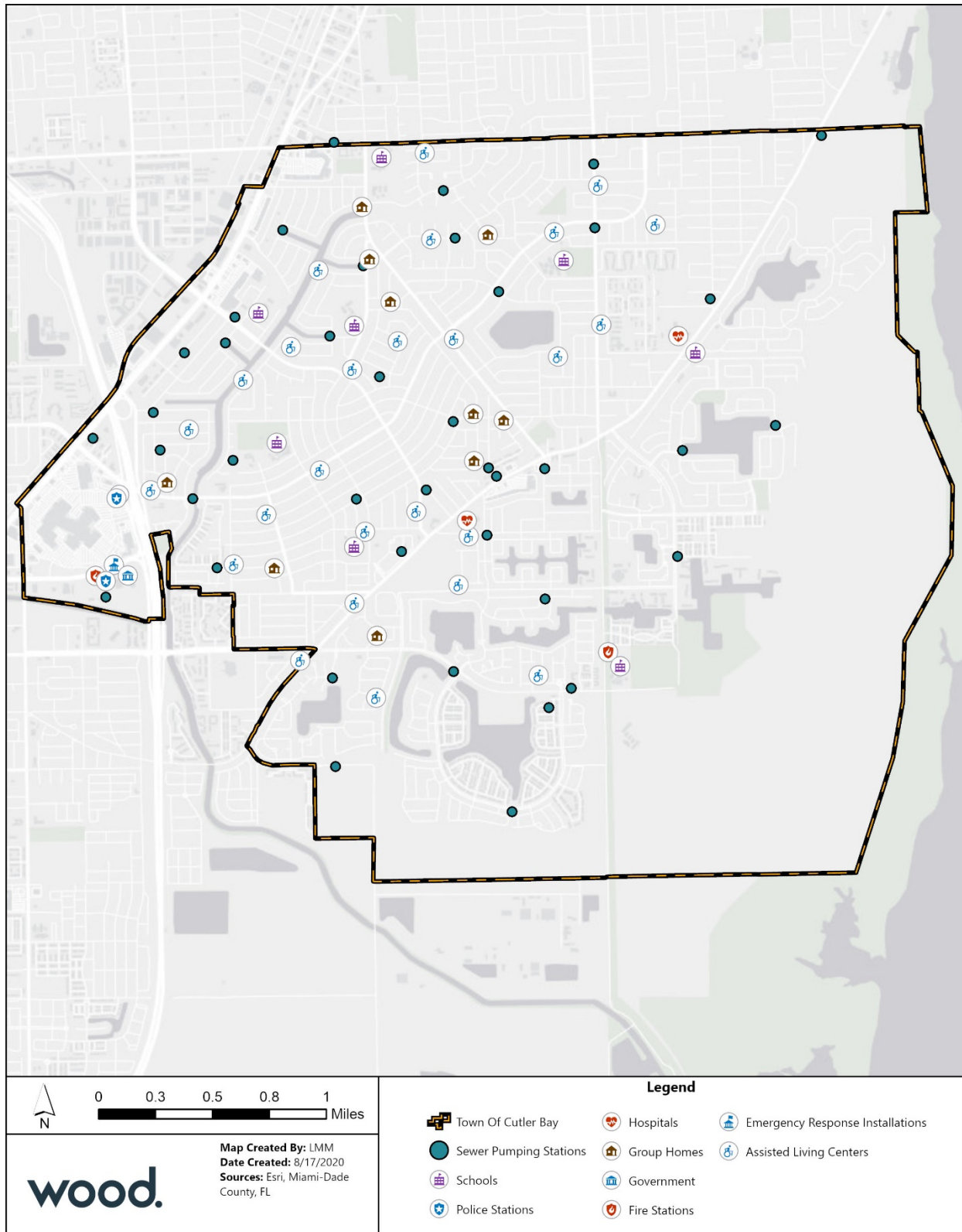
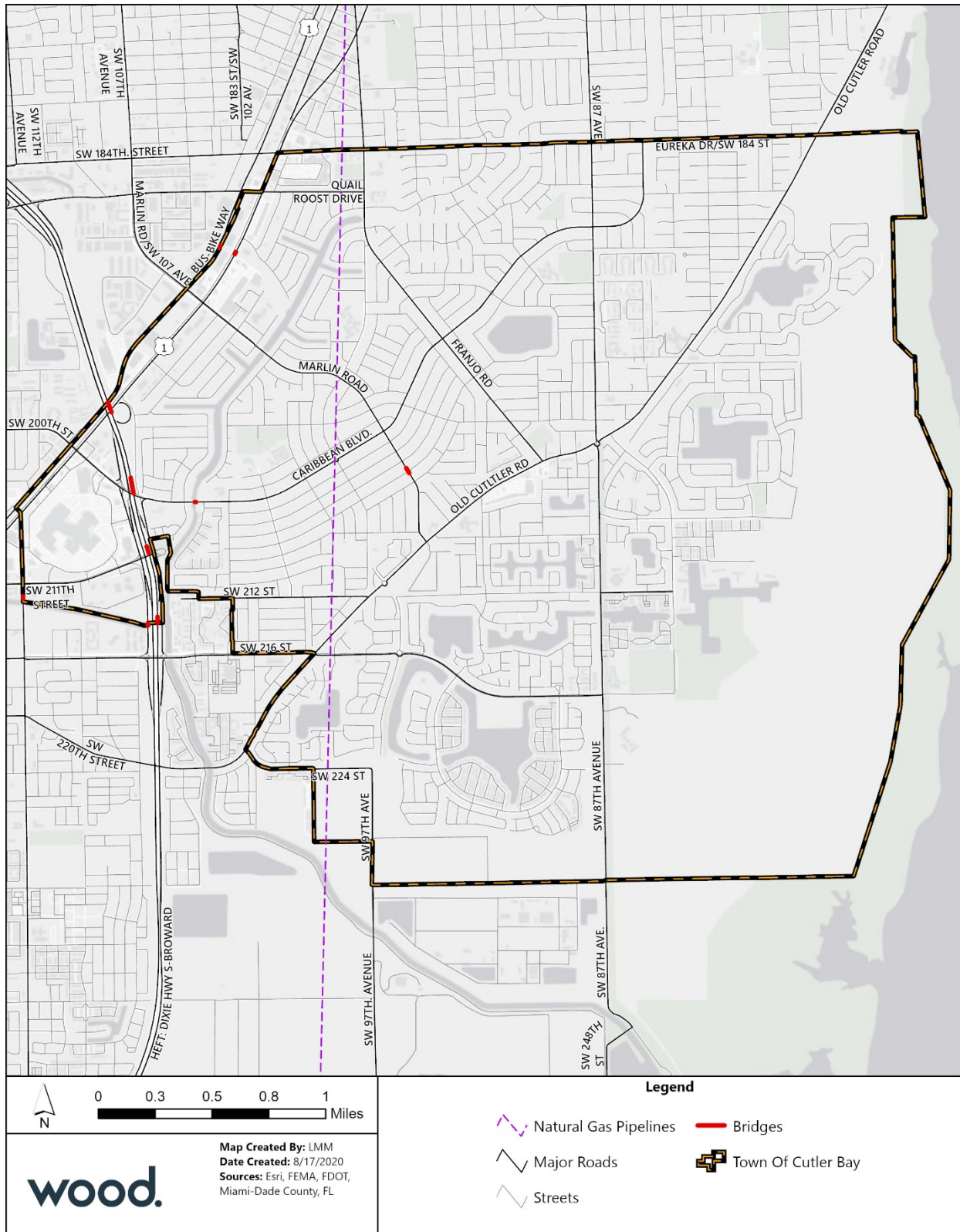


Figure 4.2 – Cutler Bay Critical Infrastructure



4.3.2 Cultural, Historic and Natural Resources

Historic and Archaeological Resources

Old Cutler Road, a designated historic roadway, traverses the Town. The Old Cutler Road zoning overlay district addresses preservation and enhancement of the historic and community character along this corridor. There are no other designated historic or archaeological districts or sites in the Town at present. Most development in the Town occurred after 1950, with only 106 housing units having been built prior to 1939.

Natural Features and Resources

The Town of Cutler Bay, like Miami-Dade County as a whole, contains and/or is proximate to numerous environmentally sensitive areas and resources, including two national parks and an aquatic preserve. The Town's eastern boundary abuts Biscayne National Park, and includes 1,579.2 acres of lands in parks, preserves or conservation areas and 269.5 acres of protected vacant lands. These lands are primarily located in the eastern portion of the Town adjacent or proximate to Biscayne National Park. In addition, many areas in the eastern portion of the Town are targeted for acquisition for conservation and/or other public purposes. These areas are denoted with a cross-hatch on the future land use map shown in Figure 4.3. Although the Town has a significant coastline along Biscayne Bay, it does not have a developed waterfront; nor can its waterfront be developed in the future. The Town's major natural resources and features are described as follows.

Parks, Preserve and Conservation

A total of 1,579.2 acres (24%) of the Town's land area are in public parks or reserved for environmental and conservation purposes. These lands include the seven public parks located within the Town's boundaries, and wetland and water conservation areas located between the developed areas east of Old Cutler Road and Biscayne National Park. A total of 375 acres (6%) are in inland waters, including canals, man-made lakes and drainage features.

Water Bodies and Floodplains

The Town contains 354.6 acres of coastal waters and 375.0 acres of inland waters in man-made lakes and other waterways, including canals. The Town is traversed by six major canals that lie within and/or border the Town: C-100, C100B, C-1, C-1N, C-1W and L31E. These canals provide important flood protection and drainage functions to the Town and surrounding areas. The Town's flood zones are shown in Figure 4.26. As can be seen, most of the Town is located within the Special Flood Hazard Area (SFHA).

Natural and Beneficial Functions

Wetlands as well as floodplains are both important natural assets to the Town of Cutler Bay. The Town contains significant coastal wetlands adjacent to Biscayne National Park. These wetlands are an important component of South Florida's ecosystem that will be conserved and, where appropriate, restored. Approximately 1,430 acres of these wetlands are in public ownership, and all are designated for Conservation purposes on the Future Land Use Map shown as Figure 4.3. The value in these resources can be better realized by the integration of floodplain management efforts with other community goals and objectives.

Wetlands function as natural sponges that trap and slowly release surface water, rain, snowmelt, groundwater and flood waters. Trees, root mats, and other wetland vegetation will slow the speed of floodwaters and distribute them more slowly over the floodplain. This combined water storage and braking action lowers flood heights and reduces erosion. Wetlands within and downstream of urban areas

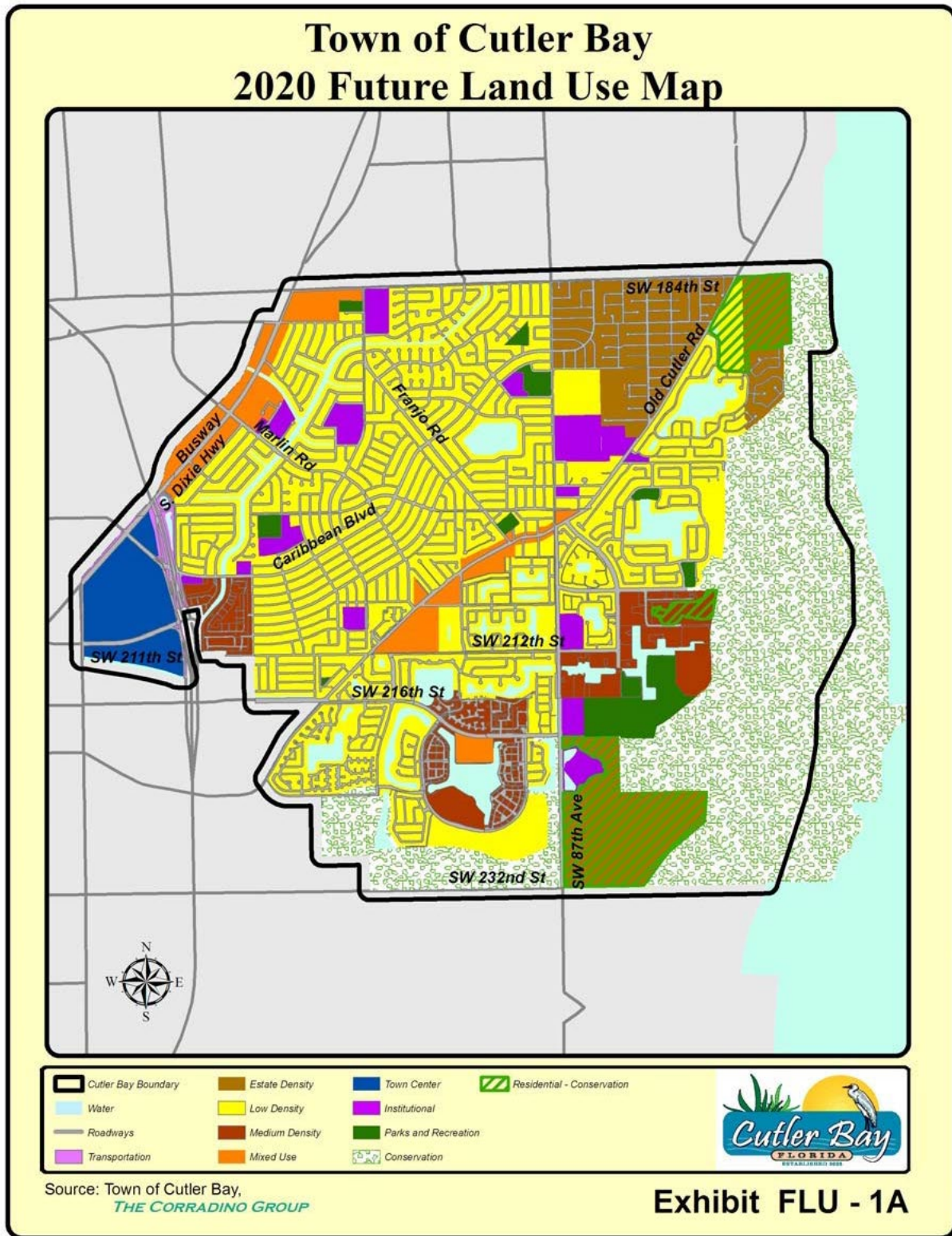


are particularly valuable, counteracting the greatly increased rate and volume of surface-water runoff from pavement and buildings. The holding capacity of wetlands helps control floods and prevents water logging of crops. Preserving and restoring wetlands, together with other water retention, can often provide the level of flood control otherwise provided by expensive dredge operations and levees.

Soils and Minerals

The Town is comprised of tidal marl and muck, marl, and urban soils. In general, tidal marl and muck is unsuitable for development and characteristic of wetlands, while marl often requires special treatment prior to construction. Marl soils are calcareous (limestone derived) soils that characterize lands that are or were historically flooded during the summer and dry during the winter, and that exhibit poor drainage. Urban soils refer to man-made or significantly altered soils resulting from development. The areas of the Town east of Old Cutler Road are characterized by marl soils, while the coastal wetlands adjacent to Biscayne National Park are tidal marl and muck. The Town is underlain by Miami Limestone. There are no mineral extraction areas in the Town.

Figure 4.3 – Cutler Bay Future Land Use Map



Source: Cutler Bay Comprehensive Growth Management Plan, 2008



4.3.3 Growth and Development Trends

The Town of Cutler Bay incorporated as Miami-Dade County's newest municipality in November 2005. It comprised most of two Census Designated Places, Cutler Ridge and Lakes by the Bay, and a strip of unincorporated Miami-Dade County south of 224 Street. The Census 2010 figures showed a population of 40,286 persons and 14,620 housing units in the Town. The average household size at the time of the 2010 Census was 3.15 persons per household. As of 2018, according to American Community Survey 5-Year Estimates, the population had grown to 44,801, but total housing units had decreased to 13,826. Average household size was 3.47.

Between 2000 and 2010, the population of the area that incorporated as the Town of Cutler Bay increased by 24.8%. The Town's 2008 Comprehensive Growth Management Plan projected that the Town population would increase to 60,000 by 2020. This population projection was made by forecasting the Town's share of the Miami-Dade County population projected for Minor Statistical Area 7.1, a statistical area that encompasses the Town. The Town of Cutler Bay was estimated to account for 80 percent of MSA 7.1 population in 2020. However, actual growth has lagged these projections.

New projections for Miami-Dade County population were available from the University of Florida Bureau of Economics and Business Research (BEER). These projections were used along with current and past population estimates from the U.S. Census Bureau to produce updated population projections for the Town of Cutler Bay, as shown in Table 4.8.

Table 4.8 – Population Projections for the Town of Cutler Bay

	Census Population Estimates			Population Projections				
	2010	2015	2018	2020	2025	2030	2035	2040
Town of Cutler Bay	38,409	43,474	44,801	47,213	49,692	51,842	53,650	55,198
Miami-Dade County	2,445,374	2,639,042	2,715,516	2,861,400	3,048,600	3,220,000	3,374,200	3,515,800
Town % of County Population	1.57%	1.65%	1.65%	1.65%	1.63%	1.61%	1.59%	1.57%

Source: BEER Projections of Florida Population by County, Medium projection; American Community Survey 5-Year Estimates

Note: These projections assume that the Town's share of the County population will decrease slightly with time given the Town's limited area for new development compared to the county overall.

Land Use

As noted in the 2008 Growth Management Plan, the Town of Cutler Bay was substantially built-out at the time of its incorporation in 2005 and has a limited supply of vacant developable land. The 2008 Growth Management Plan has not been updated since 2015 and remains the most current available data on current and future land use in Cutler Bay. Single family residential development is the predominant land use, with commercial development concentrated along US-1 and Old Cutler Road. Due to these factors, the guiding principles of the Future Land Use Element and the Town's planning program are preservation and enhancement of existing residential neighborhoods, resource protection and enhancement, and redevelopment of commercial areas as mixed-use activity centers. Table 4.9 reflects existing land uses within the Town by category and acreage, and Figure 4.4 illustrates the location of these land use designations within Cutler Bay. Future land use is shown in Figure 4.3 above.

Table 4.9 – Existing Land Use in the Town of Cutler Bay

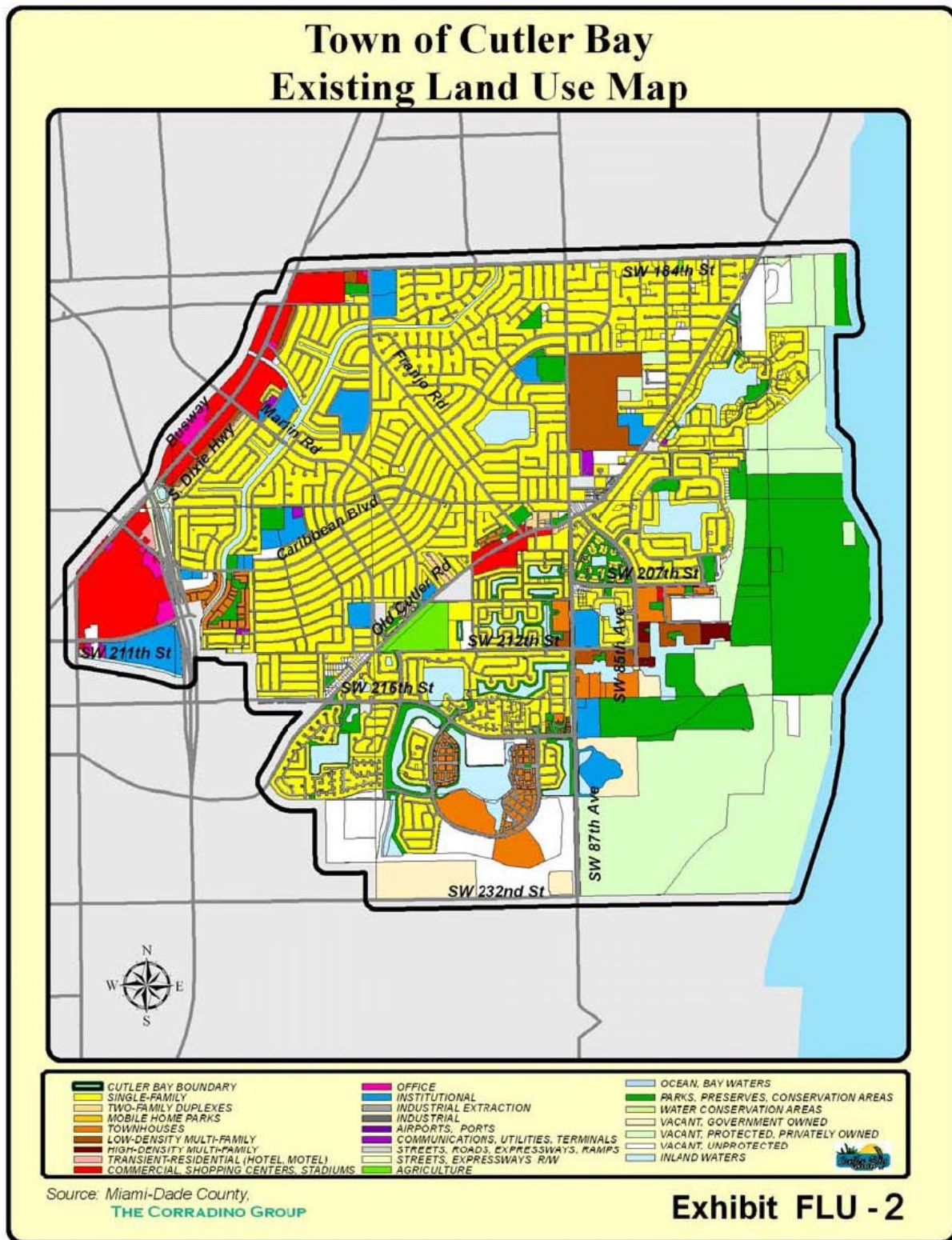
Land Use	Acres
Single Family Residential	2,244.4 (34%)
Duplex	36.5 (0.6%)
Condominiums	1.0 (0.01%)
Townhouses	176.1 (3%)



Land Use	Acres
Low-Density Multi-Family	85.9 (1%)
High Density Multi-Family	38.7 (0.6%)
Transient Residential (Hotel/Motel)	3.6 (0.06%)
Commercial	243.6 (4%)
Office	13 (0.2%)
Industrial	10.7 (0.2%)
Institutional	315.9 (5%)
Communications, Utilities, Terminals	6.0 (0.1%)
Parks, Preserves and Conservation	1,579.2 (24%)
Agriculture	34.8 (0.5%)
Vacant Protected, Privately Owned	269.5 (4%)
Vacant, Government Owned	15.5 (0.2%)
Vacant Unprotected	67.4 (1%)
Streets, Roads, Expressways, Ramps	1,057.2 (16%)
Inland Water	375.0 (6%)
Total	6,574.0

Source: Cutler Bay

Figure 4.4 – Cutler Bay Existing Land Use Map



Source: Cutler Bay Comprehensive Growth Management Plan, 2008

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.

Requirement §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 natural flood hazards that the FMPC identified in Table 4.1 Flood Hazard Summary. Note that vulnerability assessments were only developed for moderate and high priority hazards, defined using the Priority Risk Index (PRI) as those hazards with a PRI score of 2.0 or greater.

Section	Hazard	PRI Score	PRI Rating
3.4.1	Climate Change and Sea Level Rise	3.2	High
3.4.2	Coastal/Canal Bank Erosion	2.1	Moderate
3.4.3	Dam/Levee Failure	1.9	Low
3.4.4	Flood: 100-/500-year	3.4	High
3.4.5	Flood: Stormwater/Localized	3.5	High
3.4.6	Hurricane and Tropical Storm (including Storm Surge)	3.6	High

4.4.1 Climate Change and Sea Level Rise

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Climate Change and Sea Level Rise	Highly Likely	Critical	Moderate	More than 24 hrs	More than 1 week	3.2

Hazard Description

Climate change refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forces such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use (IPCC, 2014). Climate change is a natural occurrence in which the earth has warmed and cooled periodically over geologic time. The recent and rapid warming of the earth over the past century has been cause for concern, as this warming is very likely due to the accumulation of human-caused greenhouse gases, such as CO₂, in the atmosphere (IPCC, 2007). This warming is occurring almost everywhere in the world which suggests a global cause rather than changes in localized weather patterns.

There are generally two separate mechanics involved in global sea level rise. The first is directly attributed to global temperature increases, which warm the oceans waters and cause them to expand. The second is attributed to the melting of ice over land which simply adds water to the oceans. Global sea level rise is likely caused by a combination of these two mechanics and can be exacerbated on the local level by factors such as erosion and subsidence. The rate of sea level rise has varied throughout geologic history, and studies have shown that global temperature and sea level are strongly correlated.

Due to sea-level rise projected throughout the 21st century and beyond, coastal systems and low-lying areas will increasingly experience adverse impacts such as submergence, coastal flooding, and coastal erosion. The population and assets projected to be exposed to coastal risks as well as human pressures on coastal ecosystems will increase significantly in the coming decades due to population growth, economic development, and urbanization (IPCC, 2014). Cutler Bay is particularly vulnerable to the effects of climate change and sea level rise, due to its coastal location, subtropical environment, porous geology and low topography.

Warning Time: 1 – More than 24 hours

Duration: 4 – More than one week

Climate change has the potential to alter the nature and frequency of flood hazards that the Town already experiences such as hurricane storm surge, coastal erosion, and stormwater drainage. Sea level rise may also place additional stress on aquifers (saltwater intrusion) and gravity flow stormwater and septic systems due to a rising groundwater table. An elevated storm surge due to sea level rise could produce a cascade of consequences affecting things such as land use, infrastructure, facilities, waterway navigation, the local economy, public health and safety, drinking water supplies, and ecosystems.

The potential for climate change influences on each flood hazard summarized in this plan is noted within each hazard's "Probability of Future Occurrence" discussion section.

Location

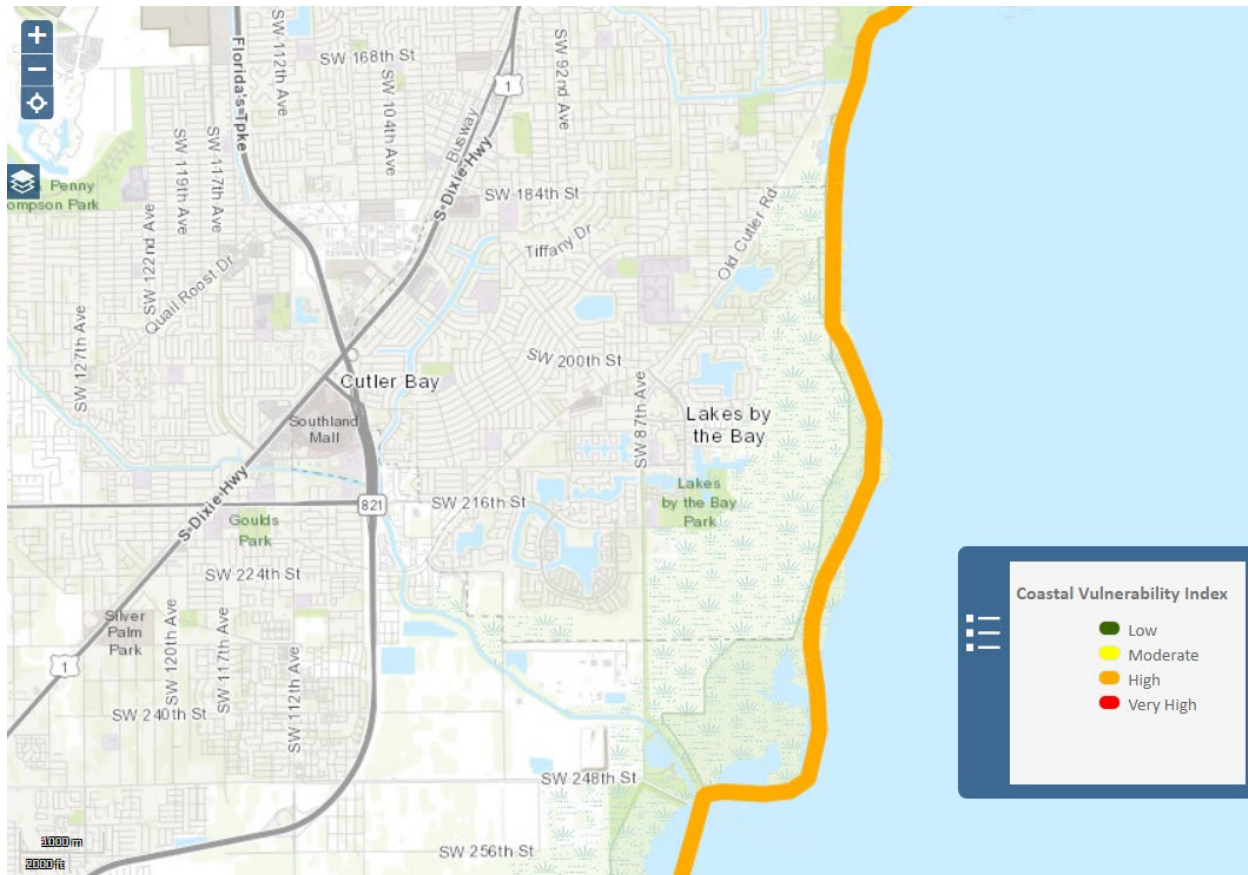
Sea level rise can occur anywhere along the coast in Cutler Bay. The Coastal Vulnerability Index (CVI), developed by United States Geological Survey (USGS), provides a preliminary overview of the relative susceptibility of the United States coast to sea level rise. The CVI is based on geomorphology, regional

coastal slope, tide range, wave height, relative sea level rise, and shoreline erosion and acceleration rates. For each study area, each variable is scored on a 1-5 scale based on defined parameters, where “1” indicates low contribution to coastal vulnerability and “5” indicates high contribution to vulnerability. These scores are then aggregated into a single index through a mathematical formula. The resulting index gives an overview of where physical changes may occur due to sea-level rise.

Figure 4.5 shows the CVI for Cutler Bay. The entire Cutler Bay shoreline has a CVI rating of high.

Spatial Extent: 3 – Moderate

Figure 4.5 – Coastal Vulnerability Index, Cutler Bay



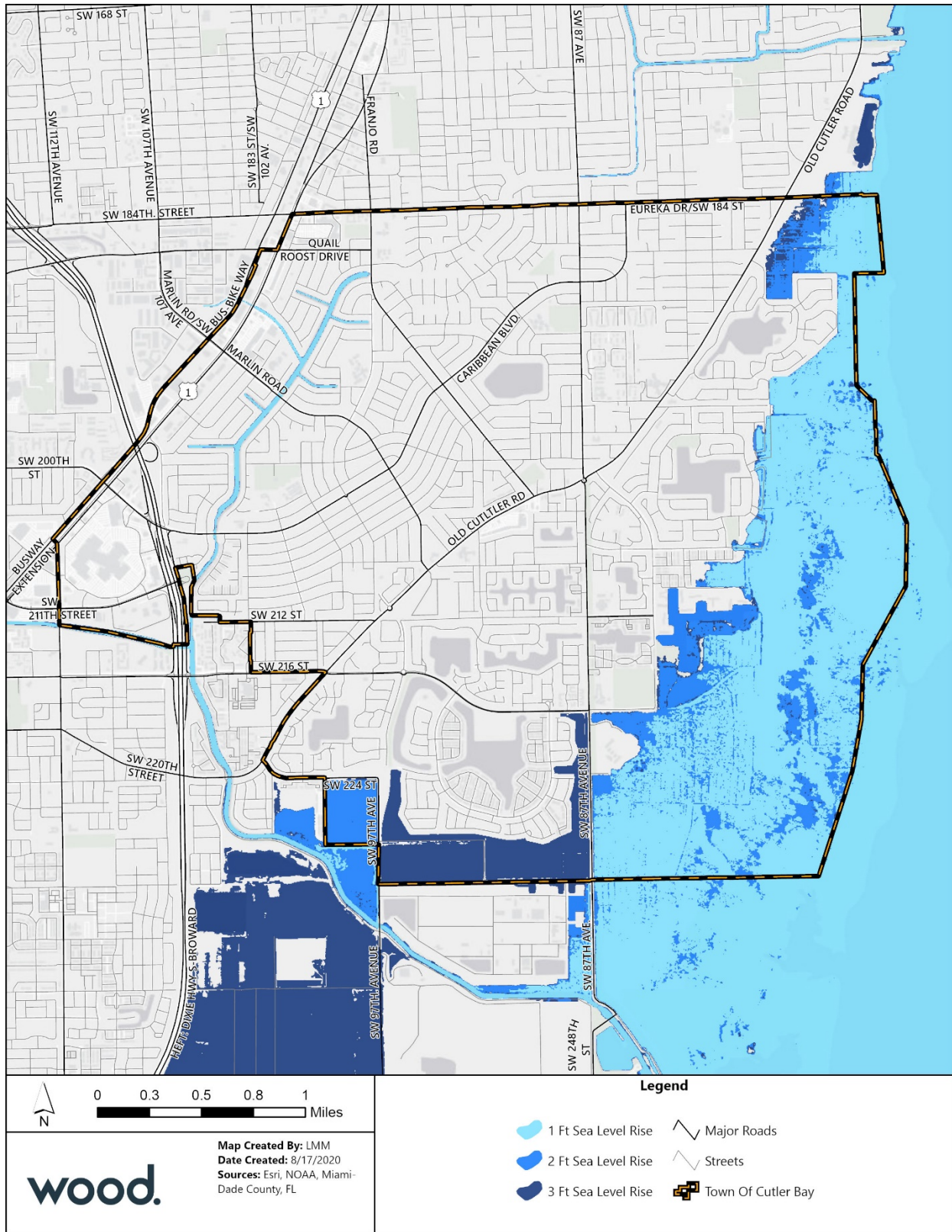
Source: USGS Coastal Change Hazards Portal

Extent

Sea level rise is measured by the number of feet of relative rise and the areas that such rise would inundate. The estimated impacts of 1-foot, 2-foot, and 3-foot, sea level rise are shown in Figure 4.6 according to data from the NOAA Sea Level Rise viewer. The sea level rise estimate maps show inundation above mean higher high water (the average of each day’s higher high tide line). Sea level rise will likely affect coastal marsh lands as well as land along streams and canals, and it will likely increase future risk of flooding from the other flood hazards discussed later in this plan, as more land will have a lower elevation relative to sea level.

Impact: 3 – Critical

Figure 4.6 – Projected Inundation from 1-Foot, 2-Foot, and 3-Foot Sea Level Rise



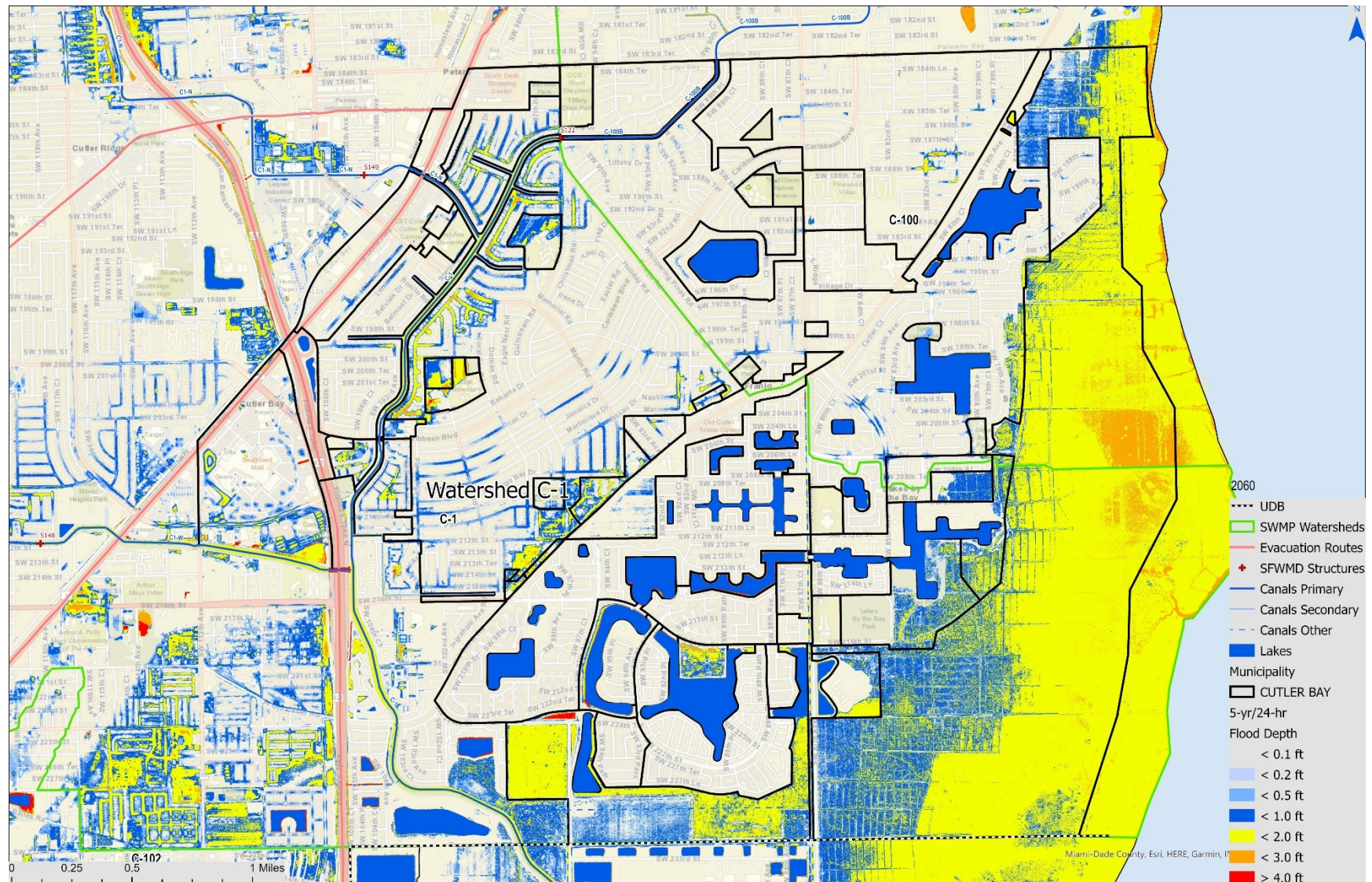


Another way to measure the extent and magnitude of sea level rise is to assess the potential flooding that may occur during rainfall events on top of an increased base sea level. Miami-Dade County is currently updating its county-wide stormwater master plan and has mapped inundation for eight design storms on top of 2060 sea-level rise conditions, estimated using 2020 tidal conditions and adding two feet of sea level rise. Figure 4.7 through Figure 4.14 illustrate the following simulations:

- ▶ 5-year, 24-hour, with 2060 sea-level rise
- ▶ 10-year, 24-hour, with 2060 sea-level rise
- ▶ 25-year, 24-hour, with 2060 sea-level rise
- ▶ 5-year, 72-hour, with 2060 sea-level rise
- ▶ 10-year, 72-hour, with 2060 sea-level rise
- ▶ 25-year, 72-hour, with 2060 sea-level rise
- ▶ 100-year, 72-hour, with 2060 sea-level rise
- ▶ 500-year, 72-hour, with 2060 sea-level rise

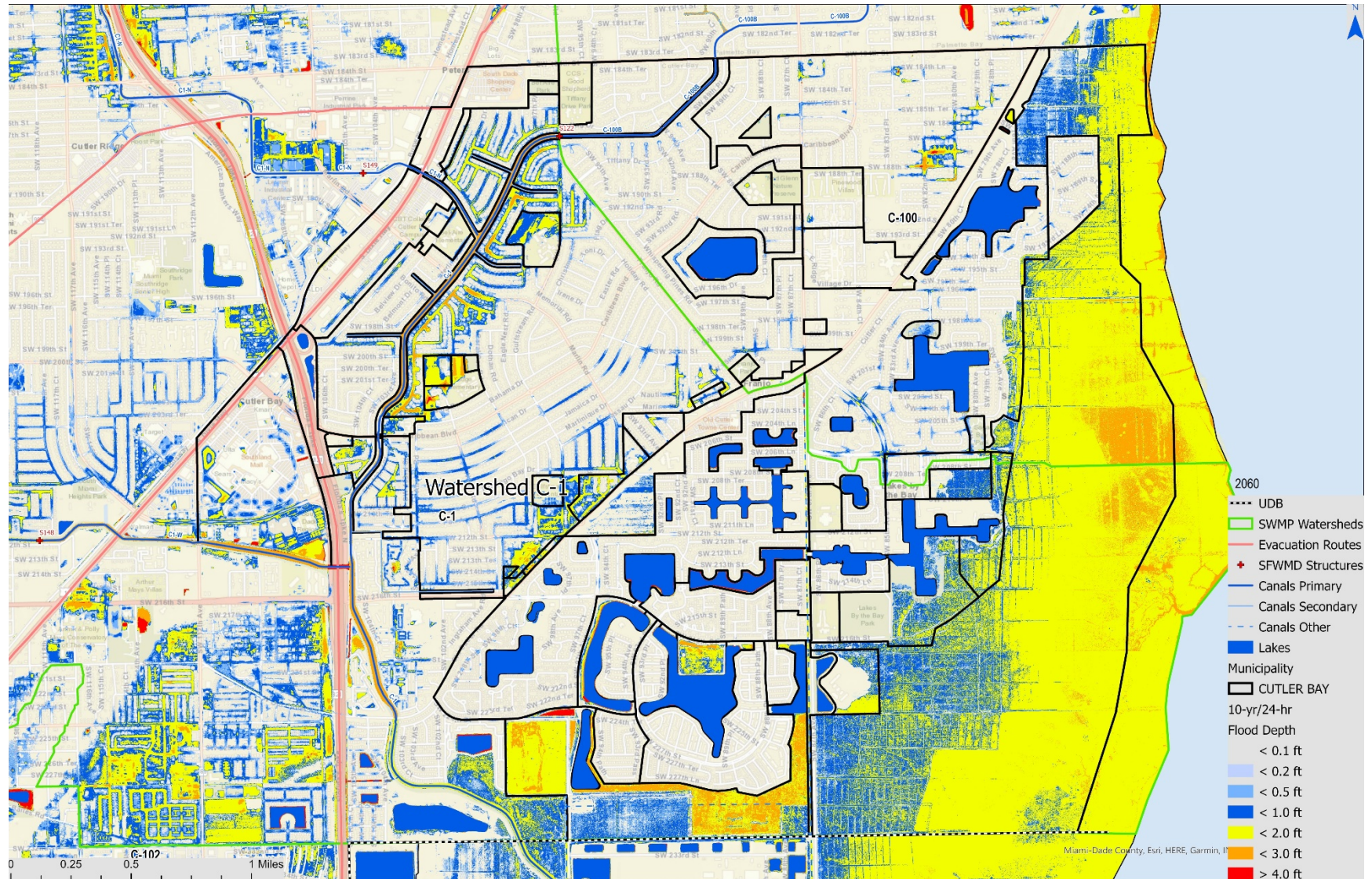
While NOAA's mapping shows direct coastal inundation from sea-level rise, this approach from Miami-Dade County helps to illustrate how sea-level rise may indirectly impact drainage and lead to flooding along streets and canals throughout the Town. Areas along Cutler Ridge and the C-100 canal are at heightened risk.

Figure 4.7 – Estimated Inundation from the 5-Year, 24-Hour Design Storm with 2060 Sea-Level Rise



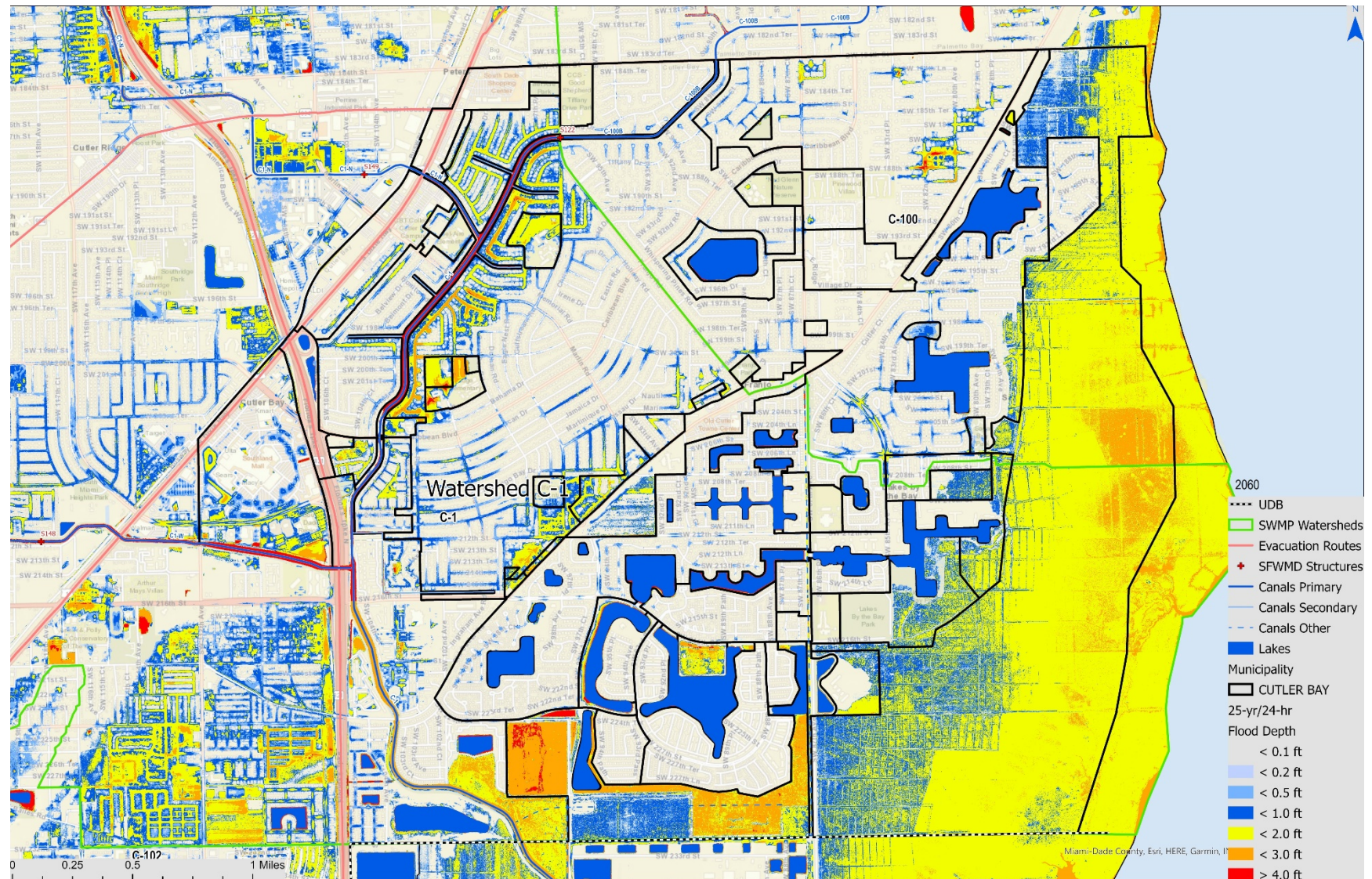
Source: Miami-Dade County Department of Regulatory and Economic Resources, Division of Environmental Resources Management

Figure 4.8 – Estimated Inundation from the 10-Year, 24-Hour Design Storm with 2060 Sea-Level Rise



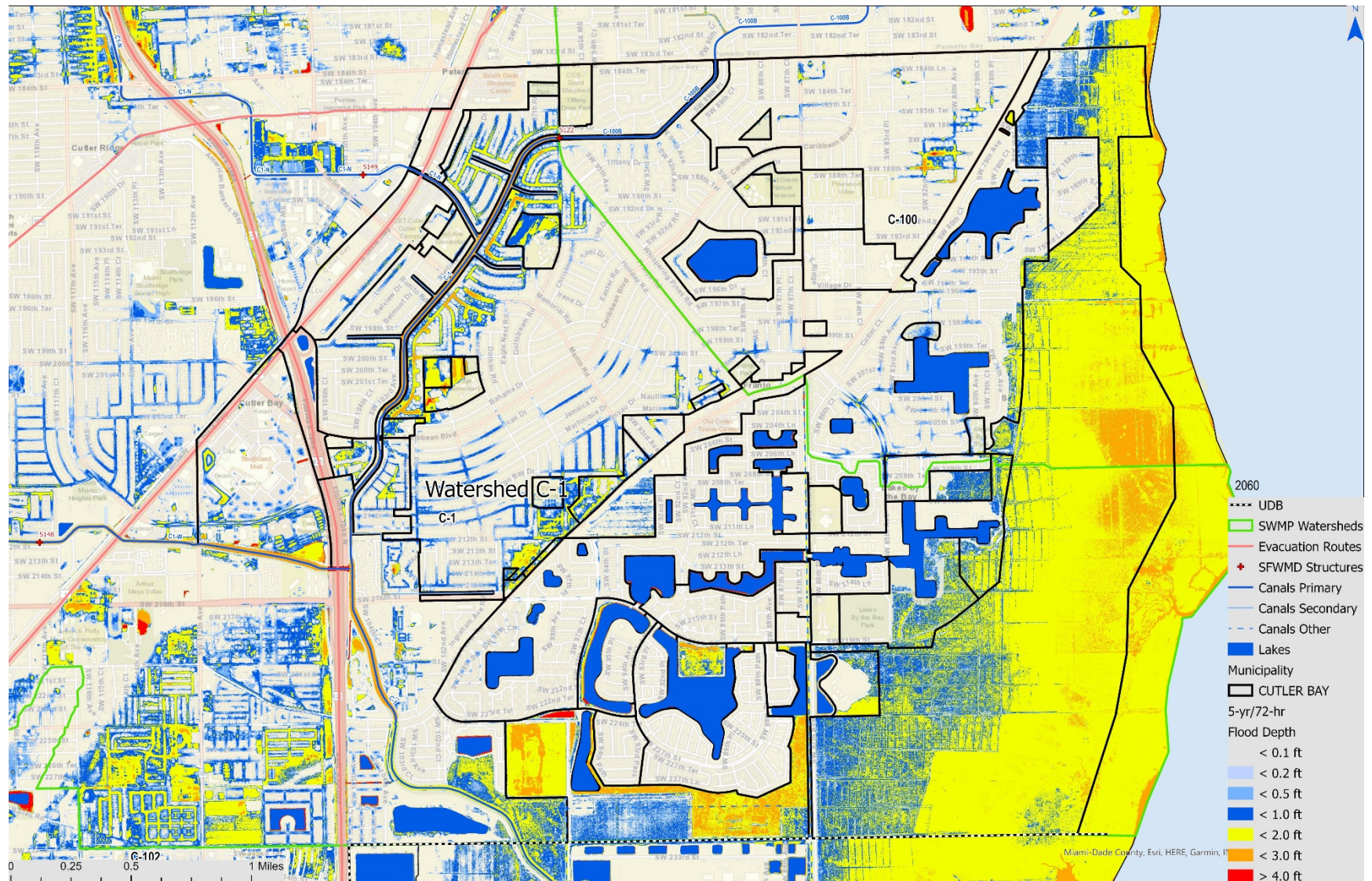
Source: Miami-Dade County Department of Regulatory and Economic Resources, Division of Environmental Resources Management

Figure 4.9 – Estimated Inundation from the 25-Year, 24-Hour Design Storm with 2060 Sea-Level Rise



Source: Miami-Dade County Department of Regulatory and Economic Resources, Division of Environmental Resources Management

Figure 4.10 – Estimated Inundation from the 5-Year, 72-Hour Design Storm with 2060 Sea-Level Rise



Source: Miami-Dade County Department of Regulatory and Economic Resources, Division of Environmental Resources Management

Figure 4.11 – Estimated Inundation from the 10-Year, 72-Hour Design Storm with 2060 Sea-Level Rise

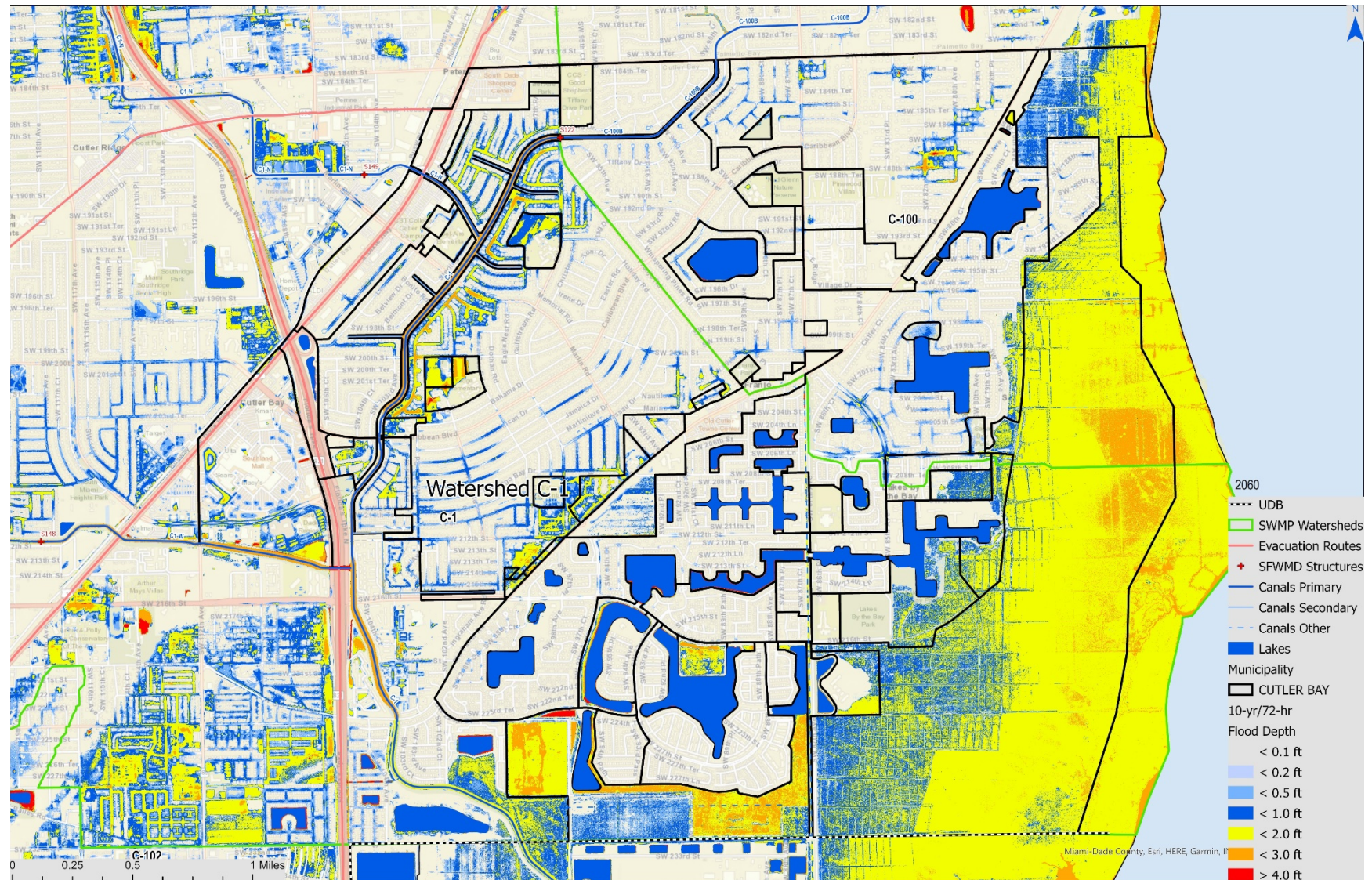


Figure 4.12 – Estimated Inundation from the 25-Year, 72-Hour Design Storm with 2060 Sea-Level Rise

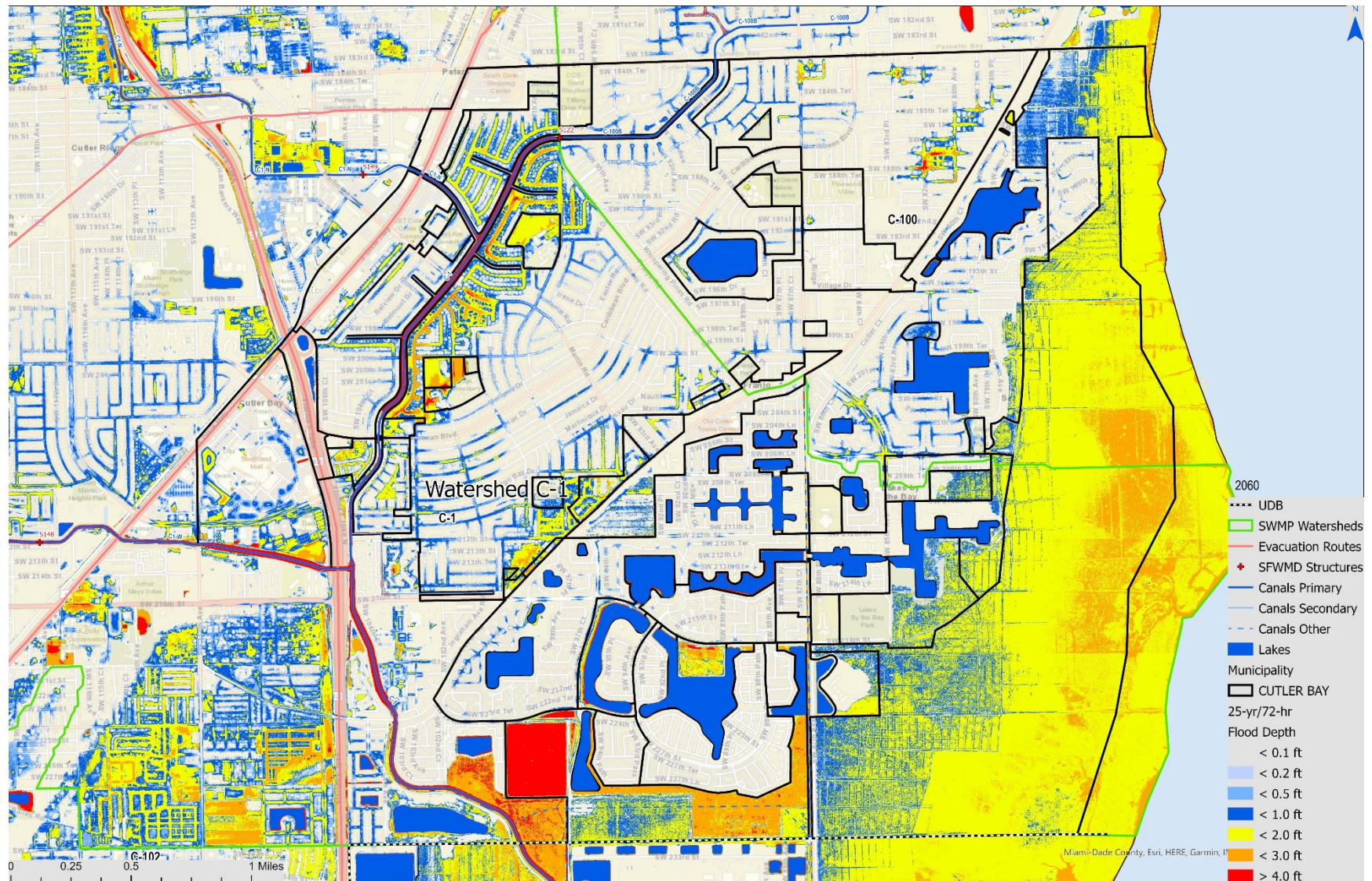
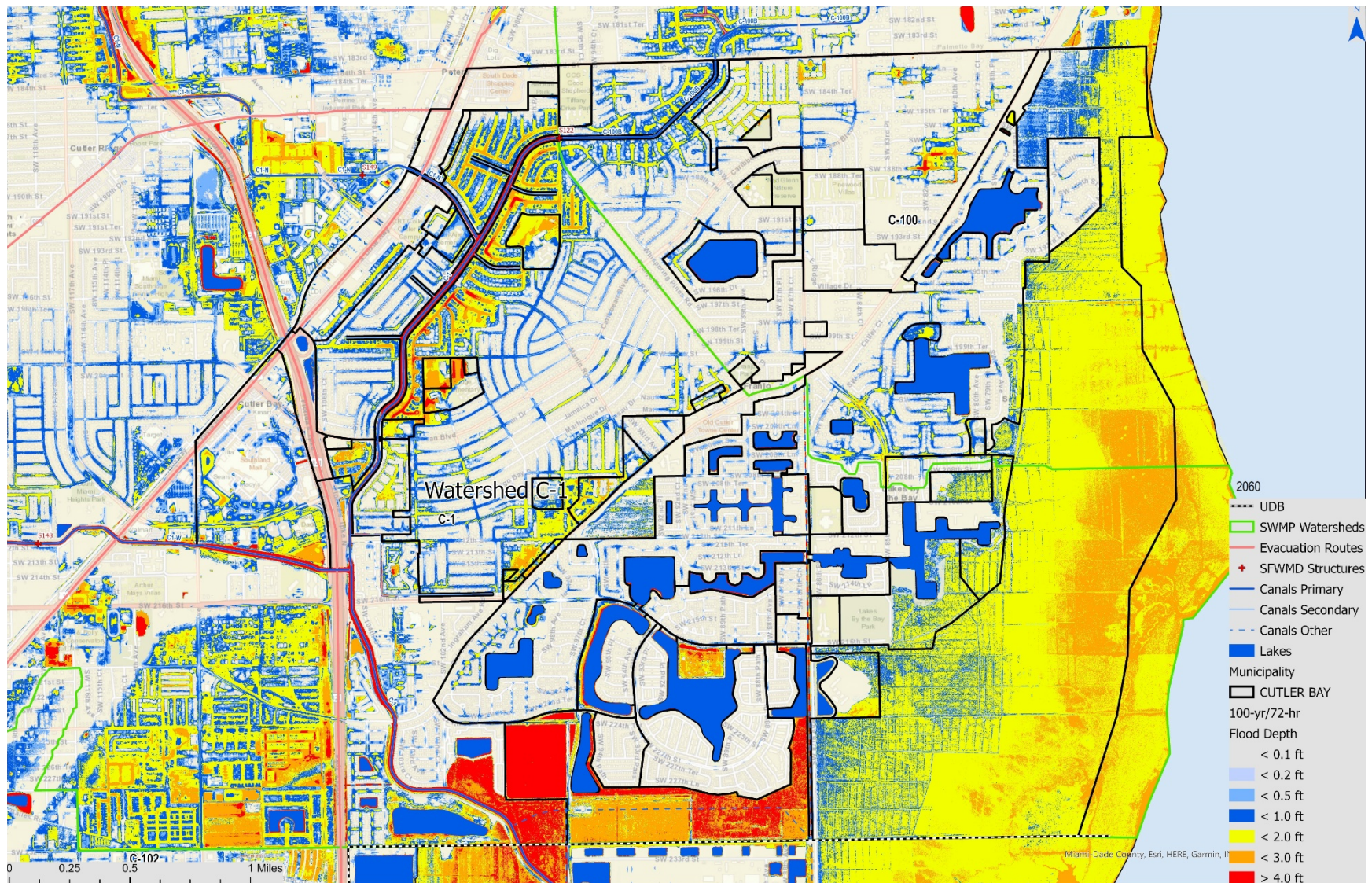
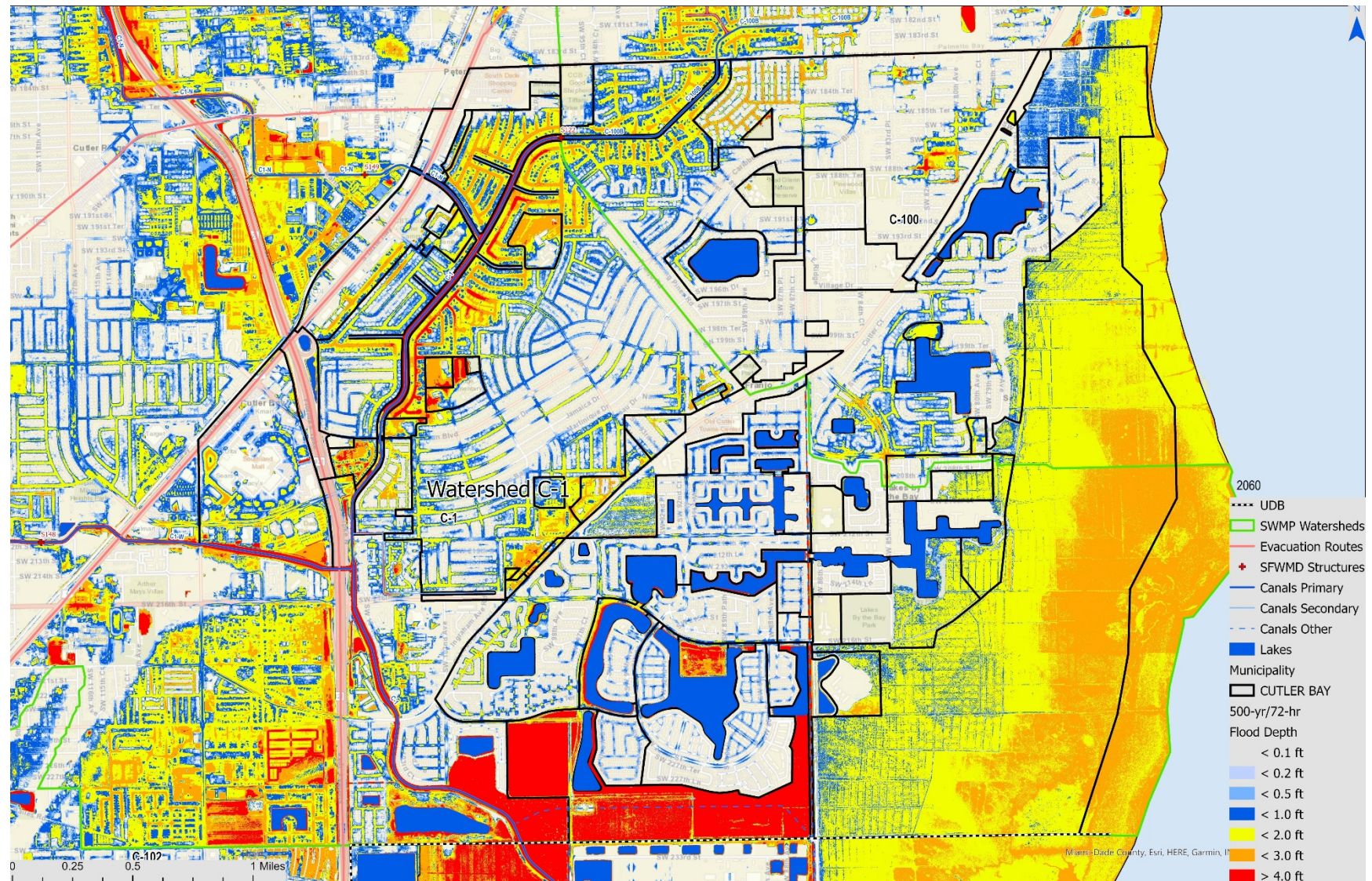


Figure 4.13 – Estimated Inundation from the 100-Year, 72-Hour Design Storm with 2060 Sea-Level Rise



Source: Miami-Dade County Department of Regulatory and Economic Resources, Division of Environmental Resources Management

Figure 4.14 – Estimated Inundation from the 500-Year, 72-Hour Design Storm with 2060 Sea-Level Rise

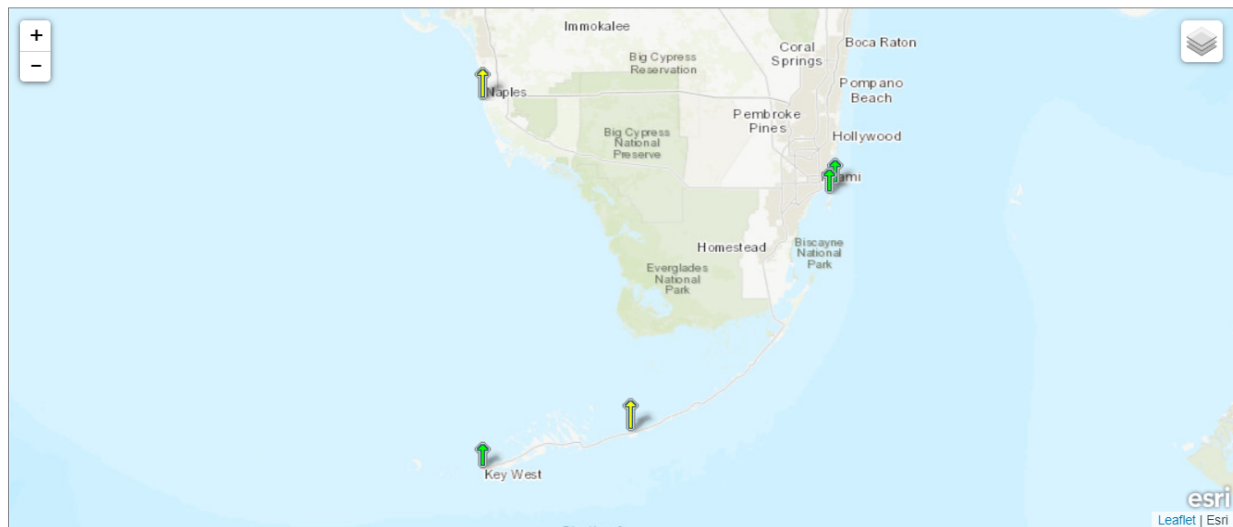


Source: Miami-Dade County Department of Regulatory and Economic Resources, Division of Environmental Resources Management

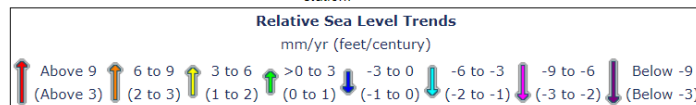
Past Occurrences

Historic trends in local Mean Sea Level (MSL) are best determined from tide gauge records. The Center for Operational Oceanographic Products and Services (CO-OPS) within NOAA has been measuring sea level for over 150 years, with tide stations operating on all U.S. coasts. Changes in MSL, either a sea level rise or sea level fall, have been computed at 128 long-term water level stations using a minimum span of 30 years of observations at each location. These measurements have been averaged by month to remove the effect of higher frequency phenomena (e.g. storm surge) in order to compute an accurate linear sea level trend. Figure 4.15 illustrates the regional trends in sea level measured in South Florida.

Figure 4.15 – Florida Gulf/Atlantic Coast Sea Level Trends



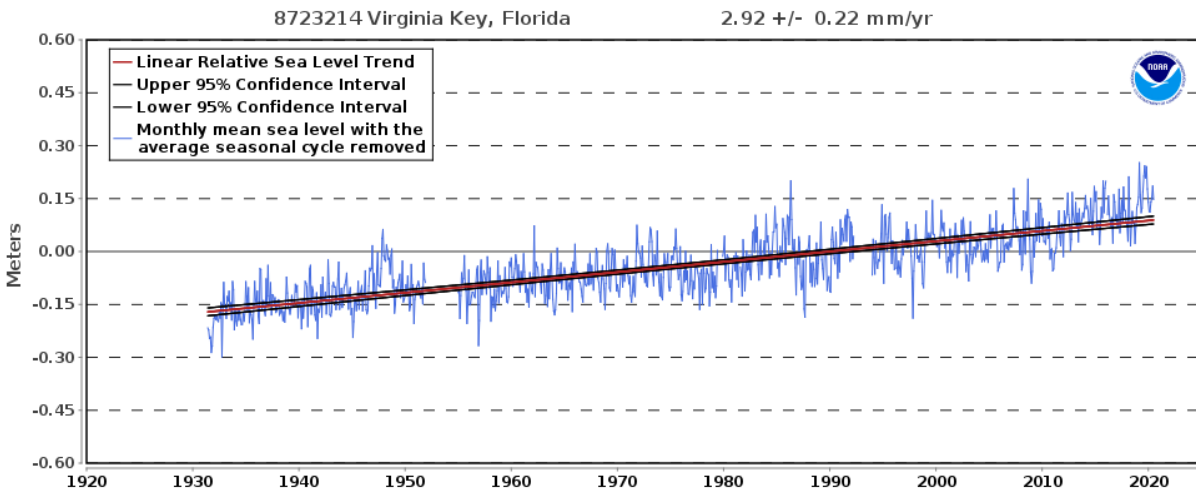
The map above illustrates relative sea level trends, with arrows representing the direction and magnitude of change. Click on an arrow to access additional information about that station.



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

At the Virginia Key station (indicated by the green arrow northeast of Cutler Bay), the relative sea level trend is 2.92 mm/year with a 95 percent confidence interval of +/- 0.22 mm/year based on monthly mean sea level data from 1931 to 2019, which is equivalent to a change of 0.96 feet in 100 years.

Figure 4.16 shows the monthly mean sea level at NOAA's Virginia Key, FL station which is the station located closest to the Cutler Bay planning area. The long-term linear trend is also shown, including its 95% confidence interval. The plotted values are relative to the most recent [Mean Sea Level datum established by CO-OPS](#).

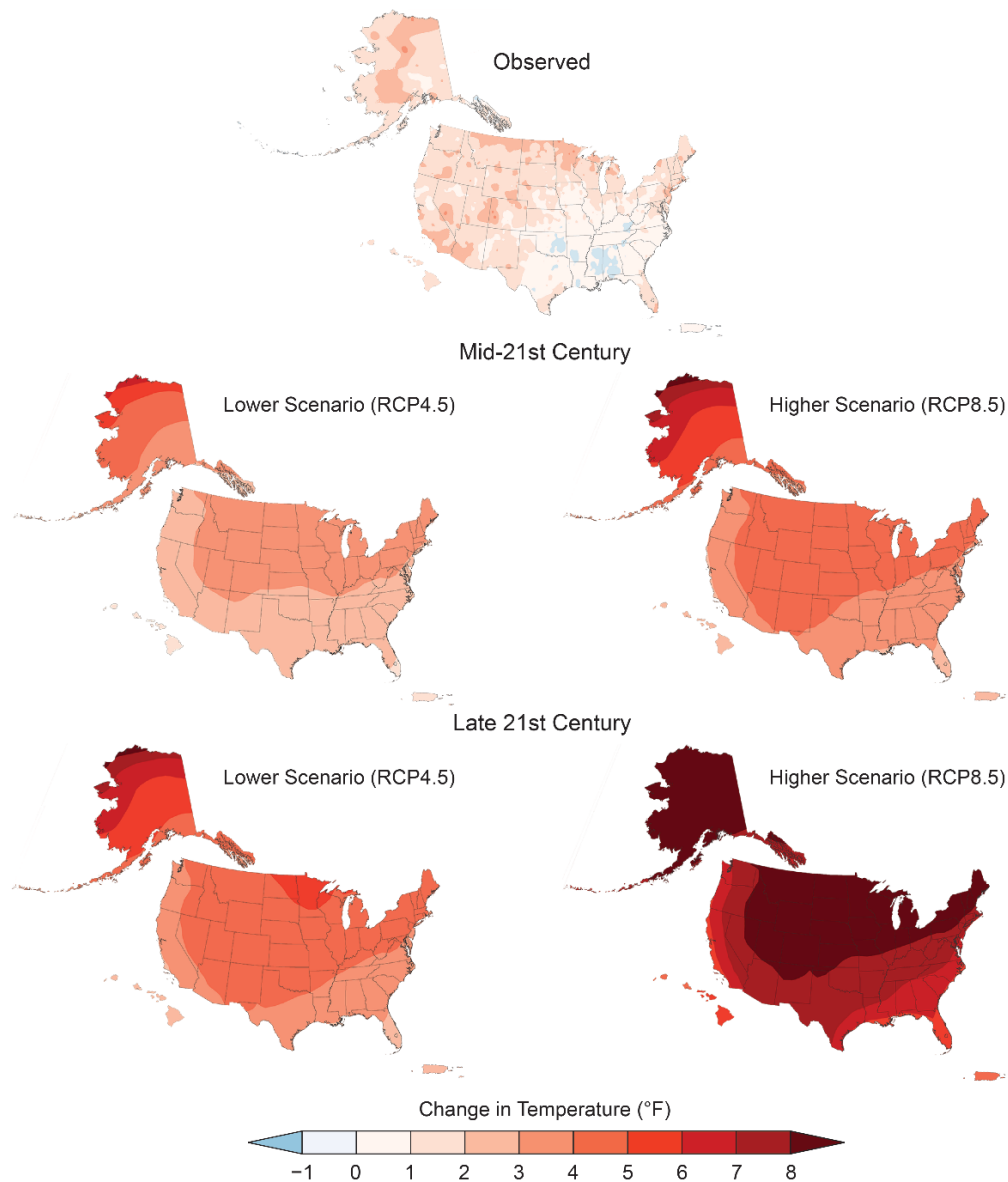
Figure 4.16 – Mean Sea Level Trend for Virginia Key, Florida

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

Probability of Future Occurrence

Temperature Trends

As previously mentioned, studies have shown that global temperature and sea level are strongly correlated. Per the Fourth National Climate Assessment, average temperature over the contiguous United States has risen by 1.2°F over the last few decades and by 1.8°F since 1901. Additional increases in annual average temperature of about 2.5°F are expected over the next few decades regardless of future emissions, and increases ranging from 3°F to 12°F are expected by the end of century depending on emissions scenario. Figure 4.17 below illustrates observed temperature change from 1986–2016 (relative to 1901–1960) as well as projected temperature change by mid-century (2036–2065) and end of century (2070–2099) relative to near present averages (1986–2015). South Florida has experienced an increase of 2-3°F and may experience up to an additional 5-6°F increase by the end of the century.

Figure 4.17 – Observed and Projected Temperature Change in the United States

Source: Fourth National Climate Assessment

Sea Level Trends

The Earth's changing climate will continue to drive nonlinear trends in Sea Level that deviate from historic trends. This is especially pertinent in the coastal communities of South Florida on the frontlines of climate change and sea level rise. Recognizing the variability in local sea level rise projections, the Southeast Florida Regional Climate Change Compact (SFRCCC) was created to unify the existing southeast Florida sea level rise projections and create a single projection for regional planning purposes. The SFRCCC consists of the county commissions of Monroe, Miami-Dade, Broward and Palm Beach Counties.

The SFRCCC developed a Unified Sea Level Rise Projection to ensure consistency in adaptation planning, policy, and infrastructure and siting design in the South Florida region. Key participants in developing existing sea level rise projections were invited to participate in the SFRCCC's Technical Ad hoc Work Group. The Work Group reviewed available scientific literature to develop a unified sea level rise projection to be



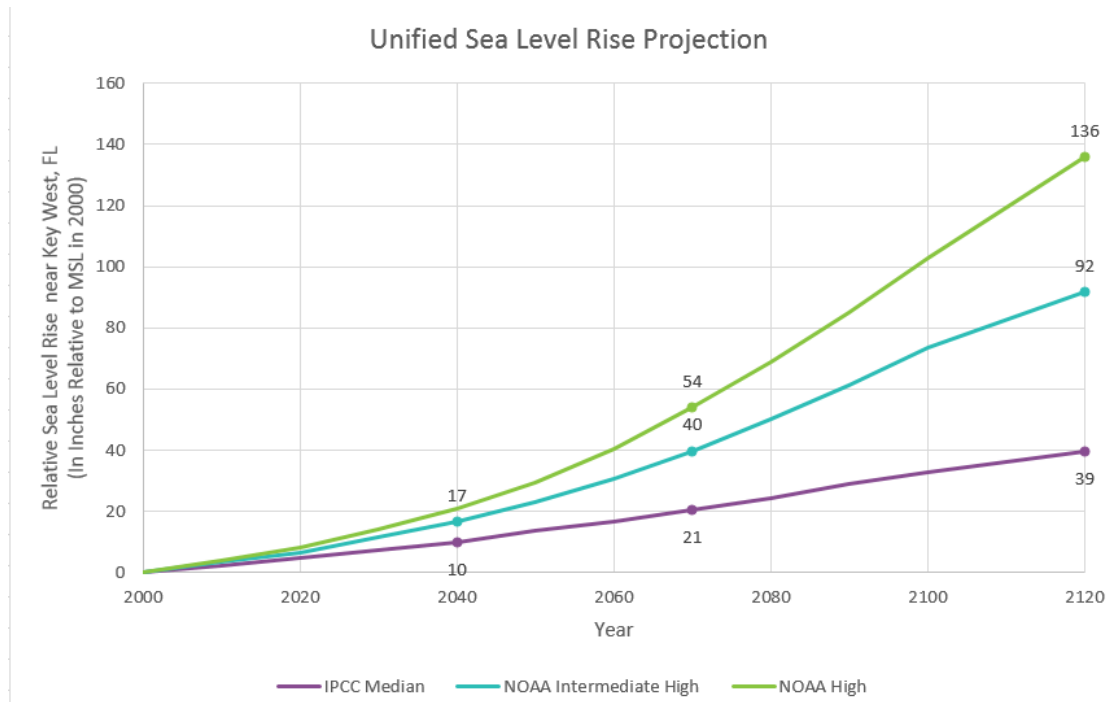
used as a guide for future policy decision makers. The Work Group ultimately agreed that the U.S. Army Corps of Engineers Guidance Document curves (USACE, 2009) offered a reasonable and defensive projection to be used for planning purposes in the southeast Florida region. The first unified projection was developed and released in 2011, updated in 2015, and most recently updated in 2019. Each update has incorporated new research and data.

The 2019 update incorporated the potential for faster rates of melting of the Antarctic Ice Sheet as well as regional sea level rise rates as reported in the Fourth National Climate Assessment. The most recent update begins in the year 2000, as this is the reference year for the most recently published NOAA projections, and uses two planning horizons: 20 years for land use (2040) and 50 years for infrastructure (2070). The projection used the Key West gauge as the reference gauge to maintain consistency with prior projections.

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

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

These projections are based on three global curves adapted for regional application: the median of the IPCC AR5 RCP 8.5 scenario as the lowest boundary, the NOAA Intermediate High Curve as the upper boundary for short term use (until 2070) and the NOAA High Curve as the upper boundary for medium and long-term use. Figure 4.18 below shows these projections. The IPCC Median Curve and the NOAA Intermediate High curve form the lower and upper bounds, respectively, for short-term use (through 2070). The IPCC median curve represents the most likely average sea level before 2070; sea level rise is unlikely to exceed the NOAA Intermediate High curve by 2100. The NOAA High curve forms the upper bound for medium- and long-term use. Sea level rise is *very unlikely* to be higher than this curve before 2100.

Figure 4.18 – Sea Level Rise Projections for South Florida (1992-2100)

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

According to the SFRCCC, scientific evidence strongly supports that sea level is rising and will continue to rise beyond 2060 even if mitigation efforts to reduce greenhouse gas emission are successful. Uncertainties in sea level rise projections do exist due to natural variability, limitations of existing computer models, and the inability to forecast human response in limiting greenhouse gas emissions. Therefore, projections will need to be reviewed and revised in the future as modeling capabilities improve and major findings in climate science data become available.

Ultimately, it is important to understand that sea level rise is not an endpoint but rather a continuing trend, and Cutler Bay must consider and plan for sea level rise in future policy decisions. Understanding trends in sea level, as well as the relationship between global and local sea level, provides critical information about the potential impacts of climate change and sea level rise on the Cutler Bay planning area. By examining local rates of sea level change and local projections for sea level rise at 10-17 inches by 2040 and 21-54 inches by 2070, Cutler Bay can begin to analyze and plan for the impacts of sea level rise in long-range planning.

Probability: 4 – Highly Likely

Vulnerability Assessment

Vulnerability—High

Cutler Bay, due to its location on the Atlantic Coast, is highly vulnerable to the potential impacts of climate change and sea level rise. Climate-driven hazards such as hurricanes and flooding are likely to increase in frequency, and possibly intensity, in the future. Thus the 25-year flood of today may become the 10-year event in the future. See the “Climate Change” section within each hazard profile for a discussion of how that hazard may be affected by climate change. This section focuses on an assessment of direct impacts from sea level rise, using best available data from Climate Central. The potential impacts of climate change and sea level rise include increased flooding frequency, potential damage to critical infrastructure, and



increasing public costs associated with flood insurance claims, infrastructure repair and maintenance, environmental impacts and increased costs associated with emergency management efforts.

Sea Level Rise

Sea level rise can have the following impacts on property and infrastructure in Cutler Bay:

- ▶ Coastal infrastructure: bridges, docks, piers
- ▶ Jettys/erosion control structures
- ▶ Roads and bridges
- ▶ Utility infrastructure
- ▶ Erosion hazard zones
- ▶ Built environment including residential development
- ▶ Natural resources
- ▶ Recreational facilities and amenities such as beaches, public access points, and parks
- ▶ Saltwater intrusion into water supply
- ▶ Loss of property and property tax revenue due to inundation

As discussed above, the SFRCCC projection for sea level rise in South Florida is 10-17 inches by 2040, 21 to 54 inches by 2070, and 40 to 136 inches by 2100. Table 4.10 provides an exposure analysis based on the elevation of land that structures are located on relative to local high tide. The results do not factor in structure elevation.

Based on this assessment, under the current SFRCCC's current projection for 2040, which is approximately one foot of sea level rise, Cutler Bay could have 712 homes, 1,694 individuals, and \$169 million in property value inundated by sea level rise. This property value at risk equates to 5.2% of the Town's total asset inventory.

Under the SFRCCC's worst case projection for 270, which is over 4 feet of sea level rise, Cutler Bay could have over 1,373 homes, 3,229 individuals, and \$398 million in property value inundated by sea level rise. This property value at risk equates to 12.1% of the Town's total asset inventory.

Table 4.10 – Sea Level Rise and Coastal Flood Exposure in Cutler Bay

Elevation relative to local high tide line (Mean Higher High Water)											
	Unit	< 1ft	< 2ft	< 3ft	< 4ft	< 5ft	< 6ft	< 7ft	< 8ft	< 9ft	< 10ft
By Totals											
High social vulnerability population	Count	859	1,236	1,468	1,900	3,423	5,341	7,318	9,449	10,767	11,484
Medium social vulnerability population	Count	5	10	22	91	539	2,604	6,342	9,700	11,347	11,825
Low social vulnerability population	Count	830	913	1,014	1,238	2,036	5,021	8,366	10,727	12,119	12,879
Property value	\$Million	169	253	310	398	641	1,195	1,918	2,524	2,898	3,101
Population	Count	1,694	2,159	2,504	3,229	5,998	12,966	22,026	29,877	34,232	36,188
Caucasian population	Count	1,281	1,628	1,887	2,451	4,649	10,160	17,424	23,725	27,235	28,819
Population of color	Count	465	597	693	868	1,503	3,125	5,144	6,875	7,823	8,247
African-American population	Count	349	454	530	662	1,127	2,273	3,654	4,842	5,505	5,801
Asian population	Count	48	57	64	85	166	389	678	919	1,054	1,114
Hispanic population	Count	970	1,250	1,451	1,868	3,340	7,066	12,001	16,382	18,681	19,643
Native American population	Count	13	19	22	26	45	100	179	241	279	296
Homes	Count	712	937	1,096	1,373	2,404	4,908	8,079	10,837	12,359	13,045
Hospitals	Count	0	0	0	0	0	0	0	0	0	1
Schools	Count	0	0	0	0	0	0	1	6	10	12
Colleges and Universities	Count	0	0	0	0	0	0	0	1	1	2
Libraries	Count	0	0	0	0	0	0	0	0	1	1
Houses of worship	Count	0	0	0	0	0	2	2	3	3	4
Government buildings	Count	0	0	0	0	0	0	0	2	5	6
Roads	Miles	0	0	0	5	24	63	97	113	122	127
Federal roads	Miles	0	0	0	0	0	0	0	0	0	1
Local roads	Miles	0	0	0	5	24	63	97	113	122	125
Secondary roads	Miles	0	0	0	0	0	0	0	0	0	1
Passenger stations	Count	0	0	0	0	0	0	0	1	1	1
Intercity bus stations	Count	0	0	0	0	0	0	0	1	1	1
Transit passenger stations	Count	0	0	0	0	0	0	0	1	1	1
Power plants	Count	0	0	0	0	0	0	0	1	1	1
Commercial & industrial power plants	Count	0	0	0	0	0	0	0	1	1	1
EPA listed sites	Count	0	0	0	2	2	4	7	13	20	24
NPDES sites	Count	0	0	0	0	0	1	1	5	7	8
RADINFO sites	Count	0	0	0	0	0	1	4	6	11	14

Elevation relative to local high tide line (Mean Higher High Water)											
	Unit	< 1ft	< 2ft	< 3ft	< 4ft	< 5ft	< 6ft	< 7ft	< 8ft	< 9ft	< 10ft
Hazardous waste sites	Count	0	0	0	0	0	1	4	6	11	14
Minor hazwaste source sites	Count	0	0	0	0	0	0	3	4	6	7
Unspecified hazardous waste sites	Count	0	0	0	0	0	1	1	2	5	7
Wastewater sites	Count	0	0	0	0	0	1	1	5	7	8
Nonmajor wastewater sites	Count	0	0	0	0	0	1	1	5	7	8
Sewage plants	Count	0	0	0	2	2	2	2	2	2	2
Land	Acres	619	834	915	1,036	1,345	2,095	3,126	4,059	4,646	4,967
Protected land	Acres	247	406	445	460	469	475	483	493	500	505
Local protected land	Acres	36	66	74	78	84	88	96	106	113	118

Source: Climate Central 2014, Findings from Surging Seas (riskfinder.climatecentral.org)

4.4.2 Coastal/Canal Bank Erosion

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Coastal/Canal Bank Erosion	Likely	Minor	Small	More than 24 hrs	More than 1 week	2.1

Hazard Description

Coastal Erosion

Coastal erosion is a process whereby large storms, flooding, strong wave action, sea level rise, and human activities, such as inappropriate land use, alterations, and shore protection structures, wears away the beaches and bluffs along the coast. Erosion undermines and often destroys homes, businesses, and public infrastructure and can have long-term economic and social consequences. According to NOAA, coastal erosion causes approximately \$500 million per year in coastal property loss in the United States, including damage to structures and loss of land. To mitigate coastal erosion, the federal government spends an average of \$150 million every year on beach nourishment and other shoreline erosion control measures.

Coastal erosion has both natural causes and causes related to human construction activities. Gradual coastal erosion results naturally from the very slow rise of sea-level. Severe coastal erosion can occur over a very short period of time when the state is impacted by hurricanes, tropical storms and other weather systems. In Florida, sand is moved parallel to most beaches by longshore drift and currents. Sand is continually removed by longshore currents in some areas but it is also continually replaced by sand carried in by the same type of currents. Structures such as piers or sea walls, jetties, and navigational inlets may interrupt the movement of sand, and sand can become “trapped” in one place by these types of structures. The currents will continue to flow, though depleted of sand trapped elsewhere which leads to erosion.

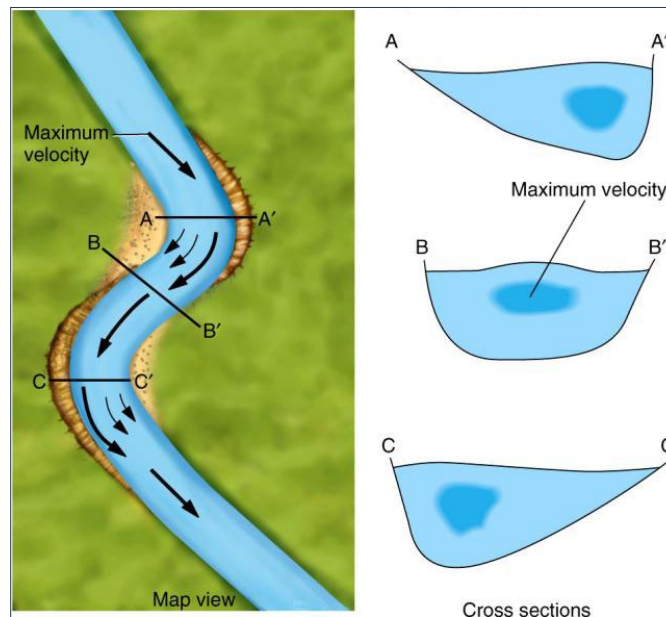
Canal Bank Erosion

Streams/canals erode by a combination of direct stream processes, like down cutting and lateral erosion, and indirect processes, like mass-wasting accompanied by transportation. When the channel bends, water on the outside of the bend (the cut-bank) flows faster and water on the inside of the bend (the point) flows slower as shown in Figure 4.19. This distribution of velocity results in erosion occurring on the outside of the bend and deposition occurring on the inside of the bend.

Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects. Stream bank erosion processes, although complex, are driven by two major components: stream bank characteristics (erodibility) and hydraulic/gravitational forces. Many land use activities can affect both of these components and lead to accelerated bank erosion. The vegetation rooting characteristics can protect banks from fluvial entrainment and collapse, and also provide internal bank strength. When riparian vegetation is changed from woody species to annual grasses and/or forbs, the internal strength is weakened, causing acceleration of mass wasting processes. When land use changes occur in a watershed, such as clearing land for agriculture or development, runoff increases. With this increase in runoff the stream channel will adjust to accommodate the additional flow, increasing streambank erosion. Stream bank aggradation or degradation is often a response to stream channel instability. Since bank erosion is often a symptom of a larger, more complex problem, the long-term solutions often involve much more than just bank stabilization.

Warning Time: 1 – More than 24 hours

Duration: 4 – More than 1 week

Figure 4.19 – Stream Meanders**Location**

Erosion can occur anywhere along the Biscayne Bay shoreline or along any of the Town's canals.

Spatial Extent: 2 – Small

Extent

Erosion rates and potential impacts are highly localized. Average coastline recession rates of 25 feet per year are not uncommon on some barrier islands in the Southeast. Severe storms can remove even wider beaches, along with substantial dunes, in a single event. In undeveloped areas, these high recession rates are not likely to cause significant concern, but in some heavily populated locations, one or two feet of erosion may be considered catastrophic (NOAA, 2014).

The severity of coastal erosion is typically measured through a quantitative assessment of annual shoreline change for a given beach cross-section profile (feet or meters per year) over a long period of time. Erosion rates vary as a function of shoreline type and are influenced primarily by episodic events but can be used in land use and hazard management to define areas of critical concern. The 2020 update of the Florida Department of Environmental Protection (FDEP), Office of Resilience and Coastal Protection's "Critically Eroded Beaches in Florida" report, which inventoried critically eroded areas along the Atlantic and Gulf coasts, did not identify any areas of erosion within the Cutler Bay planning area. Fortunately, Biscayne National Park forms the eastern boundary of the Cutler Bay planning area along Biscayne Bay. The shoreline in this area is protected from coastal erosion by the absence of development and the tangled root systems of the mangroves that are preserved in this area.

On canals, erosion may be measured by mass wasting events or decreased capacity due to sedimentation.

Impact: 2 – Limited

Past Occurrences

Miami-Dade County has been addressing coastal erosion since 1975 and invests approximately \$6 million annually in beach restoration. However, unlike other communities within Miami-Dade County affected

by coastal erosion, the shoreline of Biscayne Bay (the eastern boundary of the Cutler Bay planning area) is protected by mangroves within Biscayne National Park which assist in shoreline protection and stabilization. The tangled root systems of the mangroves trap sediments which prevents coastal erosion. Mangroves also assist in buffering the coastal zone from tropical storms and hurricanes as their branches and root systems create friction that reduces the force of winds and waves. Therefore, the mangroves play a large role in protecting Cutler Bay from coastal erosion. One past occurrence of significant beach erosion was recorded in NCEI as a high surf event associated with Hurricane Matthew. This event caused an estimated \$600,000 of damage to Miami-Dade beaches. This is the type of damage that Cutler Bay's natural shoreline protects against.

Cutler Bay has reported localized instances of limited canal erosion. The NCEI Storm Events database does not contain records of canal bank erosion. As noted above, the FDEP's 2020 "Critically Eroded Beaches in Florida" report did not identify any areas of erosion in Cutler Bay.

Probability of Future Occurrence

Cutler Bay has experienced canal bank erosion in the past. Canal bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects. Erosion has occurred and will occur as a matter of course on an occasional basis in all canal bank areas. Several known localized instances of canal erosion indicate that this hazard should be considered as an possible future occurrence.

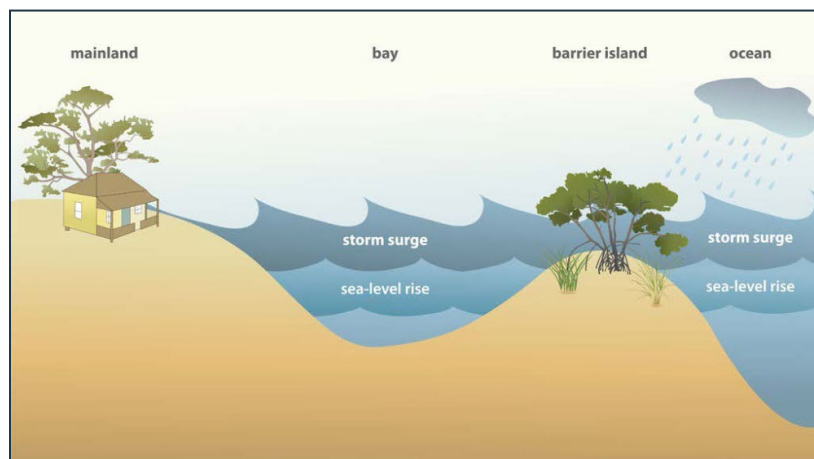
Coastal erosion is unlikely for Cutler Bay due to the existing natural protections on the shoreline. However, it is paramount that Cutler Bay continues to maintain the natural flood protection benefits and floodplain functions provided by Biscayne National Park. This coastal flood zone should remain preserved and undeveloped to continue to protect the Cutler Bay planning area from coastal erosion.

Probability: 2 – Possible

Climate Change and Coastal/Canal Bank Erosion

Coastal erosion is expected to increase as a result of rising seas. Sea level rise will raise all tide levels, from low tide to storm surge. Wave action at higher tide levels may cause erosion of sandy beaches. Higher storm surges, which may be accompanied by stronger storm winds, could wash over the tops of sand dunes, flooding the burrows of dune-nesting animals. The combined effects of wind and waves could damage dunes, leaving the beachfront more vulnerable. (UF/IFAS Extension, 2013).

Figure 4.20 – Sea Level Rise and Coastal Erosion of Dunes



Credits: Jane Hawkey, IAN Image Library (ian.umces.edu/imagelibrary/)



Climate change is also expected to make heavy rain events and tropical storms and hurricanes more frequent and intense. As a result, the erosion typically caused by these storms can be expected to occur more frequently. According to the Center of Ocean Solutions, there has been a dramatic increase in coastal erosion over the last two decades and this is expected to continue as sea level rises and storm frequency and severity increase. Rather than occurring over the same time scale with sea level rise, erosion of beaches and coastal cliffs is expected to occur in large bursts during storm events as a result of increased wave height and storm intensity. Because of these large events, scientific models predict that shoreline erosion may outpace sea level rise by 50- to 200-fold. Erosion will have significant effects on coastal habitats, which can lead to social and economic impacts on coastal communities. With the reduction of coastal habitats and the ecological services they provide, coastal communities will experience more frequent and destructive flooding, compromised water supplies and smaller or fewer beaches.

Vulnerability Assessment

Vulnerability—Medium

Data on erosion rates along the Town of Cutler Bay coastline was not available. The Florida Department of Environmental Protection (FDEP), Office of Resilience and Coastal Protection’s “Critically Eroded Beaches in Florida” report, which inventoried critically eroded areas along the Atlantic and Gulf coasts, did not identify any areas of erosion within the Cutler Bay planning area.

There is no development directly on the Town’s coast; therefore, building exposure and potential property damage from coastal erosion is minimal. The Town’s coastline is largely protected by the network of mangroves in Biscayne National Park.

4.4.3 Dam/Levee Failure

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Dam/Levee Failure	Unlikely	Limited	Small	6 to 12 hours	Less than 1 week	1.9

Hazard Description

Dam Failure

A dam is a barrier constructed across a watercourse that stores, controls, or diverts water. Dams are usually constructed of earth, rock, or concrete. The water impounded behind a dam is referred to as the reservoir and is measured in acre-feet. One acre-foot is the volume of water that covers one acre of land to a depth of one foot. Dams can benefit farm land, provide recreation areas, generate electrical power, and help control erosion and flooding issues.

A dam failure is the collapse or breach of a dam that causes downstream flooding. Dam failures may be caused by natural events, human-caused events, or a combination. Due to the lack of advance warning, failures resulting from natural events, such as hurricanes, earthquakes, or landslides, may be particularly severe. Prolonged rainfall and subsequent flooding is the most common cause of dam failure.

Dam failures usually occur when the spillway capacity is inadequate and water overtops the dam or when internal erosion in dam foundation occurs (also known as piping). If internal erosion or overtopping cause a full structural breach, a high-velocity, debris-laden wall of water is released and rushes downstream, damaging or destroying anything in its path. Overtopping is the primary cause of earthen dam failure in the United States.

Dam failures can result from any one or a combination of the following:

- ▶ Prolonged periods of rainfall and flooding;
- ▶ Inadequate spillway capacity, resulting in excess overtopping flows;
- ▶ Internal erosion caused by embankment or foundation leakage or piping;
- ▶ Improper maintenance, including failure to remove trees, repair internal seepage problems, replace lost material from the cross-section of the dam and abutments, or maintain gates, valves, and other operational components;
- ▶ Improper design, including the use of improper construction materials and construction practices;
- ▶ Negligent operation, including the failure to remove or open gates or valves during high flow periods;
- ▶ Failure of upstream dams on the same waterway; and
- ▶ High winds, which can cause significant wave action and result in substantial erosion.

Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Impacts to life safety will depend on the warning time and the resources available to notify and evacuate the public. Major casualties and loss of life could result, as well as water quality and health issues. Potentially catastrophic effects to roads, bridges, and homes are also of major concern. Associated water quality and health concerns could also be issues. Factors that influence the potential severity of a full or partial dam failure are the amount of water impounded; the density, type, and value of development and infrastructure located downstream; and the speed of failure.

The National Inventory of Dams (NID) is a database of dams in the United States which was developed and is maintained by the USACE. Congress authorized the USACE to inventory dams as part of the 1972 National Dam Inspection Act. Several subsequent acts have authorized maintenance of the NID and

provided funding. The USACE collaborates with FEMA and state regulatory offices to collect data on dams. The goal of the NID is to include all dams in the United States which meet at least one of the following criteria:

- 1) High hazard classification - loss of at least one human life is likely if the dam fails
- 2) Significant hazard classification - possible loss of human life and likely significant property or environmental destruction
- 3) Equal or exceed 25 feet in height and exceed 15 acre-feet in storage
- 4) Equal or exceed 50 acre-feet storage and exceed 6 feet in height

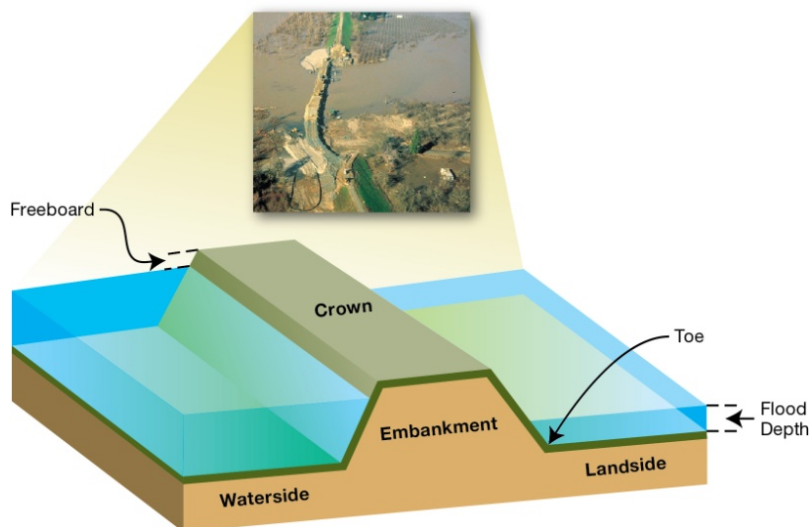
Low hazard dams which do not meet the criteria specified in number 3 or 4 are not included in the NID even if they are regulated according to state criteria. In some states, the number of these dams is several times the number of dams included in the NID.

Levee Failure

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 4.21 below shows the components of a typical levee.

Figure 4.21 – 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.

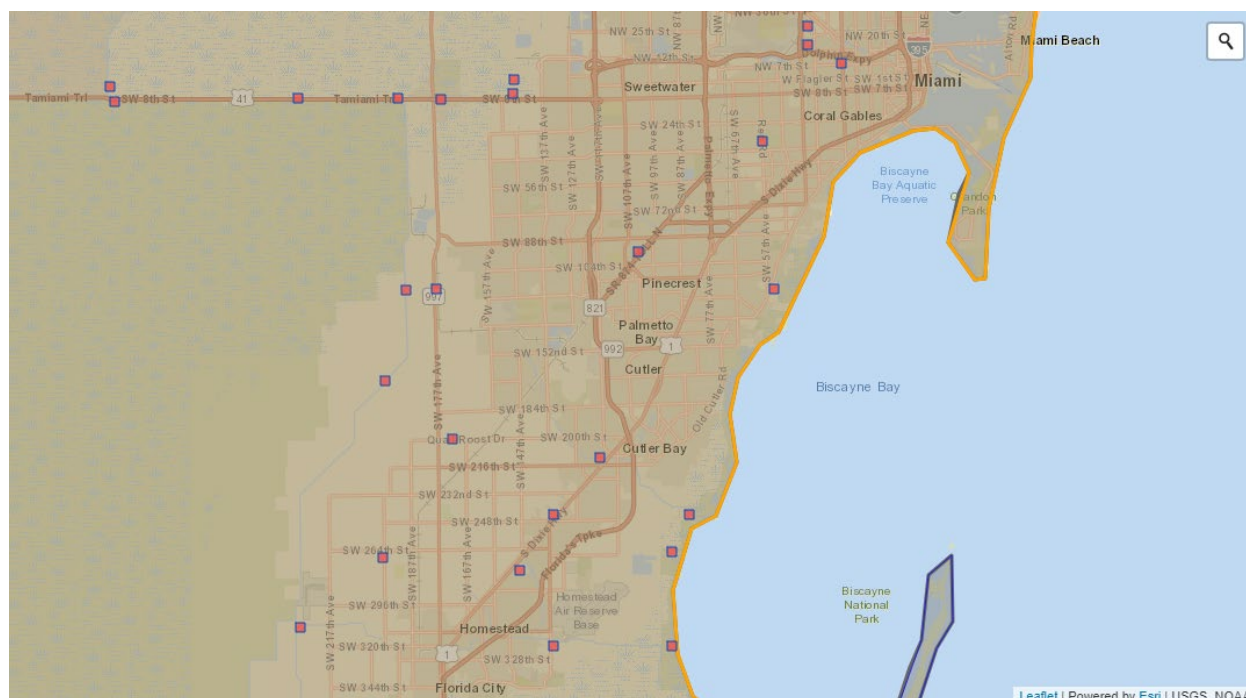
Warning Time: 3 – 6 to 12 hours

Duration: 3 – Less than 1 week

Location

Figure 4.22 reflects all dams included in the NID that are located around the Cutler Bay planning area. There are no dams actually located within the jurisdictional boundaries of Cutler Bay. Table 4.11 details the 35 dams located within Miami-Dade County that are included in the NID. All of these dams are owned by the South Florida Water Management District.

Figure 4.22 – National Inventory of Dams for Cutler Bay



Source: U.S. Army Corps of Engineers National Inventory of Dams

Table 4.11 – National Inventory of Dams, Miami-Dade County

Dam Name	NIDID	Hazard Class	Height (Ft.)	NID Storage (acre-feet)	Primary Purpose	River
Structure No. 176	FL00373	L	23	242	Flood Control	Aerojet Canal (C-111)
Structure No. 173	FL00376	L	20	2,977	Flood Control	Levee 31N Borrow Canal
Structure No. 196	FL00377	L	13	853	Flood Control	Mowry Canal (C-103)
Structure No. 194	FL00381	S	24	495	Flood Control	Princeton Canal (C-102)
Structure No. 30	FL00383	S	14	2,726,900	Flood Control	Snake Creek Canal (C-9)
Structure No. 32	FL00385	L	16	92	Flood Control	Levee 33 Borrow Canal
Structure No. 166	FL00386	L	23	1,270	Flood Control	Mowry Canal (C-103(N))
Structure No. 165	FL00387	L	22	545,380	Flood Control	Princeton Canal (C-102)
Structure No. 179	FL00388	L	32	507	Flood Control	Mowry Canal (C-103)
Structure No. 197	FL00389	L	14	527	Flood Control	Aerojet Canal (C-111)
Structure No. 148	FL00390	L	20	1,639	Flood Control	Black Creek (C-1)

Dam Name	NIDID	Hazard Class	Height (Ft.)	NID Storage (acre-feet)	Primary Purpose	River
Structure No. 121	FL00392	S	13	2,977	Flood Control	Cutler Drain Canal (C-100C)
Structure No. 22	FL00394	L	23	1,039	Flood Control	Snapper Creek Canal (C-2)
Structure No. 21	FL00399	L	20	1,039	Flood Control	Black Creek (C-1)
Structure No. 21a	FL00400	L	31	292	Flood Control	Princeton Canal (C-102)
Structure No. 20f	FL00401	L	32	292	Flood Control	Mowry Canal (C-103)
Structure No. 20a	FL00402	L	32	92	Flood Control	Canal 106
Structure No. 20	FL00403	L	27	507	Flood Control	Model Land Canal (C-107)
Structure No. 26	FL00404	S	25	812	Flood Control	Miami River (North Fork)
Structure No. 27	FL00405	L	20	1,326	Flood Control	Little River Canal (C-7)
Structure No. 28	FL00406	L	21	2,977	Flood Control	Biscayne Canal (C-8)
Structure No. 29	FL00407	L	21	1,000	Flood Control	Snake Creek Canal (C-9)
Structure No. 25b	FL00679	L	21	1,270	Flood Control	Tamiami Canal (C-4)
Structure 336	FL00683	L	18	853	Other	Tamiami Canal (C-4)
Structure 25	FL00688	L	13	527	Other	Comfort Canal (C-5)
Structure 338	FL00690	L	26	683	Other	Canal 1
Structure 32a	FL00691	L	17	495	Other	Levee 30 Borrow Canal
Structure 337	FL00693	L	15	495	Irrigation	S-31 Bypass Canal
G211 Control Structure	FL76001	L	22	1,460	Flood Control	C-1W Canal
C4 Edb East Control Structure	FL76002	S	11	1,400	Flood Control	Tamiami Canal
C4 Edb South Control Structure	FL76003	S	11	1,247	Flood Control	Tamiami Canal
G119 Control Structure	FL76004	L	22	3,410	Water Supply	Tamiami Canal (C-4)
G58 Control Structure	FL76005	S	14	1,500	Other	Arch Creek
G72 Control Structure	FL76007	L	14	545,380	Other	C-7 Extension Canal
G93 Control Structure	FL76008	H	12	560	Flood Control	C-3 Canal

Source: U.S. Army Corps of Engineers National Inventory of Dams

Figure 4.23 reflects all levees near the Town of Cutler Bay included in the U.S. Army Corps of Engineers National Levee Database (NLD). Levee centerlines are indicated in purple. Table 4.12 details all levees within a 25-mile radius of the Town of Cutler Bay as included in the NLD.

Table 4.12 – National Levee Database, Cutler Bay Planning Area

County(ies)	System Name	Sponsor	Length (mi)	Inspection Rating	Leveed Area Type
Broward, Hendry, Miami-Dade, Palm Beach	L-38 Section 2	SFWMD	3.74	Minimally Acceptable	Agricultural
Miami-Dade	East Coast, L-30	SFWMD	13.88	Minimally Acceptable	Urban
Broward, Miami-Dade	East Coast, L-33	SFWMD	8.17	Minimally Acceptable	Urban
Miami-Dade	L-31 East	SFWMD	18.91	Minimally Acceptable	Rural
Miami-Dade	L-31 North	SFWMD	21.11	Minimally Acceptable	Urban
Miami-Dade	L-31 West North	SFWMD	6.95	Minimally Acceptable	Urban
Miami-Dade	L-31 West South	SFWMD	4.13	Minimally Acceptable	Urban
Miami-Dade	8.5 Square Mile Area	SFWMD	13.38	Minimally Acceptable	Urban
Miami-Dade	L-31W Segment 3	SFWMD	5.15	Minimally Acceptable	Agricultural



County(ies)	System Name	Sponsor	Length (mi)	Inspection Rating	Leveed Area Type
Miami-Dade	C-111 SD South L-322 L-323	SFWMD	6.76	Minimally Acceptable	Agricultural
Miami-Dade	C-111 SD South L-320	SFWMD	5.15	Not Reported	Not Reported
Miami-Dade	C-111 SD North L-315	SFWMD	6.13	Not Reported	Not Reported
Miami-Dade	C-111 SD North L-316	SFWMD	5.27	Not Reported	Not Reported
Broward, Collier, Miami-Dade, Monroe	L-29	SFWMD	45.38	Unacceptable	Agricultural
Broward, Miami-Dade	WCA-3B	SFWMD	51.89	Minimally Acceptable	Agricultural
Miami-Dade	S-332D	Not Reported	4.81	Not Reported	Not Reported

Source: U.S. Army Corps of Engineers National Levee Database

The L-31 East and L-31 North levees each contain portions of the Town of Cutler Bay within their leveed area; therefore, failure of either of these levees could directly impact the Town.

Spatial Extent: 2 – Small

Extent

As discussed above, the potential magnitude of a dam failure can be measured by the NID hazard classification. There are seven significant hazard dams and one high hazard dam in Miami-Dade County. The high hazard dam is located on the C-3 Canal and the significant hazard dams are located on the Tamiami Canal, Arch Creek, Miami River North Fork, Cutler Drain Canal (C-100C), Snake Creek Canal (C-9), and Princeton Canal (C-102).

The National Levee Database also provides risk ratings for structures, which can be used to approximate the magnitude of the hazard. Following are the levee performance and risk ratings from the two levees which protect portions of the Town of Cutler Bay:

- ▶ **L-31 East (Low):** Currently, there is no immediate concern with the L-31 East levee system. The system reduces but does not eliminate the risk of loss of life or economic damages from coastal flood events from Biscayne Bay. USACE risk assessments consider flooding frequency, the likelihood of the levee breaching or overtopping, and the resulting potential loss of lives and damage to homes, businesses, and the environment. Based on the most recent risk assessment of L-31 East in 2016, USACE considers this levee to have a low risk. The most likely threat to the system is unwanted vegetation and structures encroaching into the levee. The risk associated with water overtopping the levee is low. If the system performs as designed, water would be anticipated to overtop the levee in a storm that has a 1 in 500 chance of occurring in any given year. If the levee breaches or overtops, the maximum depths of flooding in the leveed area would be less than 2 feet deep.
- ▶ **L-31 North (Moderate):** Currently, there is no immediate concern with the L-31 North levee system. The system reduces but does not eliminate the risk of loss of life or economic damages from high water events in the Everglades. USACE risk assessments consider flooding frequency, the likelihood of the levee breaching or overtopping, and the resulting potential loss of lives and damage to homes, businesses, and the environment. Based on the most recent risk assessment of L-31 North in 2016, USACE considers this levee to have a moderate risk due to potential for



seepage that could lead to a levee breach at unusually high water levels in the Everglades. Seepage is when water on the flood side of the levee seeps through to the land side. Seepage can carry soil particles with it and if enough soil is moved through the levee, the levee may be weakened and breach. Some water seeping through the levee is normal. Downstream consequences in the event of a breach are potentially high given the large population and the potential that the community may not be fully aware of the existence or function of the levee. The risk associated with water overtopping the levee is low. The levee system is performing as designed. In an extreme event, water would be anticipated to overtop the levee in a storm that has a 1 in 1,000 chance of occurring in any given year. If the levee breaches or overtops, the range of flooding in portions of the leveed area could be up to 3 feet deep.

Impact: 2 – Limited

Past Occurrences

There are no past reported dam breaches or levee failures within Cutler Bay.

Probability of Future Occurrence

There are no high or significant hazard dams located within Cutler Bay, and there are no documented occurrences of past levee failure.

It should be noted that there are no levees within Cutler Bay that have been certified by FEMA to protect against the 100-year flood. Therefore, Cutler Bay residents should not be lulled into a false sense of security by the surrounding levees as no level of protection is guaranteed. In fact, areas behind levees that cannot be certified are typically considered high-risk areas.

Probability: 1 – Unlikely

Climate Change and Dam/Levee Failure

Per the Fourth National Climate Assessment, average annual rainfall is likely to increase, as is the intensity of individual rainfall events. These changes could overwhelm fragile flood control systems. Climate change is unlikely to change the risk of the Town to dam failure. However, future levees and sea walls may need to be built to combat the effects of sea level rise and storm surge which would affect future risk.

4.4.4 Flood: 100-/500-year

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Flood: 100-/500-year	Likely	Catastrophic	Moderate	Less than 6 hours	Less than 1 week	3.4

Hazard Description

Flooding is defined by the rising and overflowing of a body of water onto normally dry land. Flooding can result from an overflow of inland or tidal waters or an unusual accumulation or runoff of surface waters from any source. Flooding within Cutler Bay can be attributed to tidal flooding resulting from hurricanes and tropical storms and heavy rainfall that overburdens the drainage system within the community.

A floodplain is the area adjacent to a channel, as shown in Figure 4.24, or a coastal body of water, as shown in Figure 4.25. A floodplain is flat or nearly flat land adjacent to a body of water that experiences occasional or periodic flooding. In riverine settings, 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. In coastal settings, it includes the area exposed to velocity wave action with wave heights of three feet or more and areas exposed to inundation with less severe or no wave action.

Figure 4.24 – Characteristics of a Riverine Floodplain

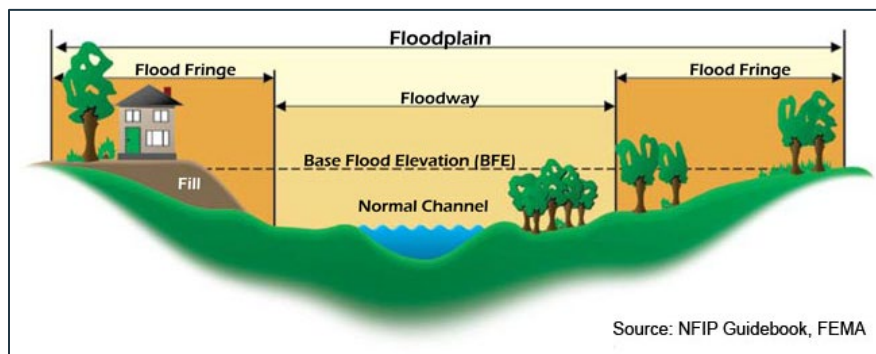
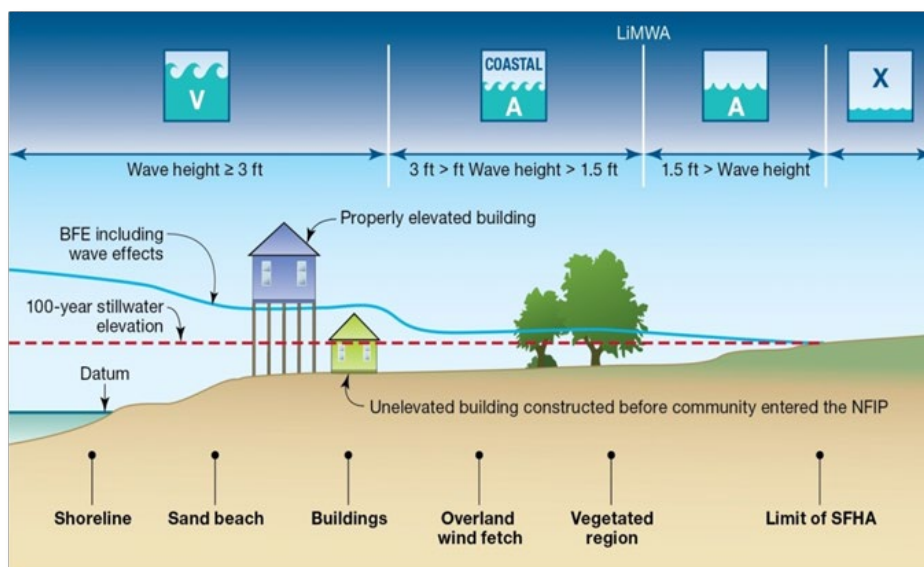


Figure 4.25 – Characteristics of a Coastal Floodplain



Source: FEMA

In its common usage, the floodplain most often refers to that area that is inundated by the flood that has a 1% chance in any given year of being equaled or exceeded, sometimes referred to as the “100-year flood.” The 1%-annual-chance flood is shown on regulatory flood maps and is the national minimum standard to which communities regulate their floodplains through the National Flood Insurance Program (NFIP). The flood with a 0.2% chance of being equaled or exceeded in any given year is also known as the “500-year flood” and is also shown on regulatory flood maps. The potential for flooding can change and increase through various land use changes and changes to land surface, which result in a change to the floodplain. A change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

Coastal floods usually occur because of abnormally high tides or tidal waves, storm surge and heavy rains in combination with high tides, and tropical storms and hurricanes. Because coastal floods are often preceded by a storm event, there is generally more time for preparation and property protection. Storm surge is discussed in greater detail under Section 3.4.6 Hurricane and Tropical Storms.

Flooding on channels can result from prolonged periods of rain that cause gradually rising waters over the course of many hours, but it is also possible for brief but intense rainfall events to cause flash flooding with little to no warning. Flash flood events can be particularly dangerous because they can reach full peak in only a few minutes. This rapid onset often does not allow time for protective measures to be put in place. Flash flood waters move at high speeds, picking up debris, scouring channels, and causing significant damages as a result.

Warning Time: 4 – Less than six hours

Duration: 3 – Less than one week

Location

Regulated floodplains are illustrated on inundation maps called Digital Flood Insurance Rate Maps (DFIRMs). It is the official map for a community on which FEMA has delineated both the special flood hazard areas (SFHAs) and the risk premium zones applicable to the community. SFHAs represent the areas subject to inundation by the 1-percent-annual chance flood event. Structures located within the SFHA have a 26-percent chance of flooding during the life of a standard 30-year mortgage.

Flood zones are geographic areas that FEMA has defined according to varying levels of flood risk and type of flooding. Flood prone areas were identified within the Town of Cutler Bay using the most current Flood Insurance Study (FIS) and associated DFIRMs developed by FEMA and adopted by ordinance on September 11, 2009. Table 4.13 summarizes the flood insurance zones identified by the DFIRMs.

Table 4.13 – Mapped Flood Insurance Zones within Cutler Bay

Zone	Description
VE	Also known as the coastal high hazard areas. They are areas subject to high velocity water including waves; they are defined by the 1% annual chance (base) flood limits (also known as the 100-year flood) and wave effects 3 feet or greater. The hazard zone is mapped with base flood elevations (BFEs) that reflect the combined influence of stillwater flood elevations, primary frontal dunes, and wave effects 3 feet or greater.
AH	Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are 1–3 feet. BFEs derived from detailed hydraulic analyses are shown in this zone.

Zone	Description
AE	AE Zones, also within the 100-year flood limits, are defined with BFEs that reflect the combined influence of stillwater flood elevations and wave effects less than 3 feet. The AE Zone generally extends from the landward VE zone limit to the limits of the 100-year flood from coastal sources, or until it reaches the confluence with riverine flood sources. The AE Zones also depict the SFHA due to riverine flood sources, but instead of being subdivided into separate zones of differing BFEs with possible wave effects added, they represent the flood profile determined by hydrologic and hydraulic investigations and have no wave effects.
0.2% Annual Chance (shaded Zone X)	Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by a levee. No BFEs or base flood depths are shown within these zones. (Zone X (shaded) is used on new and revised maps in place of Zone B.)
Zone X (unshaded)	Minimal risk areas outside the 1-percent and 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.)

Table 4.14 summarizes the total area within each identified flood zone within the Town of Cutler Bay, and Figure 4.26 illustrates the locations of mapped flood insurance zones for the Town.

Table 4.14 – Total Parcel Acres by Flood Zone

Flood Zone	Acreage	Percent of Total (%)
AE	4,253	64.6%
AH	613	9.3%
VE	36	0.5%
0.2% Annual Chance Flood Hazard	0	0.0%
Unshaded X	1,680	25.5%
Total	6,582	--
SFHA Total	4,902	74.5%

Source: Miami-Dade County 2019 Parcel Data, FEMA 2009 DFIRM

The Town of Cutler Bay's FIRMs are in the process of being updated, and preliminary FIRMs were released on February 25, 2021. Table 4.14 summarizes the total area within each identified flood zone within the Town of Cutler Bay according to the 2021 preliminary FIRMs. Figure 4.27 illustrates the mapped preliminary flood insurance zones.

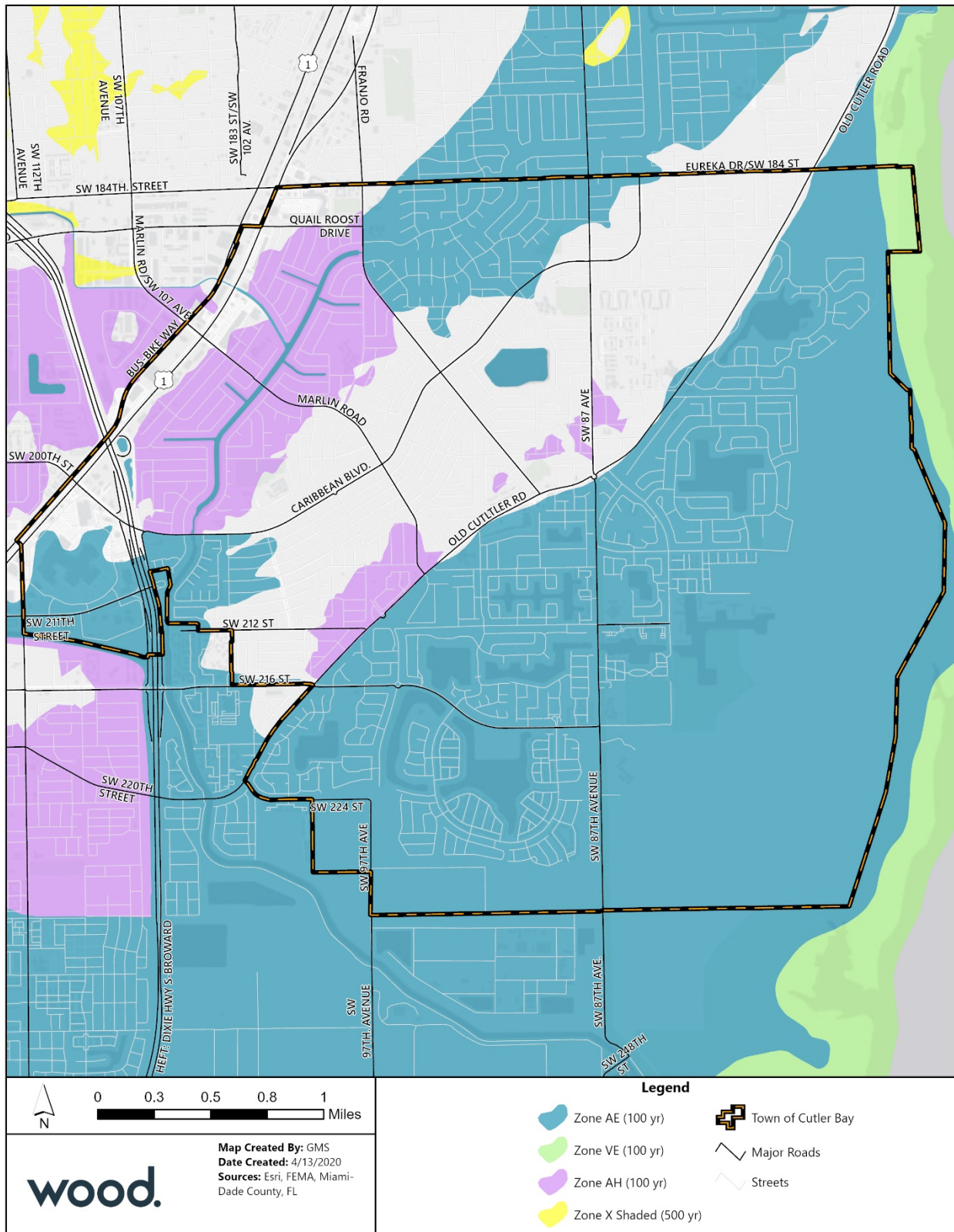
Table 4.15 – Total Parcel Acres by Flood Zone, 2021 Preliminary FIRMs

Flood Zone	Acreage	Percent of Total (%)
AE	5,471	83.6%
AH	0	0.0%
VE	143	2.2%
0.2% Annual Chance Flood Hazard	844	12.9%
Unshaded X	89	1.4%
Total	6,547	--
SFHA Total	5,614	85.7%

Source: Miami-Dade County 2019 Parcel Data, FEMA 2021 Preliminary DFIRM

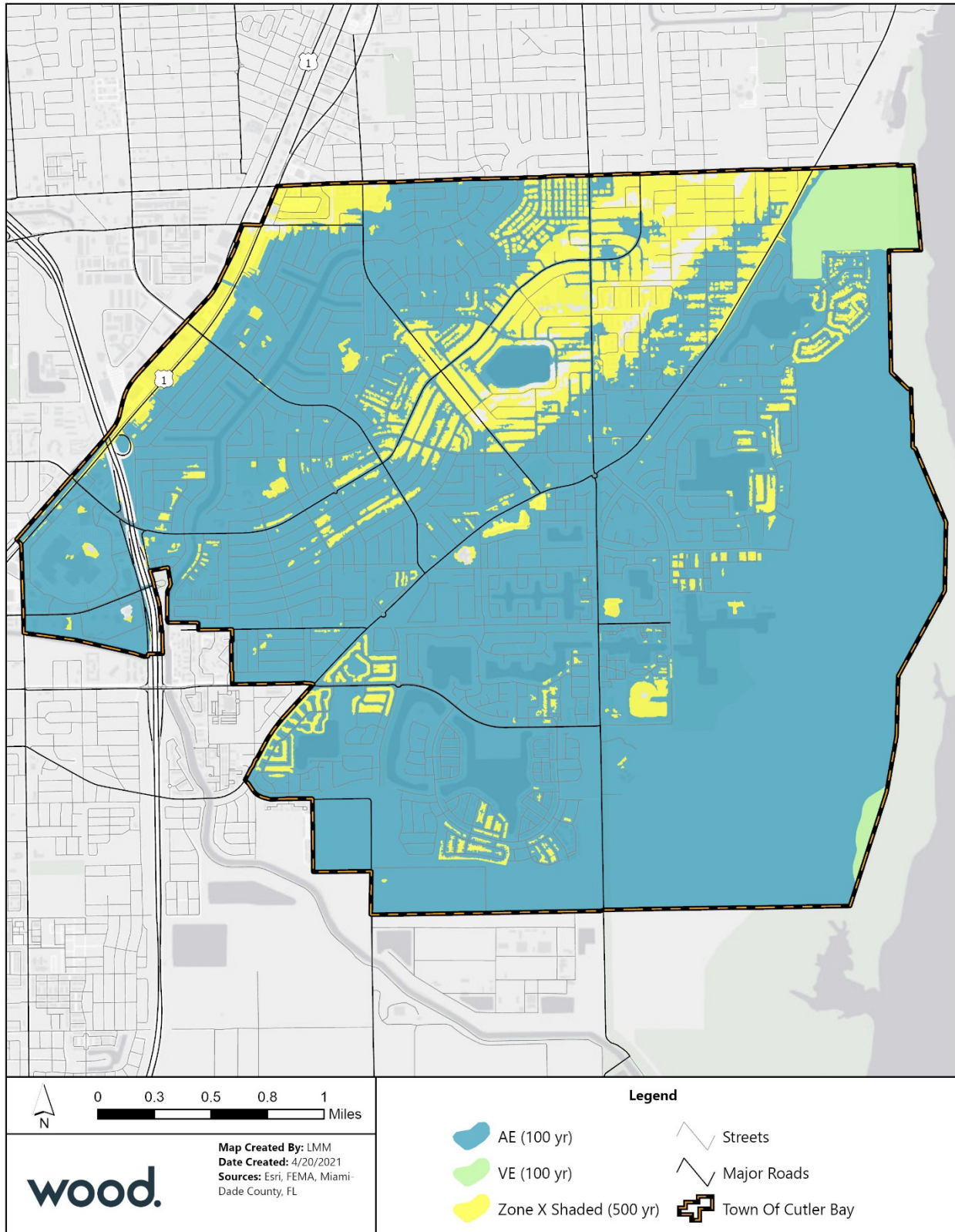
Spatial Extent: 3 – Moderate

Figure 4.26 – Cutler Bay DFIRM Flood Zones



Source: 2009 Effective DFIRM

Figure 4.27 – Cutler Bay Preliminary DFIRM Flood Zones



Source: 2021 Preliminary DFIRM



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 property damages that result, where greater depths cause more substantial damages.

Figure 4.28 shows the flood depths throughout Cutler Bay for the 1-percent-annual-chance flood event, as defined by the September 11, 2009 Effective FIRMs for the Town. Figure 4.29 shows these flood depths as defined by the 2021 Preliminary FIRMs.

Flood extent varies throughout the floodplain, but overall flooding impacts can be catastrophic, with the potential for severe damage and destruction of property and the possibility of injuries and deaths.

Impact: 4 – Catastrophic

Figure 4.28 – SFHA Flood Depths in Cutler Bay, Effective FIRM

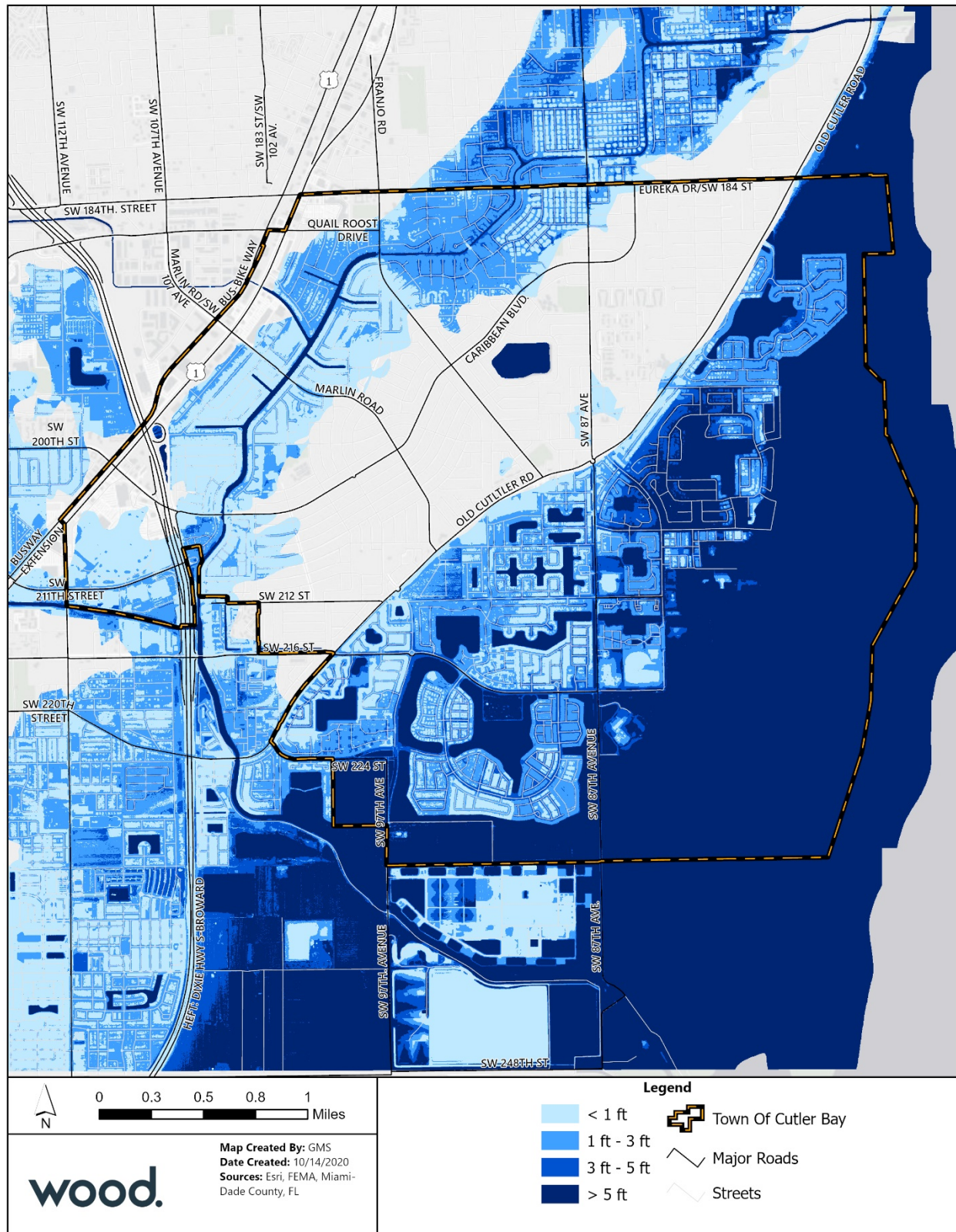
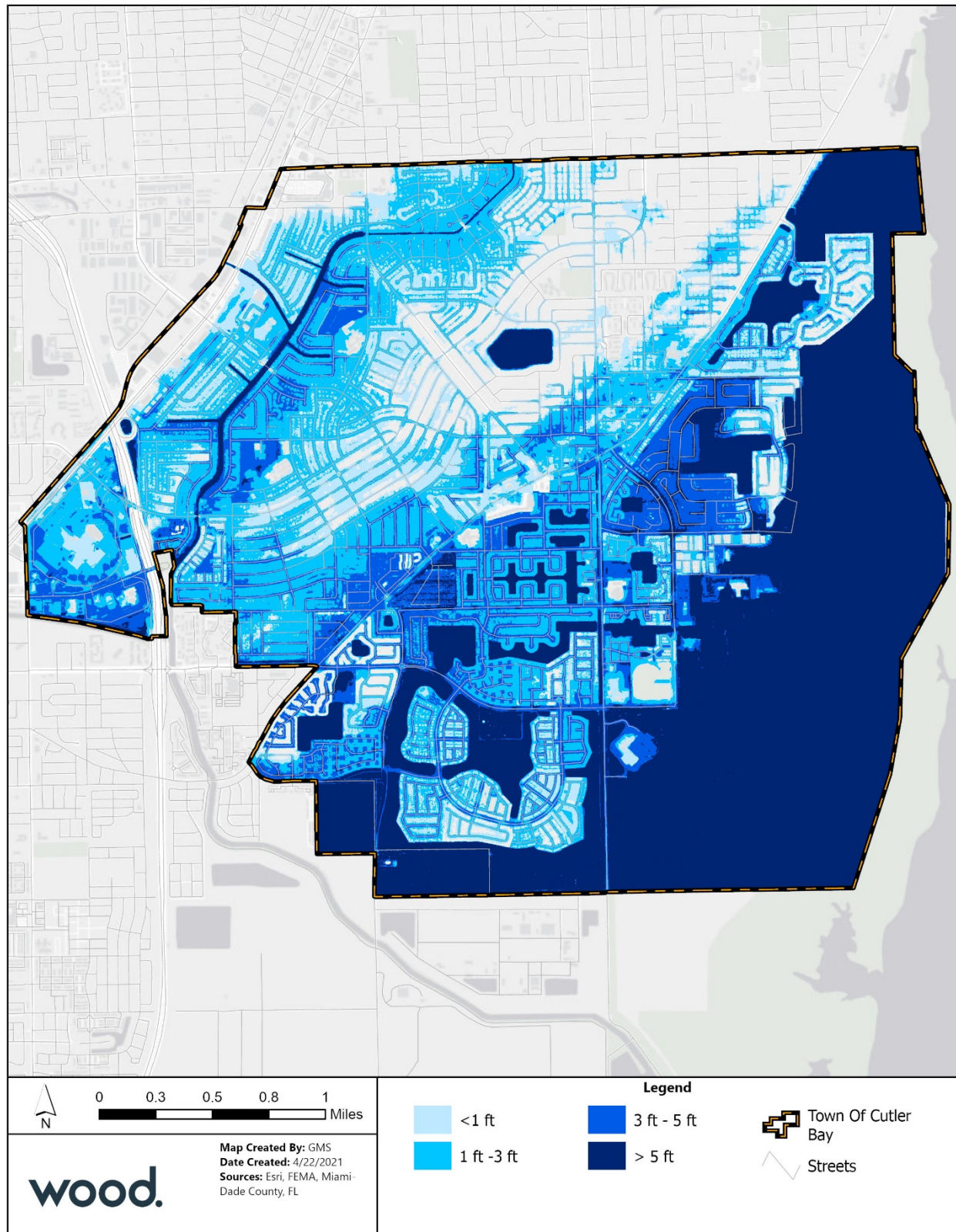


Figure 4.29 – SFHA Flood Depths in Cutler Bay, Preliminary FIRM



Past Occurrences

Miami-Dade County has sustained flood events severe enough to warrant federal disaster declarations as shown in Table 4.2 within Section 4.1.2. Flooding can occur in Cutler Bay year-around but is most frequent in late winter or early spring and again during the summer which are historically the wettest periods of the year. The summer months often bring persistent thunderstorms and in late summer the heavy rains associated with tropical storms and hurricanes are more prevalent. The average annual rainfall for Cutler Bay is 58 to 60 inches.

Table 4.16 lists the flood events from causes other than hurricanes reported by NCEI between 1996-2020 for Miami-Dade County. Past occurrences for hurricanes, tropical storms, and storm surge can be found in Section 4.4.6.

Table 4.16 – NCEI Flooding in Miami-Dade County – 1996-2020

Location	Date	Event Type	Injuries/Deaths	Property Damages
Coastal Miami-Dade County	9/24/2015	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	9/25/2015	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	9/26/2015	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	9/27/2015	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	9/28/2015	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	9/28/2015	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	9/29/2015	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	9/29/2015	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	9/29/2015	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	9/30/2015	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/1/2015	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/8/2015	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/8/2015	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/9/2015	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/9/2015	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/25/2015	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/25/2015	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/27/2015	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	11/25/2015	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/12/2016	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/12/2016	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/13/2016	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/13/2016	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/13/2016	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/13/2016	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/15/2016	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/15/2016	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/16/2016	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/17/2016	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/17/2016	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/18/2016	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/20/2016	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	11/12/2016	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	11/14/2016	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/3/2017	Coastal Flood	0/0	\$0



Location	Date	Event Type	Injuries/Deaths	Property Damages
Coastal Miami-Dade County	10/4/2017	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/4/2017	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/5/2017	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/5/2017	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/5/2017	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/5/2017	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/5/2017	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/6/2017	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/7/2017	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/21/2017	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	11/5/2017	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/8/2018	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/9/2018	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/9/2018	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	8/2/2019	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	8/30/2019	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	8/31/2019	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	8/31/2019	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	9/27/2019	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	9/29/2019	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	9/30/2019	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/1/2019	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/1/2019	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/1/2019	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/1/2019	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	10/13/2019	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	11/14/2019	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	11/15/2019	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	11/17/2019	Coastal Flood	0/0	\$0
Coastal Miami-Dade County	11/19/2019	Coastal Flood	0/0	\$0
Kendell Dr Area	4/26/1997	Flash Flood	0/0	\$0
Florida City	9/16/1998	Flash Flood	0/0	\$0
Northeast Portion	6/8/1999	Flash Flood	0/0	\$50,000
East Portion	10/15/1999	Flash Flood	0/0	\$100,000,000
Miami	4/14/2000	Flash Flood	0/0	\$10,000
Miami	5/31/2000	Flash Flood	0/0	\$5,000
North Miami	12/9/2002	Flash Flood	0/0	\$50,000
Kendall	9/28/2004	Flash Flood	0/0	\$50,000
North Miami Beach	5/20/2007	Flash Flood	0/0	\$5,000
Miami Beach	5/20/2007	Flash Flood	0/0	\$0
Miami	5/20/2007	Flash Flood	0/0	\$0
South Miami	7/5/2007	Flash Flood	0/0	\$0
Biscayne Bay Arpt	10/4/2008	Flash Flood	0/0	\$1,000
Ojus	10/9/2008	Flash Flood	0/0	\$10,000
Biscayne Park	6/5/2009	Flash Flood	0/0	\$50,000
(Mia)Miami Intl	12/17/2009	Flash Flood	0/0	\$50,000
Miami Beach	6/4/2010	Flash Flood	0/0	\$1,000
Homestead	10/8/2011	Flash Flood	0/0	\$0

Location	Date	Event Type	Injuries/Deaths	Property Damages
Goulds	10/30/2011	Flash Flood	0/0	\$100,000
Hialeah Gardens	5/22/2012	Flash Flood	0/0	\$0
Hialeah Gardens	5/22/2012	Flash Flood	0/0	\$75,000
West Miami	4/30/2013	Flash Flood	0/0	\$1,000
North Miami Beach	6/7/2013	Flash Flood	0/0	\$0
Miami Beach	7/18/2013	Flash Flood	0/0	\$5,000
South Miami	10/2/2013	Flash Flood	0/0	\$5,000
Lemon City	2/28/2015	Flash Flood	0/0	\$3,000
Pinewood	12/4/2015	Flash Flood	0/0	\$10,000
Miami New Tamiami Ar	12/5/2015	Flash Flood	0/0	\$30,000
(Mia)Miami Intl	6/2/2017	Flash Flood	0/0	\$10,000
Miami	8/2/2017	Flash Flood	0/0	\$1,000,000
Richmond Hgts	8/15/2019	Flash Flood	0/0	\$30,000
Coastal Miami-Dade	6/9/1997	Flood	0/0	\$0
Coastal Miami-Dade	6/14/1997	Flood	0/0	\$0
Surfside	8/21/1997	Flood	0/0	\$0
Coastal Miami-Dade	10/3/2000	Flood	0/0	\$440,000,000
Coastal Miami-Dade	10/5/2000	Flood	0/0	\$0
Coastal Miami-Dade	10/6/2000	Flood	0/0	\$0
Coastal Miami-Dade	12/10/2000	Flood	0/0	\$100,000
Ives Estates	8/26/2015	Flood	0/0	\$0
Lemon City	8/30/2015	Flood	0/0	\$0
Homestead Gen Avn Ar	12/4/2015	Flood	0/0	\$0
Homestead	5/18/2016	Flood	0/0	\$5,000
Leisure City	5/18/2016	Flood	0/0	\$5,000
Miami Lake	7/21/2017	Flood	0/0	\$0
Miami Spgs	6/14/2018	Flood	0/0	\$0
Sweet Water	6/28/2018	Flood	0/0	\$0
Pinewood	7/10/2018	Flood	0/0	\$0
Homestead	9/3/2018	Flood	0/0	\$0
Sweet Water	9/3/2018	Flood	0/0	\$0
Lemon City	5/5/2019	Flood	0/0	\$1,000
Westwood Lakes	5/5/2019	Flood	0/0	\$1,000
Biscayne Park	5/16/2019	Flood	0/0	\$5,000
Golden Beach	6/24/2019	Flood	0/0	\$1,000
Medley	7/8/2019	Flood	0/0	\$0
Hialeah	7/8/2019	Flood	0/0	\$0
Medley	8/6/2019	Flood	0/0	\$0
Miami New Tamiami Ar	8/13/2019	Flood	0/0	\$0
Ives Estates	8/14/2019	Flood	0/0	\$0
Coral Gables	8/26/2019	Flood	0/0	\$0
(Mia)Miami Intl	8/27/2019	Flood	0/0	\$0
Miami	8/30/2019	Flood	0/0	\$0
Golden Beach	10/11/2019	Flood	0/0	\$2,000
North Miami	10/11/2019	Flood	0/0	\$0
Miami	12/23/2019	Flood	0/0	\$0
Bay Harbor Is	12/23/2019	Flood	0/0	\$0
Countywide	9/9/2001	Heavy Rain	0/0	\$0

Location	Date	Event Type	Injuries/Deaths	Property Damages
Miami	10/21/2001	Heavy Rain	0/0	\$0
Homestead	11/6/2003	Heavy Rain	0/0	\$0
Hialeah	11/8/2003	Heavy Rain	0/0	\$0
Hialeah	8/1/2004	Heavy Rain	0/0	\$10,000
Opa Locka	8/2/2004	Heavy Rain	0/0	\$40,000
Cutler Ridge	6/11/2005	Heavy Rain	0/0	\$0
North Miami	6/16/2005	Heavy Rain	0/0	\$30,000
Miami	9/11/2005	Heavy Rain	0/0	\$0
Hialeah	5/15/2006	Heavy Rain	0/0	\$0
Hialeah	5/16/2006	Heavy Rain	0/0	\$0
South Miami	5/26/2006	Heavy Rain	0/0	\$0
Opa Locka	9/2/2006	Heavy Rain	0/0	\$100,000
Kendall	11/16/2006	Heavy Rain	0/0	\$20,000
Perrine	11/25/2009	Heavy Rain	0/0	\$50,000
Coral Gables	11/25/2009	Heavy Rain	0/0	\$75,000
Bal Harbour	5/6/2011	Heavy Rain	0/0	\$0
(Mia)Miami Intl	6/19/2011	Heavy Rain	0/0	\$0
Biscayne Park	4/15/2013	Heavy Rain	0/0	\$0
Kendall	9/7/2015	Heavy Rain	0/0	\$0
Richmond Hgts	10/7/2015	Heavy Rain	0/0	\$0
Key Biscayne	10/13/2015	Heavy Rain	0/0	\$0
Hialeah Gardens	12/3/2015	Heavy Rain	0/0	\$0
Homestead	12/5/2015	Heavy Rain	0/0	\$0
South Miami	12/8/2015	Heavy Rain	0/0	\$0
Westwood Lakes	12/22/2015	Heavy Rain	0/0	\$0
Miami Spgs	6/2/2017	Heavy Rain	1/0	\$20,000
Total			0/0	\$542,016,000

Source: NCEI Storm Events Database

While many of the above events are reported for locations outside of Cutler Bay, the events may have also impacted the Town or may be representative of what could impact the Town based on their proximity. The following narratives provide details on select flood events detailed in the NCEI database and from members of the FMPC.

August 30, 2019 – Established easterly flow, combined with plentiful low-level moisture, allowed for scattered showers and a few thunderstorms to develop over the Atlantic waters during the morning. These showers/storms moved onshore along the east coast metro during the morning hours. Heavy rainfall rates lead to flooding of streets across areas of Miami-Dade Counties, especially with antecedent soil conditions from prior days rainfall. High tides also contributed to minor coastal flooding across the area.

June 28, 2018 – Showers and storms developed along the Gulf and Atlantic seabreezes during the late morning and afternoon hours across South Florida. Several rounds of storms affected the east coast metro, producing street flooding across portions of Miami-Dade County.

October 3, 2017 – Perigean spring tides that occurred with the full moon led widespread minor to moderate flooding at high tides along the east coast of South Florida during early October. Flooding impacts were exacerbated by strong easterly flow and occasional periods of heavy rainfall. Flooding of



numerous streets, parks, and docks along the coast, canals, and intracoastal waterways was reported. Additional tidal flooding also occurred along the Gulf coast at times.

November 14, 2016 – The combination of higher than normal tidal departures coupled with coupled with the annual perigean spring tide brought minor flooding at high tides for a weekend during mid-November. Vulnerable areas along the Broward, Miami-Dade and Palm Beach coast saw flooding of streets and walkways.

September 29, 2015 – The continuing combination of higher than normal tidal departures coupled with the perigean spring tide on September 29th resulted in periodic minor flooding of low lying and vulnerable areas at high tides for several days during the end of September. Several roads, including major arteries, along the Palm Beach, Broward, and Miami-Dade coast experienced saw flooding high enough to result in road closures during times of high tide. Additional minor road flooding occurred along roads in Naples.

October 2, 2013 – Persistent heavy rains from slow moving showers and thunderstorms produced an isolated area of flash flooding during the late afternoon and early evening. Measured rainfall amounts were in the range of 7 to 10 inches in a matter of just a few hours.

April 15, 2013 – A weak upper level trough of low pressure moved across South Florida along with a stationary frontal boundary over North Florida resulting in isolated severe thunderstorms over the Miami metropolitan region during the afternoon. Nearly six inches of rain fell on Miami Beach during a short duration and caused significant street flooding.

October 30, 2011 – A weak frontal boundary across South Florida in combination with a flow of deep tropical moisture from the western Caribbean Sea associated with the remnant of Hurricane Rina led to periods of very heavy rain and significant flooding lasting the better part of 4 days. An estimated 2,000 customers lost power across South Florida due to the rain. Severe flooding occurred over large parts of eastern metro Miami-Dade County beginning during the evening hours of October 30th and continuing well into the next day. The area of heavy rain began over southern sections of the flood area, including Cutler Bay, Palmetto Bay and Key Biscayne. Numerous roads were under deep water and reports of dozens of homes with water intrusion were received across this entire area. Rainfall amounts were in the 6 to 10 inch range across this area, virtually all of it falling in less than 12 hours.

October 8, 2011 – Heavy and persistent showers led to flooding over southwestern metro Miami-Dade County. Total rainfall amounts in this area ranged from 5 to 9 inches, with most of this rain falling in a span of 6 hours or less, resulting in significant street flooding.

June 5, 2009 – Severe flooding affected the Mid and South Beach sections of Miami Beach as well as downtown Miami from a nearly stationary thunderstorm originating in Biscayne Park. A total of 9.3 inches fell at the cooperative station on South Beach, most of this falling in less than 3 hours. This caused as much as 3 feet of standing water on streets and garages on South Beach, resulting in many vehicles stalled on streets and road closures across the area. Cars were seen floating down Michigan Avenue at 11th Street. Several businesses had water intrusion along Alton Road and 17th Street. A number of condominium buildings along West Avenue had up to 5 feet of water in the parking garages.

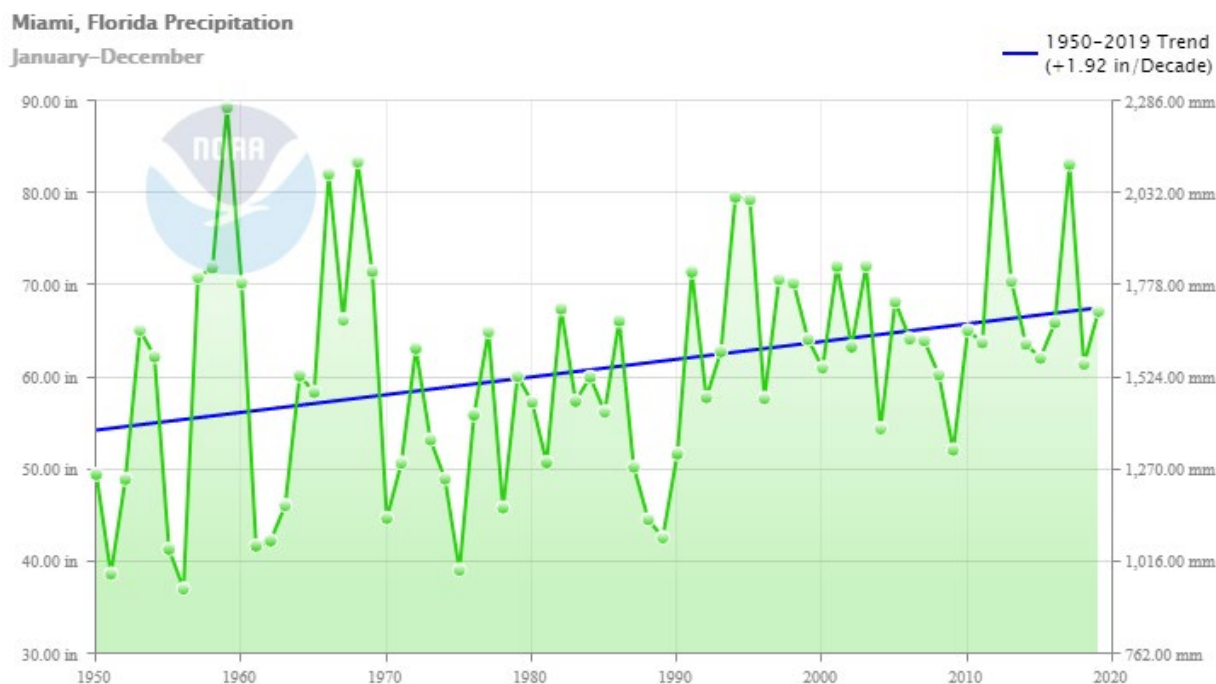
October 4, 2008 – An area of heavy rain continued to slowly move south to southeast out of Broward County into Miami-Dade County with rainfall estimates from the National Weather Service radar at two to three inches per hour. On Miami Beach, an off-duty weather service employee reported water entering cars, while more reports of the same were received from Key Biscayne. Several roads were closed with 2 to 3 feet of water for several hours.

September 9-12, 2001 – A stalled trough of low pressure across north Florida gradually shifted to south Florida and eventually spawned tropical storm Gabrielle in the east Gulf of Mexico. Before becoming Gabrielle 5 to 10 inches of rain fell across southeast Florida, causing widespread street flooding.

Probability of Future Occurrence

By definition of the 1-percent-annual-chance flood event, the Town of Cutler Bay has a 1 percent chance of flooding in or beyond the SFHA at or above the base flood elevation in any given year. Figure 4.30 shows the annual precipitation for the City of Miami, used to approximate average rainfall in Cutler Bay. According to this data, the area averages between 55-68 inches of rain annually, with an increasing trend from 1950 to 2020 of approximately 1.92 inches per decade. Based on this data and trend, precipitation increases should be anticipated in the future, which may increase the likelihood of flooding. Currently, occasional flooding is likely to occur.

Figure 4.30 – Average Annual Precipitation for Miami, FL



Source: NOAA Climate at a Glance

Climate Change and Flood: 100-/500-year

With its populous coastal community, porous geology and low topography, Cutler Bay is particularly vulnerable to the effects of climate change and sea level rise. Per the Fourth National Climate Assessment, frequency and intensity of heavy precipitation events is expected to increase across the country. More specifically, it is “very likely” (90-100% probability) that most areas of the United States will exhibit an increase of at least 5% in the maximum 5-day precipitation by late 21st century. Additionally, increases in precipitation totals are expected in the Southeast. The mean change in the annual number of days with rainfall over 1 inch for the Southeastern United States is 0.5 to 1.5 days. Therefore, with more rainfall falling in more intense incidents, the area may experience more frequent flash flooding. Increased flooding may also result from more intense tropical cyclone; 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.

Vulnerability Assessment

Vulnerability—Extremely High

Flood damage is directly related to the depth of flooding by the application of a depth damage curve. In applying the curve, a specific depth of water translates to a specific percent damage to the structure which translates to the same percentage of the structure's replacement value. As previously shown in Figure 4.26, 74.5% of the Town is located in areas vulnerable to 1%-annual-chance flood event under normal flood circumstances.

Methodology

Parcel counts by FEMA flood zone were determined using a spatial intersection of 2019 tax parcels data, provided by Miami-Dade County, and the effective FEMA flood zones provided in the Miami-Dade County FEMA DFIRM Database, effective 9/11/2009. In the case of parcels affected by multiple zones, the entire parcel assessment value was applied to the highest risk flood zone intersecting the parcel in order to provide exposure estimates for each FEMA flood zone. To determine the correct occupancy class for each parcel, the County Land Use Codes (CLUC) provided in the Cutler Bay tax parcel data were translated into FEMA Hazus specific occupancy classes (i.e. RES1, COM4, EDU2, etc.). These were translated to ensure the correct depth damage factor was applied to the parcel based on its occupancy class to ensure a more accurate damage assessment of the parcel.

Wood performed a Level 2 flood loss analysis in Hazus 4.2 by leveraging the 2019 parcel data provided by Miami-Dade County. Wood developed a depth raster for all Zone AE & Zone VE portions of the SFHA and loaded this raster as well as the parcel data into Hazus. Losses were calculated based on Hazus standard depth damage functions. Only areas that were contained within the extent of available LiDAR (and by extension depth grid) were analyzed. This accounted for 99% of all structures in the SFHA. Foundation types were not provided in the parcel data, so Wood assumed 90% slab on grade and 10% crawlspace.

Table 4.17 shows the correlation between BFEs and average flood depth.

Table 4.17 – Effective DFIRM BFE and Average Depth

Effective DFIRM BFE (ft)	Average Depth (ft)
7	4
8	3
9	2.5
10	5.5
11	8
12	11
13	12
14	13
15	14.5
16	16
17	17
18	18

Source: FEMA DFIRM September 11, 2009

Table 4.18 provides the depth damage factors that were used in calculating flood losses for the Town. These depth damage factors were developed based on the USACE Galveston District depth damage curves used in Hazus. All depths assume the structure has no basement.

Table 4.18 – Cutler Bay Flood Loss Damage Factors

Depth (ft)	Percent Damaged (%)					
	Residential	Commercial	Religious	Government	Education	Other
0	10	1	0	0	0	1
1	21	9	10	5	5	10
2	27	14	11	8	7	12
3	32	16	11	13	9	15
4	37	18	12	14	9	19
5	43	20	12	14	10	22
6	46	23	13	15	11	26
7	50	26	14	17	13	30
8	54	30	14	19	15	35
9	58	34	15	22	17	39
10	60	38	17	26	20	42
11	63	42	19	31	24	48
12	67	47	24	37	28	50
13	70	51	30	44	33	51
14	74	55	38	51	39	53
15	79	58	45	59	45	54
16	82	61	52	65	52	55
17	83	64	58	70	59	55
18	84	67	64	74	64	56

Source: FEMA estimated damage factors

Content values estimations are based on FEMA Hazus methodologies of estimating value as a percent of improved structure values by property type. Table 4.19 shows the breakdown of the different property types in Cutler Bay and their estimated content replacement value percentages.

Table 4.19 – Content Replacement Factors

Property Type	Content Replacement Values
Residential	50%
Commercial	100%
Cultural and Parks	100%
Education	100%
Government	100%
Recreation and Entertainment	100%
Religion	100%
Medical	150%
Transportation	150%
Utilities and Communication	150%

Source: Hazus 4.2

Property at Risk

The property loss estimates for flood are based on the total of improved and contents value. Land value is represented in the flood tables, but these values are only present to show the value of the land and are not included in any of the loss estimates because land is generally not subject to loss from floods. It is important to note that information on those properties mitigated (e.g., floodproofed or elevated) in the SFHA was not available for analysis, thus the resulting flood damage loss estimates could be lower than

actual figures. Once the total value of affected parcels was calculated, damage factors were applied to obtain loss estimates by flood zone.

Table 4.20 summarizes the count and improved value of parcels that fall within the 1% annual chance floodplain by occupancy type. Parcels outside the floodplain are also shown (Zone X Unshaded). Based on this analysis, 7,521 improved parcels fall within the 1% annual chance floodplain for a total value of \$2,440,066,727. Additionally, there are 3,541 improved parcels outside of the SFHA with a value of \$884,888,066.

Table 4.20 – Property Value Estimates by Flood Zone and Occupancy Type

Occupancy	Total Parcel Count	Total Improved Parcel Count	Land Value	Structure Value	Estimated Content Value	Total Value
Zone AE	7,872	5,787	\$654,745,080	\$1,246,967,868	\$703,495,704	\$1,950,463,572
Commercial	29	21	\$40,803,096	\$79,478,229	\$79,478,229	\$158,956,458
Education	1	1	\$179,031	\$960,969	\$960,969	\$1,921,938
Government	97	17	\$64,998,896	\$70,361,166	\$70,391,136	\$140,752,302
Other	172	161	\$4,394,562	\$0	\$0	\$0
Religious	136	2	\$32,579,091	\$9,163,236	\$9,163,236	\$18,326,472
Residential	7437	5585	\$511,790,404	\$1,087,004,268	\$543,502,134	\$1,630,506,402
Zone AH	1,848	1,733	\$308,946,848	\$300,264,947	\$189,288,472	\$489,553,419
Commercial	19	19	\$100,657,800	\$46,623,865	\$46,623,865	\$93,247,730
Education	1	1	\$1,061,584	\$100,000	\$100,000	\$200,000
Government	15	10	\$12,617,364	\$26,493,822	\$26,493,822	\$52,987,644
Other	40	40	\$627,907	\$0	\$0	\$0
Religious	42	5	\$7,406,845	\$5,094,309	\$5,094,309	\$10,188,618
Residential	1731	1658	\$186,575,348	\$221,952,951	\$110,976,476	\$332,929,427
Zone VE	13	1	\$3,916,203	\$24,868	\$24,868	\$49,736
Commercial	0	0	\$0	\$0	\$0	\$0
Education	0	0	\$0	\$0	\$0	\$0
Government	13	1	\$3,916,203	\$24,868	\$24,868	\$49,736
Other	0	0	\$0	\$0	\$0	\$0
Religious	0	0	\$0	\$0	\$0	\$0
Residential	0	0	\$0	\$0	\$0	\$0
Zone X (Unshaded)	3,651	3,541	\$507,960,202	\$573,134,107	\$311,753,959	\$884,888,066
Commercial	66	65	\$78,662,414	\$49,693,800	\$49,693,800	\$99,387,600
Education	0	0	\$0	\$0	\$0	\$0
Government	12	3	\$3,947,593	\$56,237	\$56,237	\$112,474
Other	47	47	\$2,486,200	\$0	\$0	\$0
Religious	40	1	\$11,288,298	\$623,773	\$623,773	\$1,247,546
Residential	3486	3425	\$411,575,697	\$522,760,297	\$261,380,149	\$784,140,446
Total	13,384	11,062	1,475,568,333	2,120,391,790	1,204,563,002	3,324,954,792

Source: Miami-Dade County 2019 Parcel Data, FEMA 2009 DFIRM

¹Total value does not include land value.

Table 4.21 summarizes flood loss estimate values by occupancy. Based on this analysis, the 1% annual chance flood is estimated to cause \$279,045,026 in damages, which equates to a 13% loss ratio. The loss ratio is the loss estimate divided by the total potential exposure (i.e., total of improved and contents value for all parcels located within the 1% annual chance flood zone) 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 4.21 – Summary of Flood Loss Estimates by Occupancy

Occupancy Type	Total Parcels with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Agriculture	0	\$0	\$0	\$0	\$0	0.0%
Commercial	17	\$81,734,032	\$28,790	\$83,497	\$112,287	0.1%
Educational	2	\$2,121,938	\$1,621	\$8,751	\$10,372	0.5%
Government	24	\$154,097,024	\$1,224,851	\$7,437,943	\$8,662,794	5.6%
Industrial	0	\$0	\$0	\$0	\$0	0.0%
Religious	4	\$23,604,240	\$75,625	\$538,151	\$613,777	2.6%
Residential	6,779	\$1,845,049,352	\$169,854,450	\$99,791,347	\$269,645,797	14.6%
Total	6,826	\$2,106,606,586	\$171,185,337	\$107,859,689	\$279,045,026	13.0%

Source: Miami-Dade County 2019 Parcel Data, FEMA 2009 DFIRM

¹Total value does not include land value.

Some protection from flood losses can be provided by flood insurance, which is available to property owners in communities that participate in the National Flood Insurance Program (NFIP). The Town of Cutler Bay has been a participant in the NFIP since August 31, 2006. Cutler Bay has achieved a Class 4 rating through participation in the NFIP's Community Rating System which rewards policyholders in the Town with a 30 percent reduction in their flood insurance premiums. A summary of current flood insurance policy holdings and past claims is provided under Flood Insurance Analysis.

To understand how changes in the flood hazard have affected exposure, property value estimates were also compiled relative to the 2021 Preliminary DFIRM.

Table 4.22 summarizes the count and improved value of parcels that fall within the 1% annual chance floodplain by occupancy type. Based on this analysis, 10,517 improved parcels fall within the 1% annual chance floodplain for a total value of \$3,096,270,826. In other words, total property exposure within the SFHA increases by 2,996 improved parcels and \$656,204,099.

Table 4.22 – Property Value Estimates by Preliminary DFIRM Flood Zone and Occupancy Type

Occupancy	Total Parcel Count	Total Improved Parcel Count	Land Value	Structure Value	Estimated Content Value	Total Value
Zone AE	12,805	10,511	\$1,341,694,117	\$1,978,979,485	\$1,114,506,484	\$3,093,485,969
Commercial	91	82	\$166,830,959	\$137,179,971	\$137,179,971	\$274,359,942
Education	2	2	\$1,240,615	\$1,060,969	\$1,060,969	\$2,121,938
Government	120	30	\$80,673,356	\$96,911,225	\$96,911,225	\$193,822,450
Other	246	235	\$4,394,562	\$0	\$0	\$0
Religious	211	8	\$49,182,026	\$14,881,318	\$14,881,318	\$29,762,636
Residential	12135	10154	\$1,039,372,599	\$1,728,946,002	\$864,473,001	\$2,593,419,003
Zone AH	26	6	\$5,763,826	\$1,848,282	\$936,575	\$2,784,857
Commercial	0	0	\$0	\$0	\$0	\$0
Education	0	0	\$0	\$0	\$0	\$0
Government	16	1	\$4,805,223	\$24,868	\$24,868	\$49,736
Other	0	0	\$0	\$0	\$0	\$0
Religious	1	0	\$568,500	\$0	\$0	\$0

Occupancy	Total Parcel Count	Total Improved Parcel Count	Land Value	Structure Value	Estimated Content Value	Total Value
Residential	9	5	\$390,103	\$1,823,414	\$911,707	\$2,735,121
Zone VE	546	538	\$124,051,331	\$137,995,279	\$88,305,601	\$226,300,880
Commercial	23	23	\$53,292,351	\$38,615,923	\$38,615,923	\$77,231,846
Education	0	0	\$0	\$0	\$0	\$0
Government	1	0	\$1,477	\$0	\$0	\$0
Other	13	13	\$0	\$0	\$0	\$0
Religious	6	0	\$1,523,708	\$0	\$0	\$0
Residential	503	502	\$69,233,795	\$99,379,356	\$49,689,678	\$149,069,034
Zone X (Unshaded)	7	7	\$944,952	\$1,568,744	\$784,372	\$2,353,116
Commercial	0	0	\$0	\$0	\$0	\$0
Education	0	0	\$0	\$0	\$0	\$0
Government	0	0	\$0	\$0	\$0	\$0
Other	0	0	\$0	\$0	\$0	\$0
Religious	0	0	\$0	\$0	\$0	\$0
Residential	7	7	\$944,952	\$1,568,744	\$784,372	\$2,353,116
Total	13,384	11,062	1,472,454,226	2,120,391,790	1,204,533,032	3,324,924,822

Source: Miami-Dade County 2019 Parcel Data, FEMA 2021 Preliminary DFIRM

¹Total value does not include land value.

To supplement the above assessment of buildings at risk, the planning team also evaluated the land area affected by the various flood zones. The following is an analysis of flooded acres in the Town in comparison to total area within the Town limits.

Methodology

GIS was used to calculate acres flooded by FEMA flood zones and land use categories. The Cutler Bay parcel layer and Effective DFIRM were intersected and the flooded parcel area was calculated in acres. The flood zone was assigned to any given parcel based on the intersection of the parcel with a flood zone. Only the flooded acreage within the parcel was counted for each flood zone.

Limitations

One limitation of this analysis is that the parcel layer does not include right-of-way areas. Due to this, there are voids of land that are not accounted for; therefore, this analysis only represents total parcel acres. Table 4.23 and Table 4.24 represent a detailed and summary analysis of total improved flooded acres by land use and FEMA DFIRM flood zone, respectively.

Table 4.23 – Total Parcel Acres to Flooded Acres by Land Use

Land Use	Total Parcel Acres	Improved Flooded Acres
Commercial	776	48
Education	3	3
Government	1,534	159
Other	655	0
Religious	46	33
Residential	2,577	1,298
Total	5,592	1,541

Source: Miami-Dade County 2019 Parcel Data, FEMA 2009 DFIRM

Table 4.24 – Total Parcel Acres to Flooded Acres by Flood Zone

Flood Zone	Total Parcel Acres	Improved Flooded Acres
Zone AE	3,992	1,146
Zone AH	592	396
Zone VE	51	0
Zone X (unshaded)	956	0
Total	5,592	1,541

Source: Miami-Dade County 2019 Parcel Data, FEMA 2009 DFIRM

Critical Facilities at Risk

A separate analysis was performed to determine critical facilities in the 1% annual chance floodplain. Using GIS, the DFIRM flood zones were overlayed on the critical facility location data. Table 4.25 summarizes critical facilities by facility type and flood zone. Figure 4.31 shows critical facilities and DFIRM flood zones. Figure 4.32 shows critical facilities and 100-yr flood depth.

Table 4.25 – Summary of Critical Facility Flood Exposure

Facility Type	Critical Facility Count by SFHA Zone			Total Facilities at Risk
	Zone AH	Zone AE	Zone VE	
Emergency Response Installations	0	1	0	1
Schools	3	2	0	5
Fire Stations	0	2	0	2
Government	0	1	0	1
Police Stations	0	1	0	1
Hazmat Installations	0	1	0	1
Hospitals	0	2	0	2
Assisted Living Facilities	8	2	0	10
Group Homes	4	8	0	12
Sewer Pumping Stations	10	20	0	30
Total	25	40	0	65

Source: Miami-Dade County 2019 Parcel Data, FEMA 2009 DFIRM

Figure 4.31 – Critical Facilities and FEMA Flood Zones

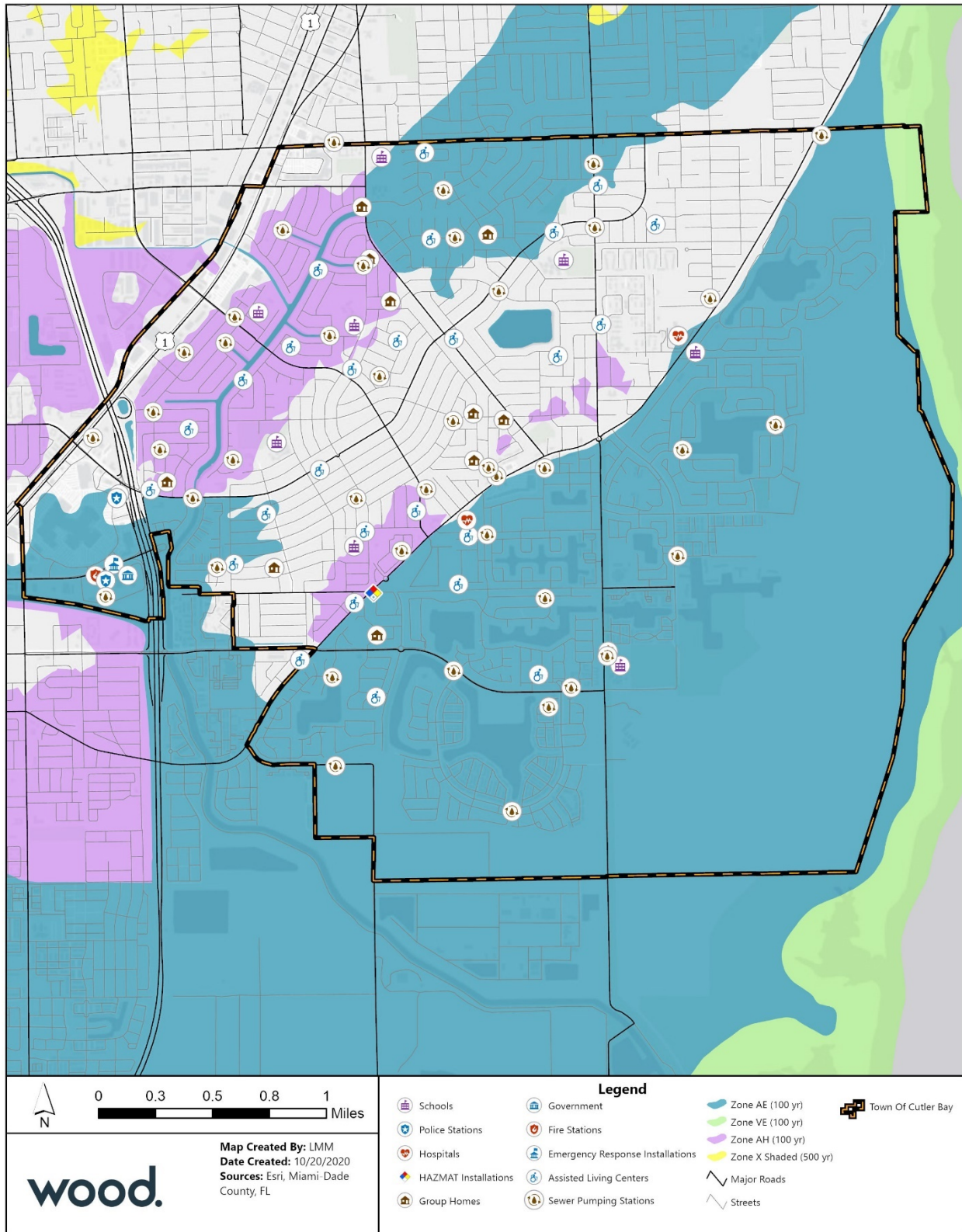
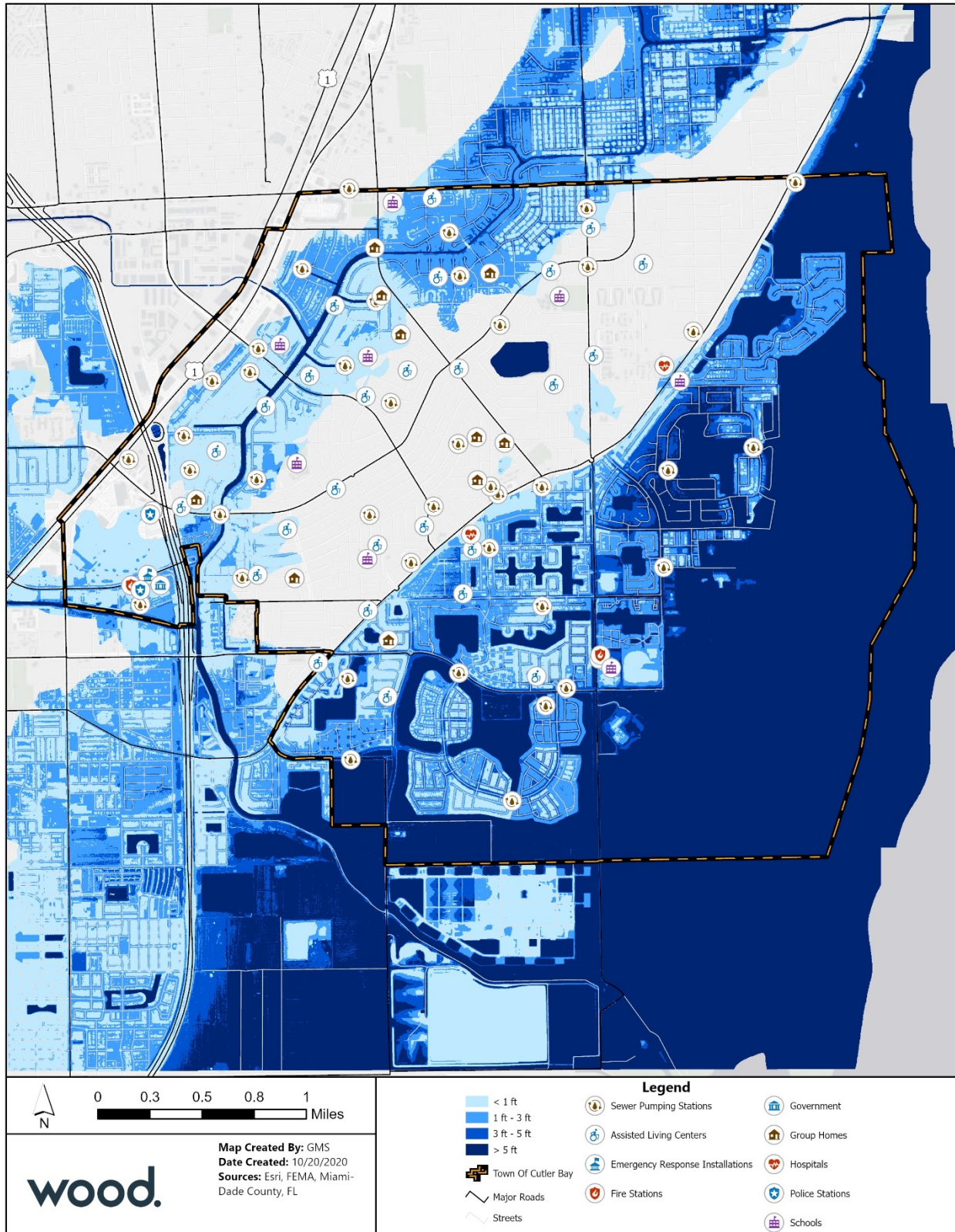


Figure 4.32 – Critical Facilities and 100-yr Flood Depths



Population at Risk

A separate analysis was performed to determine the population at risk to the 1% annual chance flood zones (AE, VE and AH Zones). Using GIS, the DFIRM flood zones were overlayed on the improved residential parcel data. Those residential parcels that intersected the flood zones were counted and multiplied by the American Community Survey 2018 estimate of household factor for Cutler Bay (3.47 persons per household). In the case of residential parcels intersected by multiple flood zones, the parcel was assigned to the highest risk flood zone. As shown in Table 4.26, there is an estimated total population of 31,633 at risk within the 1% annual chance flood zones.

Table 4.26 – Cutler Bay Population at Risk to Flood

Flood Zone	Residential Property Count	Population
Zone AE	7,363	25,550
Zone AH	1,753	6,083
Zone VE	0	0
Zone X (unshaded)	3,502	12,152
Total	12,618	43,784

Source: Miami-Dade County 2019 Parcel Data, FEMA 2009 DFIRM, U.S. Census Bureau

Future Development

A GIS analysis was performed to quantify parcels within future development areas that are located within a special flood hazard area.

Methodology

The 2019 parcel layer provided by Miami-Dade County was used to identify potential areas of future development located within FEMA flood zones. Parcel counts by FEMA flood zone were determined using a spatial intersection of the parcels and the flood hazard area as delineated by both the 2009 Effective DFIRM and the 2021 Preliminary DFIRM. In each case, if a parcel was affected by multiple zones, the highest risk flood zone covering the parcel was assigned to the parcel. Table 4.27 delineates the future development areas by land use and flood zone for the Effective and Preliminary FIRMs.

Table 4.27 – Future Land Use and FEMA Flood Zones

Future Land Use	2009 Effective FIRM		2021 Preliminary FIRM	
	Unimproved Parcel Count	Land Value	Unimproved Parcel Count	Land Value
Zone AE	2,085	\$63,682,787	2,294	\$77,071,781
Commercial	8	\$2,000	9	\$2,870
Education	0	\$0	0	\$0
Government	80	\$30,268,881	90	\$31,907,311
Other	11	\$4,394,562	11	\$4,394,562
Religious	134	\$28,745,279	203	\$40,387,723
Residential	1,852	\$272,065	1,981	\$379,315
Zone AH	115	\$5,140,906	n/a	n/a
Commercial	0	\$0	n/a	n/a
Education	0	\$0	n/a	n/a
Government	5	\$1,198,552	n/a	n/a
Other	0	\$0	n/a	n/a
Religious	37	\$3,942,354	n/a	n/a
Residential	73	\$0	n/a	n/a
Zone VE	12	\$2,700,876	20	\$4,158,396

Future Land Use	2009 Effective FIRM		2021 Preliminary FIRM	
	Unimproved Parcel Count	Land Value	Unimproved Parcel Count	Land Value
Commercial	0	\$0	0	\$0
Education	0	\$0	0	\$0
Government	12	\$2,700,876	15	\$3,589,896
Other	0	\$0	0	\$0
Religious	0	\$0	1	\$568,500
Residential	0	\$0	4	\$0
Zone X (Shaded)	n/a	n/a	8	\$1,525,185
Commercial	n/a	n/a	0	\$0
Education	n/a	n/a	0	\$0
Government	n/a	n/a	1	\$1,477
Other	n/a	n/a	0	\$0
Religious	n/a	n/a	6	\$1,523,708
Residential	n/a	n/a	1	\$0
Zone X (unshaded)	110	\$11,230,793	n/a	n/a
Commercial	1	\$870	n/a	n/a
Education	0	\$0	n/a	n/a
Government	9	\$1,330,375	n/a	n/a
Other	0	\$0	n/a	n/a
Religious	39	\$9,792,298	n/a	n/a
Residential	61	\$107,250	n/a	n/a
Total	2,322	82,755,362	2,322	82,755,362

Source: Miami-Dade County 2019 Parcel Data, FEMA 2009 DFIRM

Based on this analysis, there are 2,212 unimproved parcels with a total land value of \$71,524,569 located in the SFHA according to the Effective FIRM flood zones. Using the Preliminary FIRM flood zones, an additional 102 parcels and \$9,705,608 in land value are located in the SFHA.

Flood Insurance Analysis

The NFIP utilizes the 1-percent-annual-chance flood as a basis for floodplain management. The FIS defines the probability of this flooding as flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 100-year period (recurrence interval). Or considered another way, properties within a SFHA have a one percent probability of flooding during any given year. Mortgage lenders require that owners of properties with federally-backed mortgages located within SFHAs purchase and maintain flood insurance policies on their properties. Consequently, newer and recently purchased properties in the community are insured against flooding. However, due to the risk of flooding from hurricanes and stormwater flooding, all property owners in the Town, even if the property is not located in a SFHA, should be encouraged to purchase and maintain flood insurance policies.

Current flood insurance data for activity policies and past claims is valuable source of information on flood hazards. Flood insurance is required as a condition of federal aid or a mortgage or loan that is federally insured for a building located in a FEMA flood zone. Table 4.28 through Table 4.31 reflect NFIP policy and claims data for the Town categorized by structure type, flood zone, Pre-FIRM and Post-FIRM. Compared to data from 2014 when the previous FMP was developed, the Town of Cutler Bay now has 4,359 more policies and \$1,162,001,600 more coverage as well as 205 more paid claims.

Table 4.28 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	6,553	\$4,191,028	\$1,707,466,700	191	\$2,190,891.12
2-4 Family	57	\$20,731	\$11,757,600	2	\$2,805.00
All Other Residential	1,001	\$215,554	\$126,536,100	9	\$0.00
Non-Residential	73	\$129,023	\$49,508,100	7	\$2,162.66
Total	7,684	\$4,556,336	\$1,895,268,500	209	\$2,195,858.78

Source: FEMA Community Information System, September 2020

Table 4.29 – 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	5,955	\$3,960,444	\$1,431,189,600	142	\$940,404.46
A Zones	9	\$5,400	\$639,000	1	\$0.00
AO Zones	0	\$0	\$0	0	\$0.00
AH Zones	112	\$69,913	\$25,568,800	14	\$227,516.48
AR Zones	0	\$0	\$0	0	\$0.00
A99 Zones	0	\$0	\$0	0	\$0.00
V01-30 & VE Zones	0	\$0	\$0	0	\$0.00
V Zones	0	\$0	\$0	0	\$0.00
D Zones	0	\$0	\$0	0	\$0.00
B, C & X Zone					
Standard	40	\$54,712	\$14,954,400	7	\$527,985.96
Preferred	435	\$170,615	\$136,295,000	11	\$177,326.66
Total	6,551	\$4,261,084	\$1,608,646,800	175	\$1,873,233.56

Source: FEMA Community Information System, September 2020

Table 4.30 – 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	2,517	\$1,836,730	\$587,987,900	87	\$776,455.33
A Zones	9	\$5,400	\$639,000	1	\$0.00
AO Zones	0	\$0	\$0	0	\$0.00
AH Zones	107	\$68,844	\$24,411,500	14	\$227,516.48
AR Zones	0	\$0	\$0	0	\$0.00
A99 Zones	0	\$0	\$0	0	\$0.00
V01-30 & VE Zones	0	\$0	\$0	0	\$0.00
V Zones	0	\$0	\$0	0	\$0.00
D Zones	0	\$0	\$0	0	\$0.00
B, C & X Zone	350	\$175,268	\$112,401,400	15	\$667,985.96
Standard	37	\$49,504	\$14,216,400	7	\$527,985.96
Preferred	313	\$125,764	\$98,185,000	8	\$140,000.00
Total	2,983	\$2,086,242	\$725,439,800	117	\$1,671,957.77

Source: FEMA Community Information System, September 2020

Table 4.31 – 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	3,438	\$2,123,714	\$843,201,700	55	\$163,949.13
A Zones	0	\$0	\$0	0	\$0.00
AO Zones	0	\$0	\$0	0	\$0.00
AH Zones	5	\$1,069	\$1,157,300	0	\$0.00
AR Zones	0	\$0	\$0	0	\$0.00
A99 Zones	0	\$0	\$0	0	\$0.00
V01-30 & VE Zones	0	\$0	\$0	0	\$0.00
V Zones	0	\$0	\$0	0	\$0.00
D Zones	0	\$0	\$0	0	\$0.00
B, C & X Zone	125	\$50,059	\$38,848,000	3	\$37,326.66
Standard	3	\$5,208	\$738,000	0	\$0.00
Preferred	122	\$44,851	\$38,110,000	3	\$37,326.66
Total	3,568	\$2,174,842	\$883,207,000	58	\$201,275.79

Source: FEMA Community Information System, September 2020

Table 4.32 compares the number of policies in force with the number of buildings (estimated by improved parcel counts) located within each flood zone in order to examine the percentage of buildings that are insured within each zone. Note that this assessment does not account for parcels with multiple insurable buildings and therefore overestimates policy coverage.

Table 4.32 – Percentage of Buildings Insured

Flood Zone	Number of Policies in Force	Number of Buildings	% Insured
AE Zone	5,964	5,619	100%
AH Zone	112	1,690	6.6%
VE Zone	0	0	0.0%
X Zone	475	3,491	13.6%
Total	6,551	10,800	60.7%

Source: FEMA Community Information System, September 2020; Miami-Dade County 2019 Parcel Data

Table 4.33 compares number of buildings present (estimated by improved parcel counts), number of policies in force, total coverage and a calculation of loss estimate values for the 100-yr flood.

Table 4.33 – Flood Loss Estimates by Flood Zone

Flood Zone	Number of Buildings	Number of Policies in Force	Total Value ¹	Total Coverage	Loss Estimate
AE Zone	5,619	5,964	\$1,901,384,663	\$1,431,828,600	\$261,761,373
AH Zone	1,690	112	\$482,203,519	\$25,568,800	\$17,263,384
VE Zone	0	0	\$0	\$0	\$0
Total	7,309	6,076	\$2,383,588,182	\$1,457,397,400	\$279,024,757

Source: Miami-Dade County 2019 Parcel Data, FEMA 2009 DFIRM

¹Total value does not include land value.

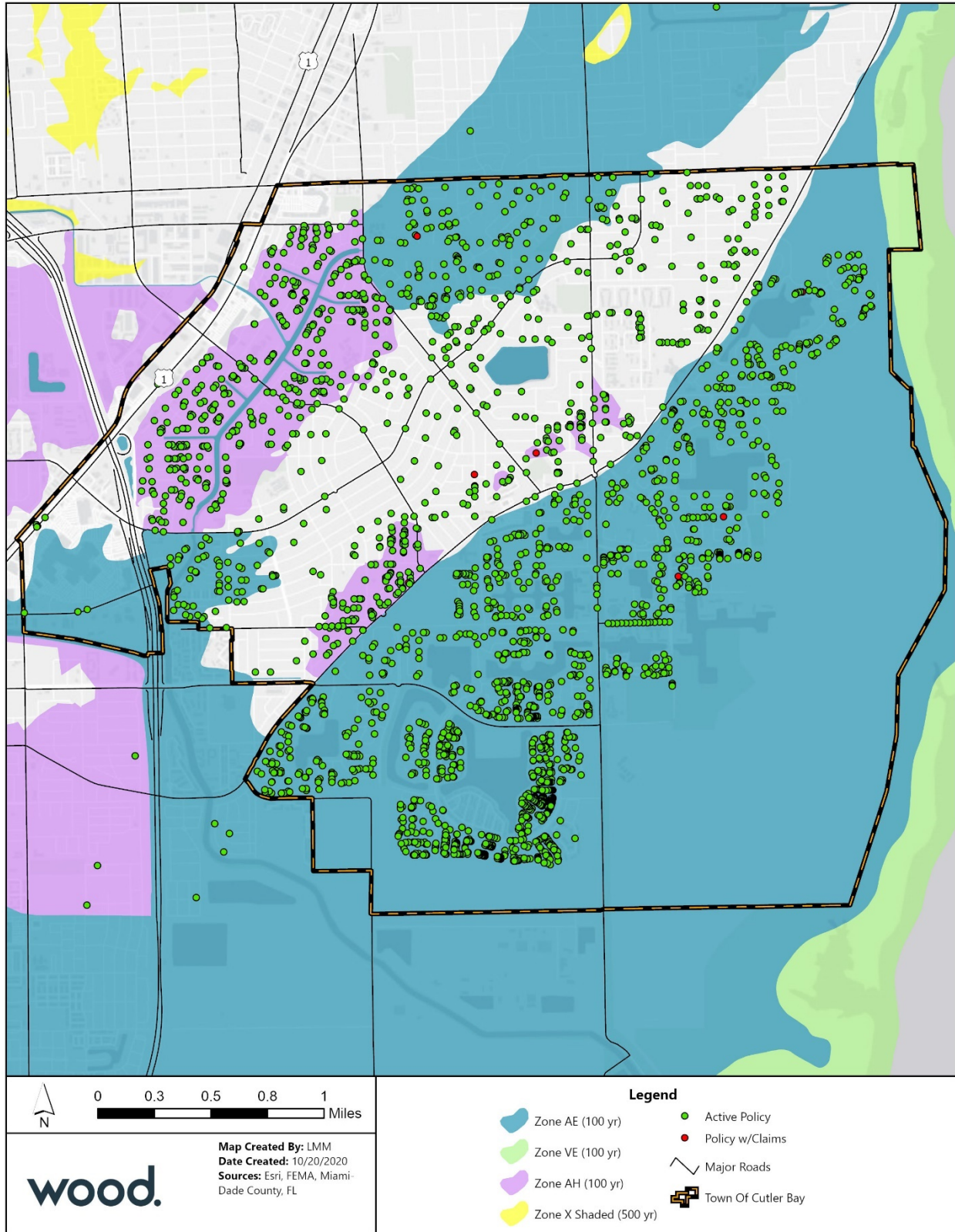
The above analysis of existing flood insurance coverage shows that existing building coverage does meet the loss estimate for the 1%-annual-chance flood event; however, this comparison does not take into



account the large number of uninsured proprietries that would have no coverage in the event of a flood loss.

Figure 4.33 shows the location of flood insurance policies as well as policies with claims as of 2014. Updated spatial data on the location of individual flood insurance policies was not available. However, this data still provides an indication of where gaps in coverage may exist.

Figure 4.33 – Cutler Bay Flood Insurance Policies in Force



Repetitive Loss Analysis

Methodology

Updated NFIP data was not available in time to incorporate into this assessment. However, according to 2014 NFIP records, there was one mitigated property with a total payment of \$25,945 and 32 unmitigated properties with a total payment of \$1,816,483 within the Town of Cutler Bay. Table 4.34 details repetitive loss building counts, FEMA flood zones and total payment.

Table 4.34 – Repetitive Loss Summary Table (Unmitigated Properties)

Flood Zone	Building Count		Total Building Payment	Total Content Payment	Total Paid
	Insured	Uninsured			
AE	8	14	\$627,757	\$281,284	\$909,041
AH	1	0	\$60,925	\$24,443	\$85,369
A10	1	0	\$28,856	\$0	\$28,856
X	4	4	\$516,088	\$277,129	\$793,217
Total	14	18	\$1,233,626	\$582,856	\$1,816,483

Source: NFIP Repetitive Loss Data 2014

Figure 4.34 illustrates the location of the repetitive loss properties separated out by the classification of mitigated or unmitigated in relation to the known flood hazard areas within Cutler Bay. Figure 4.35 illustrates the location of these properties in relation to the 100-yr flood depth.

Figure 4.34 – Repetitive Loss Properties and Flood Zones

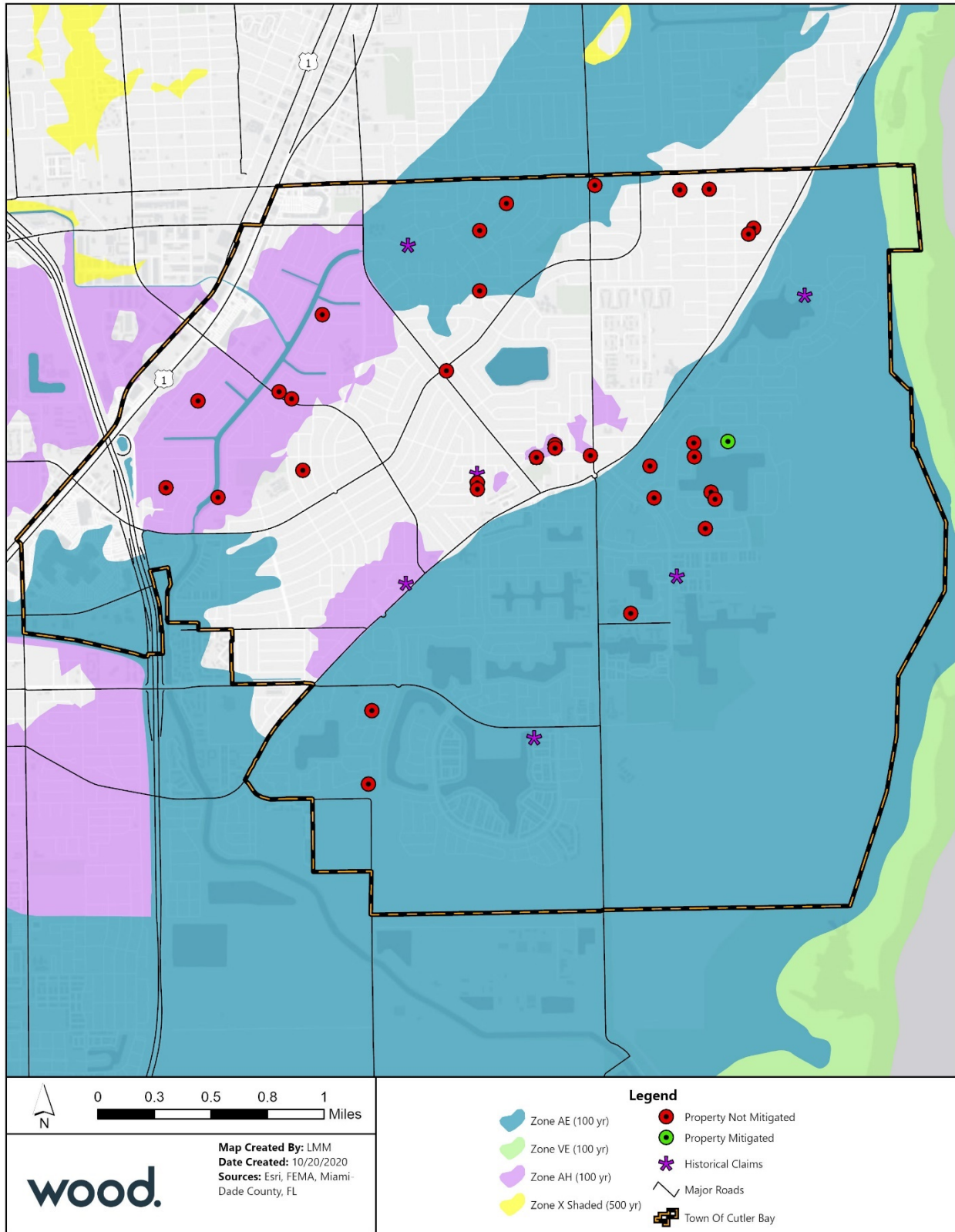
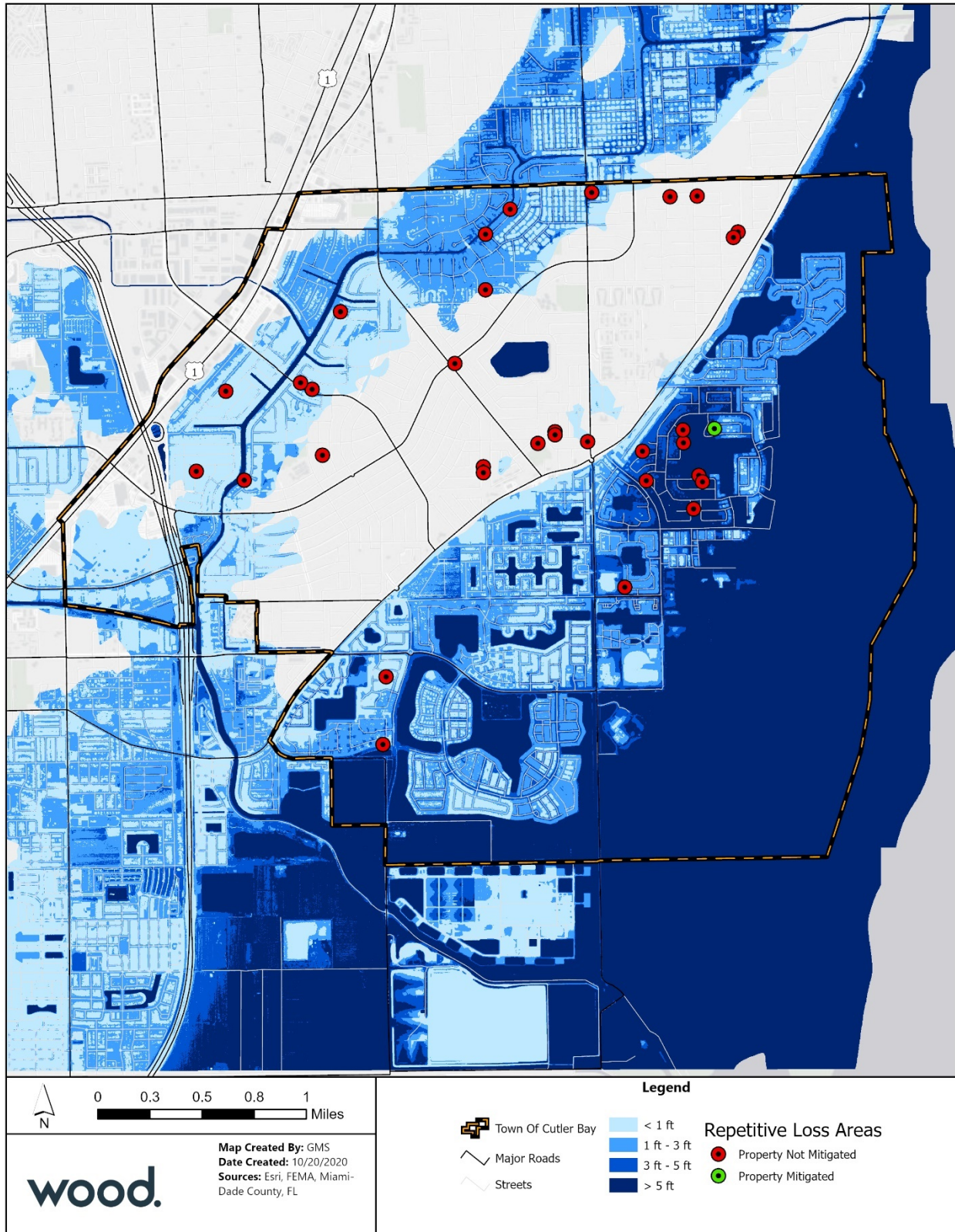


Figure 4.35 – Repetitive Loss Properties and 100-yr Flood Depth



4.4.5 Flood: Stormwater/Localized

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Flood: Stormwater/Localized Flooding	Highly Likely	Critical	Small	Less than 6 hours	Less than 24 hours	3.1

Hazard Description

Localized stormwater flooding can occur throughout Cutler Bay. Localized stormwater flooding occurs when heavy rainfall and an accumulation of runoff overburden the stormwater drainage system within the community. Cutler Bay is located along the Atlantic Ocean and Biscayne Bay, and the topography of the area is very flat with elevations generally below 10 feet (NGVD 29). Flooding problems are presented by ponding in the very flat, poorly drained areas and by overflow from the drainage canals that traverse the Town. Stormwater drainage has been an ongoing challenge in the Town, particularly the areas of marl and muck soils east of Old Cutler Road.

Localized flooding may be caused by the following maintenance related 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 which may cause flooding near the structure. 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 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 damages. While it may not impact as large an area or produce the damaging wave energy of coastal flooding, 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

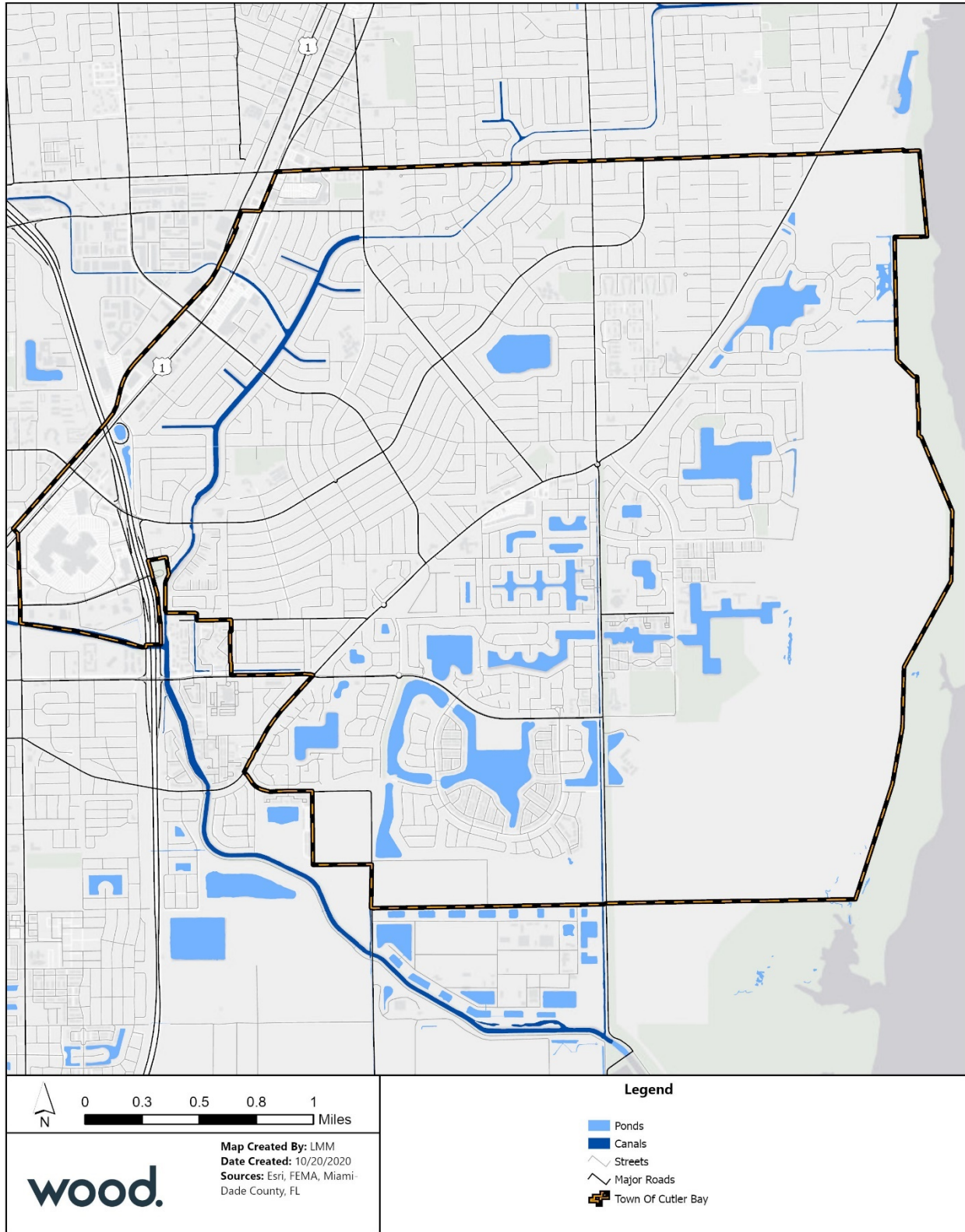
Location

As shown in Figure 4.36, there are six major canals that lie within and/or border the Town of Cutler Bay: C-100, C100B, C-1, C-1N, C-1W and L31E. These canals provide three main functions:

- ▶ To provide drainage and flood protection.
- ▶ To supply water for irrigation.
- ▶ To maintain a groundwater table elevation that is adequate to prevent saltwater intrusion into local groundwater.

These canals and the inlets, pipes, culverts, and other stormwater infrastructure that drain to the canals can become locations of localized stormwater flooding.

Figure 4.36 – Cutler Bay Canal System



Extent

The severity of localized stormwater 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. Past events provide an indication of potential magnitude. For example, the following storm event narrative from the NCEI database illustrates the property damage and threats to life safety that may result from localized stormwater flooding:

June 8, 1999 – Excessive rains caused localized heavy flooding from Boca Raton to Miami Beach. The greatest official 24-hour rainfall was 13.75 inches at Pompano Beach with over 7 inches reported at Boca Raton and Miami Shores. Numerous streets were flooded, and several vehicles became submerged in parking lots with their occupants having to be rescued. Three Broward mobile homes had to be evacuated, several roofs collapsed, and numerous dwellings had flood waters inside.

Past Occurrences

Areas of local stormwater flooding were identified by the FMPC. Figure 4.38 depicts the areas where localized flooding has recently occurred according to the FMPC. The areas of recent localized flooding are detailed in Table 4.35.

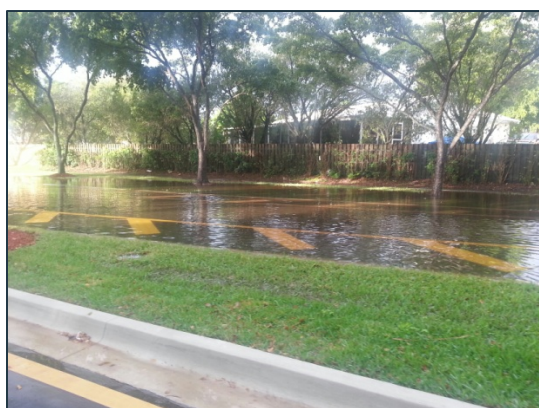
Table 4.35 – Locations of Recent Localized Flooding

Area #	Street Name or Intersection	Observations
1	The parcels between SW 195 St and SW 196 St	This appears to be Cutler Cay HOA, a private community with private roads, which the Community Development District and HOA maintain. Town staff have received resident concerns and have observed localized flooding due to over mulching. The Town Code enforcement has enforced cleaning of storm drains. Town staff continues to monitor.
2	The parcels bordered by Caribbean Blvd, Anchor Rd, Pan American Dr and Blue Water Rd	Flooding has been partially resolved with the completion of the Caribbean Blvd JPA project. The Cutler Ridge Section 3 project has been designed and construction will soon be ready to commence. This project is expected to fully resolve flooding in this area.
3	The intersection of SW 89 Ct, Franjo Rd and SW 200 St	The Franjo Road JPA project is currently being designed and is expected to resolve flooding in this area.
4	The intersection of SW 186 Street and SW 82 Avenue	There is a dip in the Road in the SE corner of the intersection where localized flooding occurs. A future roadway resurfacing for the SW 82 Avenue corridor with some swale restoration at the SE corner of intersection will resolve it.
5	SW 77 Ave and SW 188 St through the intersection of SW 78 Ave	This is Cutler Cay, a private community with private roads, which the Community Development District and HOA maintain. Town staff have received resident concerns and have observed localized flooding due to over mulching. The Town Code Enforcement has enforced cleaning of storm drains. Town Staff continues to monitor.
6	SW 84 Avenue at SW 199 Terrace	A future project in Saga Bay identified in the Town's Stormwater Master Plan is expected to resolve flooding here.
7	SW 214 Terrace between SW 97 Ave and SW 98 Ct	Regular Storm Drain cleaning as per Town schedule has reduced/improved the area localized flooding, but flooding still observed by Staff.
8	SW 216 St between SW 97 Ave and SW 98 Ct	The County is currently looking into procuring design on this County Owned and Maintained Road.
9	The quadrant of parcels bordered by SW 97 Ave, SW	This is Catalina HOA a private community with private Roads, which the HOA maintains. Town staff have received resident concerns and have

Area #	Street Name or Intersection	Observations
	221 Street/Terrace, SW 99 Pl and SW 224 St	observed localized flooding due to over mulching. The Town Code Enforcement has enforced cleaning of storm drains. Town Staff continues to monitor.
10	The intersection of SW 92 Ave/SW 93 Path and SW 216 St	The County is currently looking into procuring design on this County Owned and Maintained Road.
11	The parcels between SW 216 St and the eastern portion of SW 215 Terrace	This appears to be Patio Homes at Monterey Lakes HOA a private community with private roads that the HOA maintains. Town staff has not received any resident concerns and we have not observed any localized flooding. Town Staff continues to monitor.
12	SW 216 St between SW 87 Pl and SW 88 Pl	The County is currently looking into procuring design on this County Owned and Maintained Road.
13	SW 92 Place and SW 204 Terrace	This area has been improved due to the Town's Storm Drain cleaning schedule, but some localized street flooding has still been observed.

Figure 4.37 shows past instances of localized flooding in the Town.

Figure 4.37 – Examples of Past Localized Flooding



SW 216th St and 97th Ave



SW 197th St between 99 Ct & Bel-Aire Dr

Table 4.36 details areas of localized flooding that were previously identified by the FMPC but have since been mitigated.

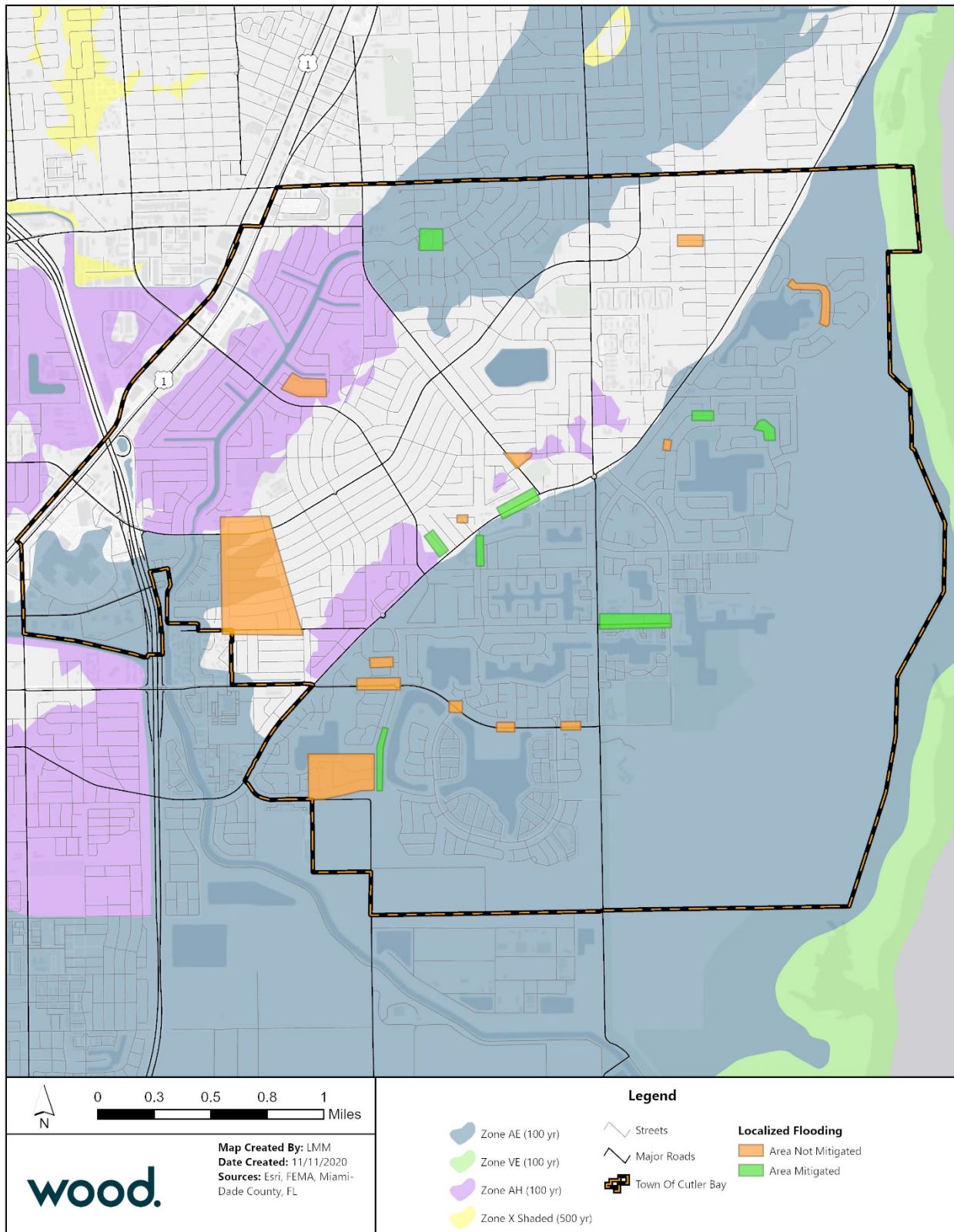
Table 4.36 – Mitigated Locations of Localized Flooding

Street Name or Intersection	Mitigation
Sterling Dr and SW 93 St	Regular Storm Drain cleaning as per Town schedule has improved the area flooding tremendously. No flooding has been observed by Town Staff since.
Manta Drive at Old Cutler Rd	Resolved with completion of Manta Drive Roadway/Drainage improvement project and Old Cutler Road JPA project.
Old Cutler Road southwest of the intersection of Franjo Road.	Resolved with completion of the Old Cutler Road JPA project.
SW 79 Ave at SW 79 Ct	Resolved with completion of the Saga Bay 1.2 Drainage Improvement Project.
SW 197 Terrace at SW 196 Terrace	Resolved with completion of the Saga Bay 1.2 Drainage Improvement Project.
SW 212 St between SW 85 Ave and SW 87 Ave	Resolved with completion of the SW 212 Street Roadway/Drainage Improvement project.



Street Name or Intersection	Mitigation
SW 92 Ave between Old Cutler Road and SW 208 St	Resolved with completion of a minor drainage project installing a Drainage Structure with exfiltration trench in the swale.
SW 97 Ave between SW 219 St and SW 224 St	Resolved with completion of drainage project in this segment of SW 97 Avenue.

Figure 4.38 – Localized Flooding Identified by the FMPC





Probability of Future Occurrence

Due to the low elevations, a flat terrain, a consistent level of annual precipitation and the tidal influence on canal drainage resulting from heavy rainstorms, tropical storms, and hurricanes, it is highly likely that unmitigated properties will continue to experience localized flooding.

Probability: 4 – Highly Likely

Climate Change and Flood: Stormwater/Localized Flooding

Climate change and sea level rise do have the potential to affect localized flooding in Cutler Bay. As discussed in Section 3.4.4, the frequency and intensity of heavy precipitation events is expected to increase across the U.S., and total precipitation amounts are expected to increase in the Southeast according to the Fourth National Climate Assessment. Increases in the intensity of individual rainfall events may cause increases in localized flooding, as stormwater drainage systems designed for smaller floods become overwhelmed more frequently.

Vulnerability Assessment

Vulnerability—High

Localized flooding occurs at various times throughout the year with several areas of primary concern to the Town, as noted in Table 4.35 above. Localized flooding and ponding affect streets and property.

Figure 4.39 depicts localized flooding in relation to repetitive loss areas and flood zones. Figure 4.40 depicts localized flooding in relation to repetitive loss areas and the depth of flooding that can be expected from the 100-yr flood event.

Figure 4.39 – Localized Flooding, Repetitive Losses and Flood Zones

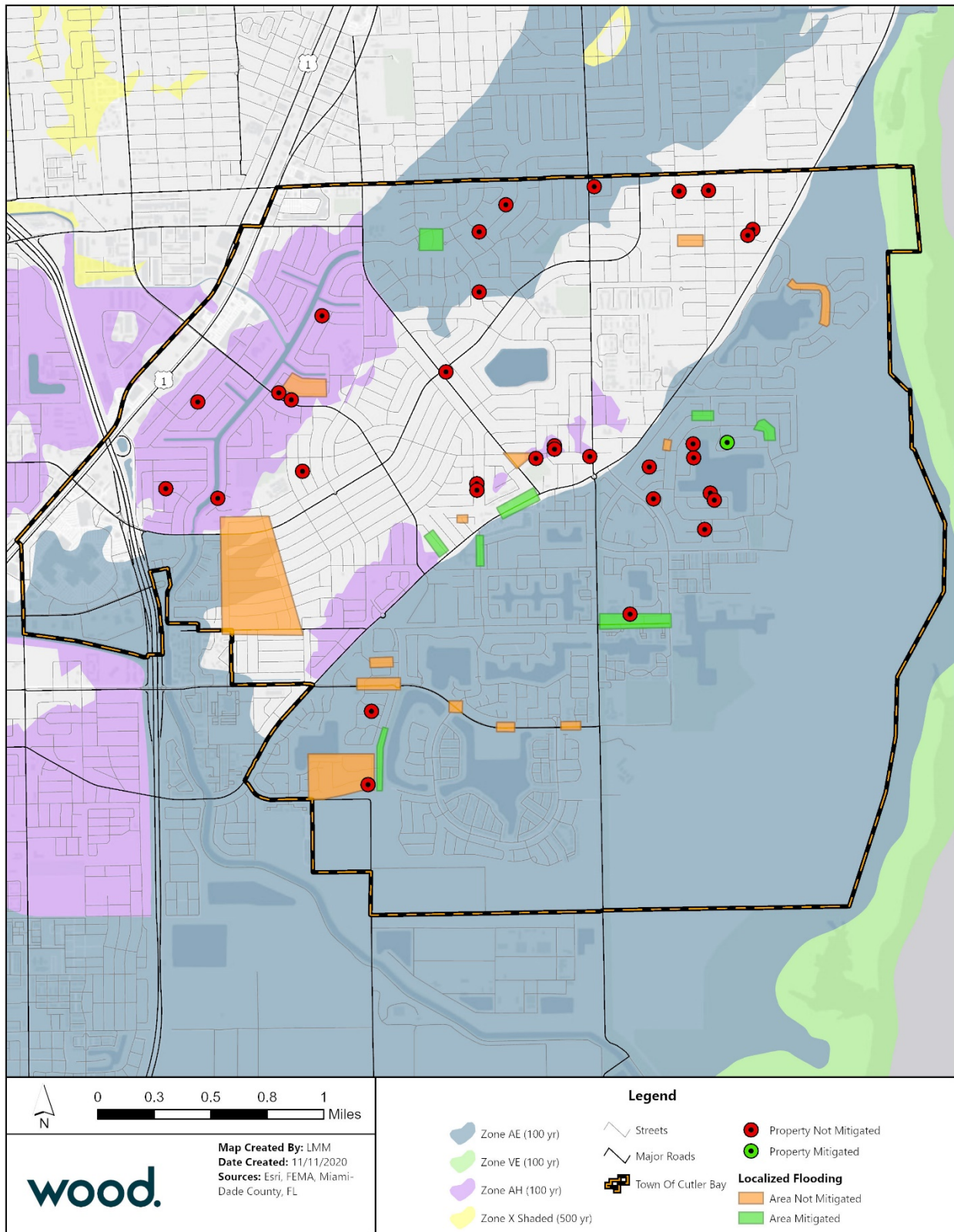
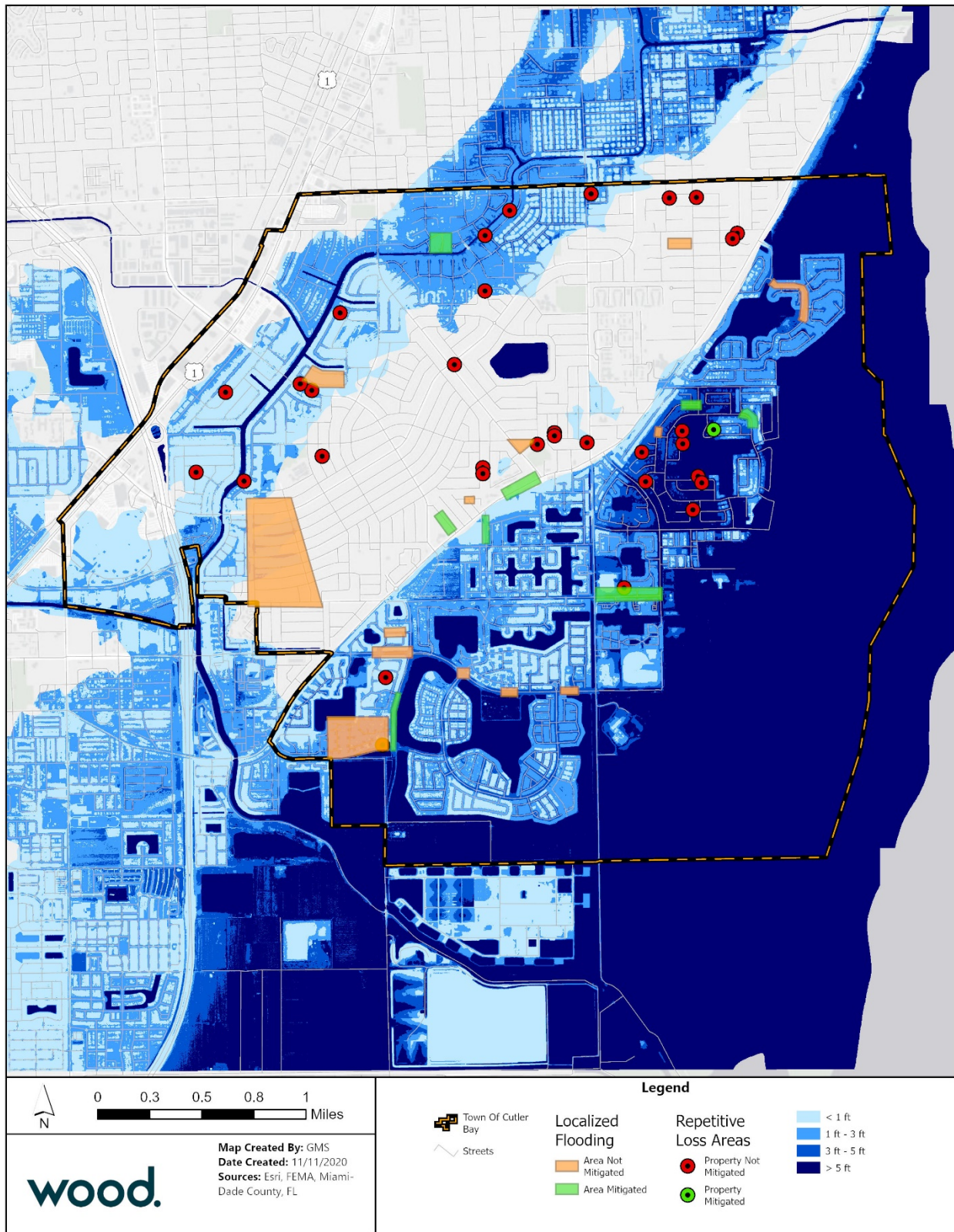


Figure 4.40 – Localized Flooding, Repetitive Losses and 100-yr Flood Depth



4.4.6 Hurricane and Tropical Storm (including Storm Surge)

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

Hazard Description

A hurricane is a type of tropical cyclone or severe tropical storm that forms in the southern Atlantic Ocean, Caribbean Sea, Gulf of Mexico, and in the eastern Pacific Ocean. All Atlantic and Gulf of Mexico coastal areas are subject to hurricanes. The Atlantic hurricane season lasts from June to November, with the peak season from mid-August to late October.

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. Broadly defined, the stages of a tropical disturbance are tropical depression, tropical storm, hurricane, and major hurricane.

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 closely 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. This process generally occurs over many days, allowing for ample warning and preparation.

The heavy rains associated with tropical weather systems are not only responsible for major flooding in areas where the storm initially strikes, but can also affect areas hundreds of miles inland. Torrential rains from hurricanes and tropical storms can produce extensive urban and riverine flooding, especially if the storm systems are large and slow moving. Winds from these storms located offshore can drive ocean water up the mouth of a river or canal, compounding the severity of inland overbank flooding.

In addition to the combined destructive forces of wind, rain, and lightning, hurricanes can cause a surge in the ocean, which can raise the sea level as high as 25 feet or more in the strongest hurricanes. As a hurricane approaches the coast, its winds drive water toward the shore. Once the edge of the storm reaches the shallow waters of the continental shelf, the water begins to pile up. Winds of hurricane strength eventually force the water onto the shore. At first, the water level climbs slowly, but as the eye of the storm approaches, water rises rapidly. Furthermore, storm surge can also cause extensive damage on the backside of a hurricane as storm surge waters are sucked back out to sea.

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.

Warning Time: 1 – More than 24 hours

Duration: 3 – Less than 1 week

Tropical Storm

Tropical depressions and tropical storms are both categorized by the National Weather Service as a tropical cyclone. The differentiation between these two is wind speed and organization:

Tropical Depression – A tropical cyclone in which the maximum 1-minute sustained surface wind is 33 knots (38 mph) or less. When viewed from a satellite, tropical depressions appear to have little organization. However, the slightest amount of rotation can usually be perceived when looking at a series of satellite images. Instead of a round appearance similar to hurricanes, tropical depressions look like individual thunderstorms that are grouped together.

Tropical Storm – A tropical cyclone in which the maximum 1-minute sustained surface wind ranges from 34 to 63 knots (39 to 73 mph) inclusive. As the storm transitions from tropical depression to tropical storm, the storm itself becomes more organized and begins to become more circular in shape, resembling a hurricane.

While hurricanes pose the greatest threat to life and property, tropical storms and depressions also can be devastating. Floods from heavy rains and severe weather, such as tornadoes, can cause extensive damage and loss of life.

Hurricane

A hurricane is a tropical cyclone in which the maximum sustained surface wind is 74 mph or more. Hurricanes are classified by wind speed into one of five categories on the Saffir-Simpson Hurricane Wind Scale as shown in Table 4.37. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher, with sustained wind speeds at or above 111 mph, are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous, however, and require preventative measures.

Table 4.37 – Saffir-Simpson Hurricane Wind Scale

Category	Maximum Sustained Wind Speed (mph)	Potential Damage
1	74-95	Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110	Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3	111-129	Devastating damage will occur: Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4	130-156	Catastrophic damage will occur: Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5	≥ 157	Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: National Hurricane Center/NOAA

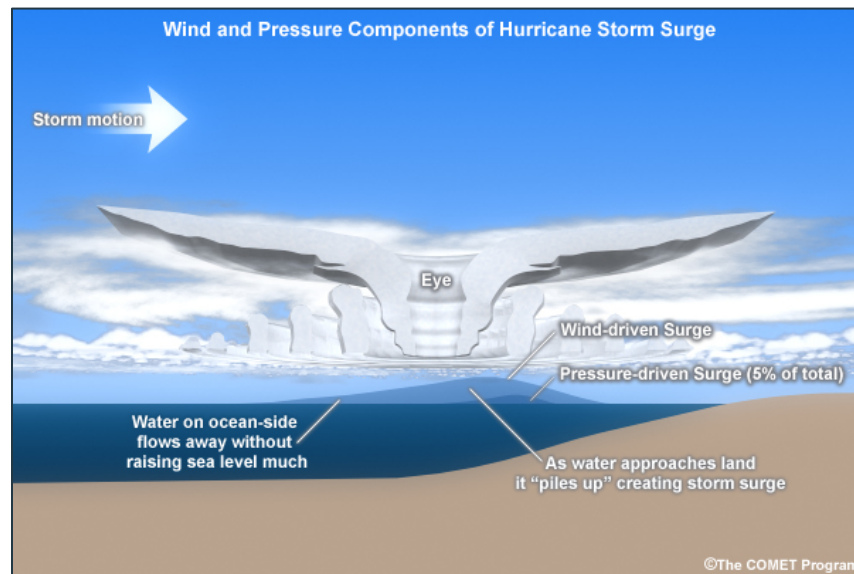
Storm Surge

The greatest potential for loss of life related to a hurricane is from the storm surge. Storm surge is simply water that is pushed toward the shore by the force of the winds swirling around the storm as shown in Figure 4.41. This advancing surge combines with the normal tides to create the hurricane storm tide, which can increase the mean water level to heights impacting roads, homes and other critical infrastructure. In addition, wind driven waves are superimposed on the storm tide. This rise in water level can cause severe flooding in coastal areas, particularly when the storm tide coincides with the normal high tides. Because much of the densely populated Atlantic coastline lies less than 10 feet above mean sea level, the danger from storm tides is tremendous.

The storm surge combined with wave action can cause extensive damage and severely erode beaches and coastal highways. With major storms like Katrina, Camille and Hugo, complete devastation of coastal communities occurred. Many buildings withstand hurricane force winds until their foundations, undermined by erosion, weaken and fail.

The maximum potential storm surge for a particular location depends on a number of different factors. Storm surge is a very complex phenomenon because it is sensitive to the slightest changes in storm intensity, forward speed, size (radius of maximum winds-RMW), angle of approach to the coast, central pressure (minimal contribution in comparison to the wind), and the shape and characteristics of coastal features such as bays and estuaries. Other factors which can impact storm surge are the width and slope of the continental shelf. A shallow slope will potentially produce a greater storm surge than a steep shelf. For example, a Category 4 storm hitting the Louisiana coastline, which has a very wide and shallow continental shelf, may produce a 20-foot storm surge, while the same hurricane in Miami Beach, Florida, where the continental shelf drops off very quickly, might see an 8 or 9-foot surge.

Figure 4.41 – Components of Hurricane Storm Surge



Source: NOAA/The COMET Program

Location

Hurricanes and tropical storms can cause catastrophic damage to coastlines and several hundred miles inland. Hurricanes can produce winds exceeding 157 miles per hour as well as tornadoes and microbursts. Additionally, hurricanes and tropical storms can create storm surges along the coast and cause extensive damage from heavy rainfall. Floods and flying debris from the excessive winds are often

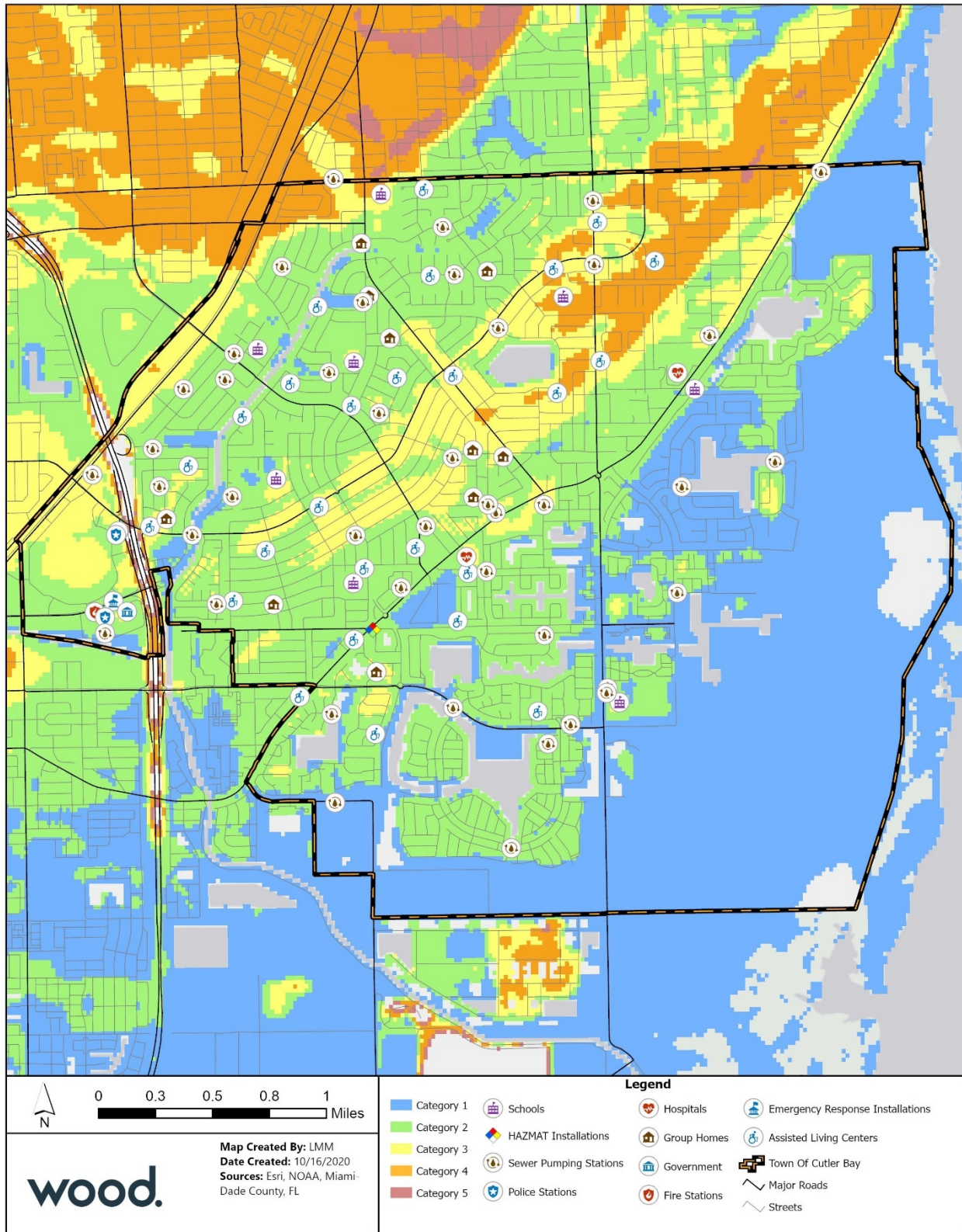


the deadly and destructive results of these weather events. Flash flooding can also occur due to intense rainfall. All of the planning area can be impacted by hurricanes and tropical storms.

The Sea, Lake and Overland Surges from Hurricanes (SLOSH) model is a computerized numerical model developed by the National Weather Service (NWS) to estimate storm surge heights resulting from historical, hypothetical, or predicted hurricanes by taking into account the atmospheric pressure, size, forward speed, and track data. These parameters are used to create a model of the wind field which drives the storm surge. The SLOSH model consists of a set of physics equations which are applied to a specific locale's shoreline, incorporating the unique bay and river configurations, water depths, bridges, roads, levees and other physical features.

Anticipated SLOSH model surge elevations for Category 1-5 hurricanes are shown for Cutler Bay in Figure 4.42. The feature set depicting surge zones in this figure was created using a Surge Modeling application created for the Florida Statewide Regional Evacuation Update Study. The data was derived from National Hurricane Center SLOSH model runs on all the NOAA SLOSH basins throughout Florida. The runs create outputs for all different storm simulations from all points of the compass. Each direction has a MEOW (maximum envelope of water) for each category of storm (1-5), and all directions combined result in a MOMs (maximum of maximums) set of data. The MOMs are used in this surge model.

Figure 4.42 – Category 1 through Category 5 Storm Surge Zones for Cutler Bay



Extent

Wind speed is the determining factor in the Saffir-Simpson scale, which is used as a measure of hurricane intensity. Storm surge is also significant to a hurricane's magnitude, and storm surge projections are often tied to a storm's category on the Saffir-Simpson scale; however, storm surge values are highly dependent on the slope of the continental shelf, the shape of the coastline in the landfall region, and the storm's path. The following describes the characteristics of each category storm from the Saffir-Simpson Hurricane Wind Scale Extended Table:

Category 1 Hurricane - Winds 74 – 95 mph. Very dangerous winds will produce some damage. People, livestock, and pets struck by flying or falling debris could be injured or killed. Older (mainly pre-1994 construction) mobile homes could be destroyed, especially if they are not anchored properly as they tend to shift or roll off their foundations. Newer mobile homes that are anchored properly can sustain damage involving the removal of shingle or metal roof coverings, and loss of vinyl siding, as well as damage to carports, sunrooms, or lanais. Some poorly constructed frame homes can experience major damage, involving loss of the roof covering and damage to gable ends as well as the removal of porch coverings and awnings. Unprotected windows may break if struck by flying debris. Masonry chimneys can be toppled. Well-constructed frame homes could have damage to roof shingles, vinyl siding, soffit panels, and gutters. Failure of aluminum, screened-in, swimming pool enclosures can occur. Some apartment building and shopping center roof coverings could be partially removed. Industrial buildings can lose roofing and siding especially from windward corners, rakes, and eaves. Failures to overhead doors and unprotected windows will be common. Windows in high-rise buildings can be broken by flying debris. Falling and broken glass will pose a significant danger even after the storm. There will be occasional damage to commercial signage, fences, and canopies. Large branches of trees will snap and shallow rooted trees can be toppled. Extensive damage to power lines and poles will likely result in power outages that could last a few to several days.

Category 2 Hurricane - Winds 96-110 mph. Extremely dangerous winds will cause extensive damage. There is a substantial risk of injury or death to people, livestock, and pets due to flying and falling debris. Older (mainly pre-1994 construction) mobile homes have a very high chance of being destroyed and the flying debris generated can shred nearby mobile homes. Newer mobile homes can also be destroyed. Poorly constructed frame homes have a high chance of having their roof structures removed especially if they are not anchored properly. Unprotected windows will have a high probability of being broken by flying debris. Well-constructed frame homes could sustain major roof and siding damage. Failure of aluminum, screened-in, swimming pool enclosures will be common. There will be a substantial percentage of roof and siding damage to apartment buildings and industrial buildings. Unreinforced masonry walls can collapse. Windows in high-rise buildings can be broken by flying debris. Falling and broken glass will pose a significant danger even after the storm. Commercial signage, fences, and canopies will be damaged and often destroyed. 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. Potable water could become scarce as filtration systems begin to fail.

Category 3 Hurricane - Winds 111-129 mph. Devastating damage will occur. There is a high risk of injury or death to people, livestock, and pets due to flying and falling debris. Nearly all older (pre-1994) mobile homes will be destroyed. Most newer mobile homes will sustain severe damage with potential for complete roof failure and wall collapse. Poorly constructed frame homes can be destroyed by the removal of the roof and exterior walls. Unprotected windows will be broken by flying debris. Well-built frame homes can experience major damage involving the removal of roof decking and gable ends. There will be a high percentage of roof covering and siding damage to apartment buildings and industrial buildings. Isolated structural damage to wood or steel framing can occur. Complete failure of older metal buildings is possible, and older unreinforced masonry buildings can collapse. Numerous windows will be blown out



of high-rise buildings resulting in falling glass, which will pose a threat for days to weeks after the storm. Most commercial signage, fences, and canopies will be destroyed. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to a few weeks after the storm passes.

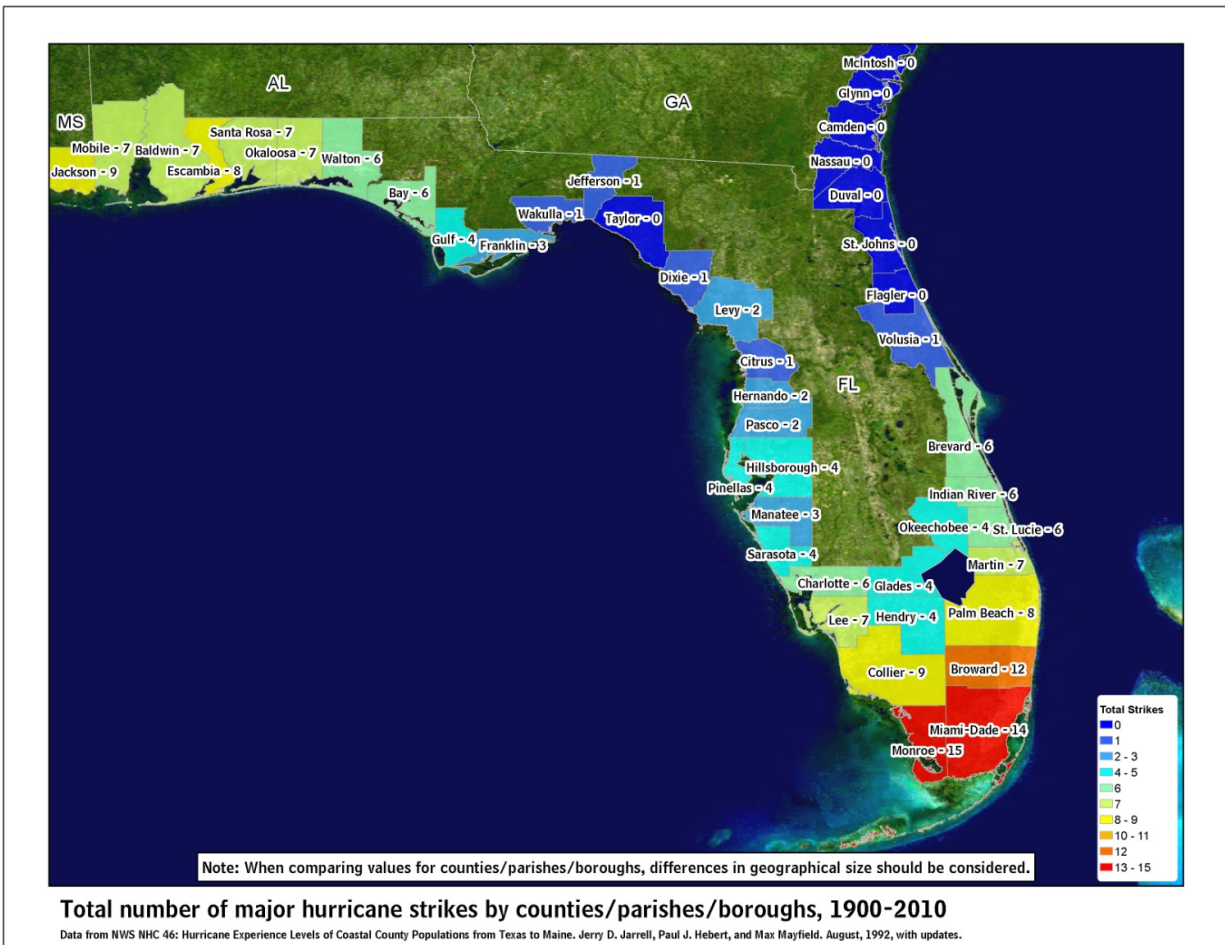
Category 4 Hurricane - Winds 130 to 156 mph. Catastrophic damage will occur. There is a very high risk of injury or death to people, livestock, and pets due to flying and falling debris. Nearly all older (pre-1994) mobile homes will be destroyed. A high percentage of newer mobile homes also will be destroyed. Poorly constructed homes can sustain complete collapse of all walls as well as the loss of the roof structure. Well-built homes also can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Extensive damage to roof coverings, windows, and doors will occur. Large amounts of windborne debris will be lofted into the air. Windborne debris damage will break most unprotected windows and penetrate some protected windows. There will be a high percentage of structural damage to the top floors of apartment buildings. Steel frames in older industrial buildings can collapse. There will be a high percentage of collapse to older unreinforced masonry buildings. Most windows will be blown out of high-rise buildings resulting in falling glass, which will pose a threat for days to weeks after the storm. Nearly all commercial signage, fences, and canopies will be destroyed. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Long-term water shortages will increase human suffering. Most of the area will be uninhabitable for weeks or months.

Category 5 Hurricane - Winds 157 mph or higher. Catastrophic damage will occur. People, livestock, and pets are at very high risk of injury or death from flying or falling debris, even if indoors in mobile homes or framed homes. Almost complete destruction of all mobile homes will occur, regardless of age or construction. A high percentage of frame homes will be destroyed, with total roof failure and wall collapse. Extensive damage to roof covers, windows, and doors will occur. Large amounts of windborne debris will be lofted into the air. Windborne debris damage will occur to nearly all unprotected windows and many protected windows. Significant damage to wood roof commercial buildings will occur due to loss of roof sheathing. Complete collapse of many older metal buildings can occur. Most unreinforced masonry walls will fail which can lead to the collapse of the buildings. A high percentage of industrial buildings and low-rise apartment buildings will be destroyed. Nearly all windows will be blown out of high-rise buildings resulting in falling glass, which will pose a threat for days to weeks after the storm. Nearly all commercial signage, fences, and canopies will be destroyed. Nearly all trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Long-term water shortages will increase human suffering. Most of the area will be uninhabitable for weeks or months. Hurricane Andrew (1992) is an example of a hurricane that brought Category 5 winds and impacts to coastal portions of Cutler Ridge, Florida with Category 4 conditions experienced elsewhere in south Miami-Dade County.

Past Occurrences

Major disaster declarations for hurricanes and tropical storms in Miami-Dade County can be found in Table 4.3.

Figure 4.43 illustrates the average number of hurricane strikes along the southern U.S. coast from 1900 to 2010. Miami-Dade County has experienced 14 total strikes.

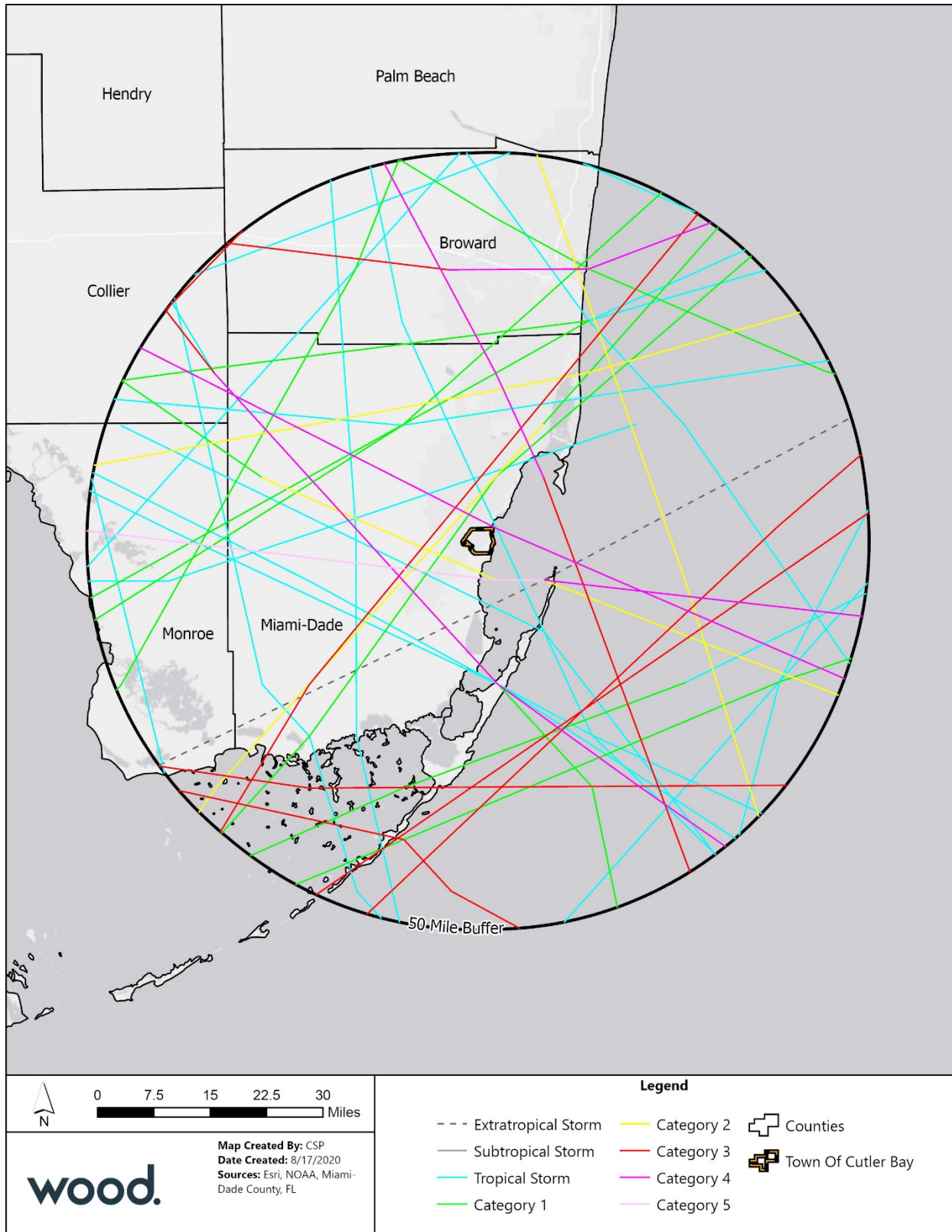
Figure 4.43 – Major Hurricane Strikes, 1900-2010

Source: NOAA/National Hurricane Center

While direct strikes from major hurricanes provide an indication of the most significant past impacts, even weaker storms can cause substantial damage. Additionally, the large scale of hurricanes mean that their impacts may be felt hundreds of miles from the track of the storm. Figure 4.44 reflects the tracks of past land-falling hurricanes in the Cutler Bay area from 1900-2017 according to NOAA NCEI's International Best Track Archive for Climate Stewardship (IBTrACS) data set. This data set includes records through 2017 and is the best available data.

Table 4.38 lists hurricane, tropical storm, and tropical depression events reported by NCEI since 1996 for Miami-Dade County and Table 4.39 lists storm surge events reported by NCEI since 1996 for Miami-Dade County. Over the 24-year period from 1996-2020, NCEI records 58 hurricane, tropical storm, tropical depression, and storm surge/tide events across 28 separate days. These events caused \$253,722,000 in property damages as well as 10 deaths.

Figure 4.44 – Past Track Map of Hurricanes Passing within 50 Miles of Cutler Bay



Source: NOAA/National Hurricane Center

Table 4.38 – NCEI Hurricane/Tropical Storm Events for Miami-Dade County, 1996-2020

Date	Event Type	Deaths/ Injuries	Property Damage	Crop Damage
07/10/1996	Hurricane	2/0	\$0	\$0
09/25/1998	Hurricane	0/0	\$5,000,000	\$15,000,000
09/13/1999	Hurricane	0/0	\$0	\$0
10/14/1999	Hurricane	0/0	\$140,000,000	\$230,000,000
11/05/2001	Hurricane	0/0	\$10,000	\$0
09/04/2004	Hurricane	0/0	\$34,000,000	\$0
09/25/2004	Hurricane	0/0	\$10,000,000	\$0
07/08/2005	Hurricane	0/0	\$0	\$0
08/25/2005	Hurricane	6/0	\$64,000,000	\$423,000,000
10/24/2005	Hurricane	2/0	\$0	\$0
9/24/1998	Tropical Storm	0/0	\$0	\$0
9/25/1998	Tropical Storm	0/0	\$0	\$0
11/4/1998	Tropical Storm	0/0	\$0	\$0
11/4/1998	Tropical Storm	0/0	\$0	\$0
9/20/1999	Tropical Storm	0/0	\$0	\$0
9/20/2005	Tropical Storm	0/0	\$0	\$0
8/29/2006	Tropical Storm	0/0	\$0	\$0
8/29/2006	Tropical Storm	0/0	\$0	\$0
10/30/2007	Tropical Storm	0/0	\$0	\$0
8/18/2008	Tropical Storm	0/0	\$10,000	\$0
8/18/2008	Tropical Storm	0/0	\$0	\$0
8/18/2008	Tropical Storm	0/0	\$0	\$0
8/18/2008	Tropical Storm	0/0	\$0	\$0
9/8/2008	Tropical Storm	0/0	\$0	\$0
9/8/2008	Tropical Storm	0/0	\$0	\$0
9/8/2008	Tropical Storm	0/0	\$0	\$0
7/23/2010	Tropical Storm	0/0	\$2,000	\$0
8/26/2012	Tropical Storm	0/0	\$0	\$0
8/26/2012	Tropical Storm	0/0	\$0	\$0
8/26/2012	Tropical Storm	0/0	\$100,000	\$0
10/25/2012	Tropical Storm	0/0	\$0	\$0
9/9/2017	Tropical Storm	0/0	\$0	\$0
9/3/2018	Tropical Storm	0/0	\$0	\$0
9/3/2018	Tropical Storm	0/0	\$0	\$0
9/9/2017	Tropical Storm	0/0	\$0	\$0
10/30/2007	Tropical Depression	0/0	\$0	\$0
10/30/2007	Tropical Depression	0/0	\$0	\$0
11/1/2007	Tropical Depression	0/0	\$0	\$0
11/1/2007	Tropical Depression	0/0	\$0	\$0
10/6/2016	Tropical Depression	0/0	\$600,000	\$0
10/6/2016	Tropical Depression	0/0	\$0	\$0
10/28/2017	Tropical Depression	0/0	\$0	\$0
10/28/2017	Tropical Depression	0/0	\$0	\$0
9/3/2018	Tropical Depression	0/0	\$0	\$0
9/3/2018	Tropical Depression	0/0	\$0	\$0
9/3/2018	Tropical Depression	0/0	\$0	\$0
9/3/2018	Tropical Depression	0/0	\$0	\$0
9/3/2018	Tropical Depression	0/0	\$0	\$0



Date	Event Type	Deaths/ Injuries	Property Damage	Crop Damage
9/3/2019	Tropical Depression	0/0	\$0	\$0
9/3/2019	Tropical Depression	0/0	\$0	\$0
9/3/2019	Tropical Depression	0/0	\$0	\$0
Total:		10/0	\$253,722,000	\$668,000,000

Source: NCEI Storm Events Database

Table 4.39 – NCEI Storm Surge Events for Miami-Dade County, 1996-2020

Date	Event Type	Deaths/ Injuries	Property Damage	Crop Damage
10/24/2005	Storm Surge/Tide	0/0	\$0	\$0
10/30/2007	Storm Surge/Tide	0/0	\$0	\$0
11/1/2007	Storm Surge/Tide	0/0	\$0	\$0
8/26/2012	Storm Surge/Tide	0/0	\$0	\$0
10/26/2012	Storm Surge/Tide	0/0	\$0	\$0
9/10/2017	Storm Surge/Tide	0/0	\$0	\$0
9/3/2019	Storm Surge/Tide	0/0	\$0	\$0
Total:		0/0	\$0	\$0

Source: NCEI Storm Events Database

The following descriptions of past occurrences of hurricanes, tropical storms, and storm surge come from the Miami-Dade County Local Mitigation Strategy (LMS) and NCEI.

September 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. The strength and size of Hurricane Irma allowed for 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 wind 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 storm force sustained wind occurred. Irma brought a significant storm surge on both coasts of South Florida. 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. 5 to 10 inches of rain were noted elsewhere across South Florida, with areas of minor to moderate flooding. 32 deaths were attributed to Irma in southern Florida, all but one indirect. 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.

October 2016 – The collective effects of Hurricane Matthew in Palm Beach, Broward, and Miami-Dade counties on October 6-7 resulted in about \$32 million in beach-related damage and about \$2 million in wind damage. In Miami-Dade County, a few trees and power lines were downed, resulting in over 16,000 customers without power at the peak of the event. Damages were estimated at \$1.2 million dollar across the county. Voluntary evacuations were ordered for residents in low-lying areas and mobile homes, and a total of 700 people took shelter in county shelters during the event.

October 2012 – Hurricane Sandy began to affect the Miami-Dade County coast and its adjacent Atlantic waters with tropical storm force winds during the early morning of October 25th as it moved north across the northwest Bahamas. Virginia Key reported a sustained wind of 40 mph shortly after 0500 LST with gusts to 50 mph. As Hurricane Sandy continued to move north and then northeast over the Atlantic waters



north of the Bahamas, large northeast swells generated by the storm pummeled the Southeast Florida coast through October 30th with beach erosion and coastal flooding reported along the northeast shore of Miami-Dade County including the communities of Sunny Isles, Bal Harbour and Surfside. Large breaking of waves estimated at around 10 feet were reported along the coast of Miami-Dade County. A maximum storm tide of 4.15 feet above mean lower low water (MLLW) was observed at Virginia Key on October 28th at 848 AM, along with a maximum storm surge of 1.44 feet. Only minor wind damage was noted, primarily to vegetation. A total 57,870 customers lost power. Exact damage figures are unknown for Miami-Dade County but are believed to be primarily from beach erosion.

July 2010 – Tropical Storm Bonnie made landfall near Cutler Bay in southern Miami-Dade County during the late morning of July 23rd. Maximum sustained winds were near 40 mph as the storm made landfall. Minimum central pressure was 1008 mb. Effects over south Florida were minimal, with the only areas experiencing sustained tropical storm force winds right along the coast in Virginia Key south of downtown Miami. Highest wind gusts over most of Miami-Dade County were in the 40 to 45 mph range. Widely scattered power outages were the primary impact (about 14,000 customers), along with negligible damage to newly planted small to medium sized trees and downed power lines. Rainfall associated with the storm was also relatively minor, with maximum storm total amounts of 2.5 to 3.25 inches over central and northern Miami-Dade County. Minor urban flooding was the result. Highest storm surge was 0.92 feet at Virginia Key at 806 AM EDT. No significant coastal flooding or beach erosion was noted.

August 2005 – Hurricane Katrina was every bit as much a flood event as it was a windstorm. Rainfall amounts were excessive across portions of south Miami-Dade County causing flooding of structures, vehicles, crop lands and nurseries. A maximum storm total amount of 16.33 inches, of which 15.10 inches fell in a 24-hour period, was measured by a cooperative observed in Perrine. Other heavy storm total amounts in south Miami-Dade County included 14.04 inches at Homestead Air Reserve Base, 12.25 inches near Florida City and 11.13 inches near Cutler Ridge.

September 2004 – Hurricane Jeanne formed from a tropical depression just east of the Leeward Islands on September 13. She moved across Puerto Rico and Hispaniola then turned north into the Atlantic and became a hurricane on September 20. Property damage from storm surge and winds at the coast occurred to condos, marinas, piers, seawalls, bridges and docks, as well as to boats and a few coastal roadways.

October 2000 – A low-pressure system, later to become Tropical Storm Leslie, developed off the west coast of Cuba, and headed toward South Florida (DR-1345). Water managers and weather officials closely tracked the storm, and preemptive measures were taken to start moving water out of the canals. Once the storm passed over south Florida, it exploded, dumping 14 to 18 inches of rainfall over a linear area in the center of Miami-Dade County.

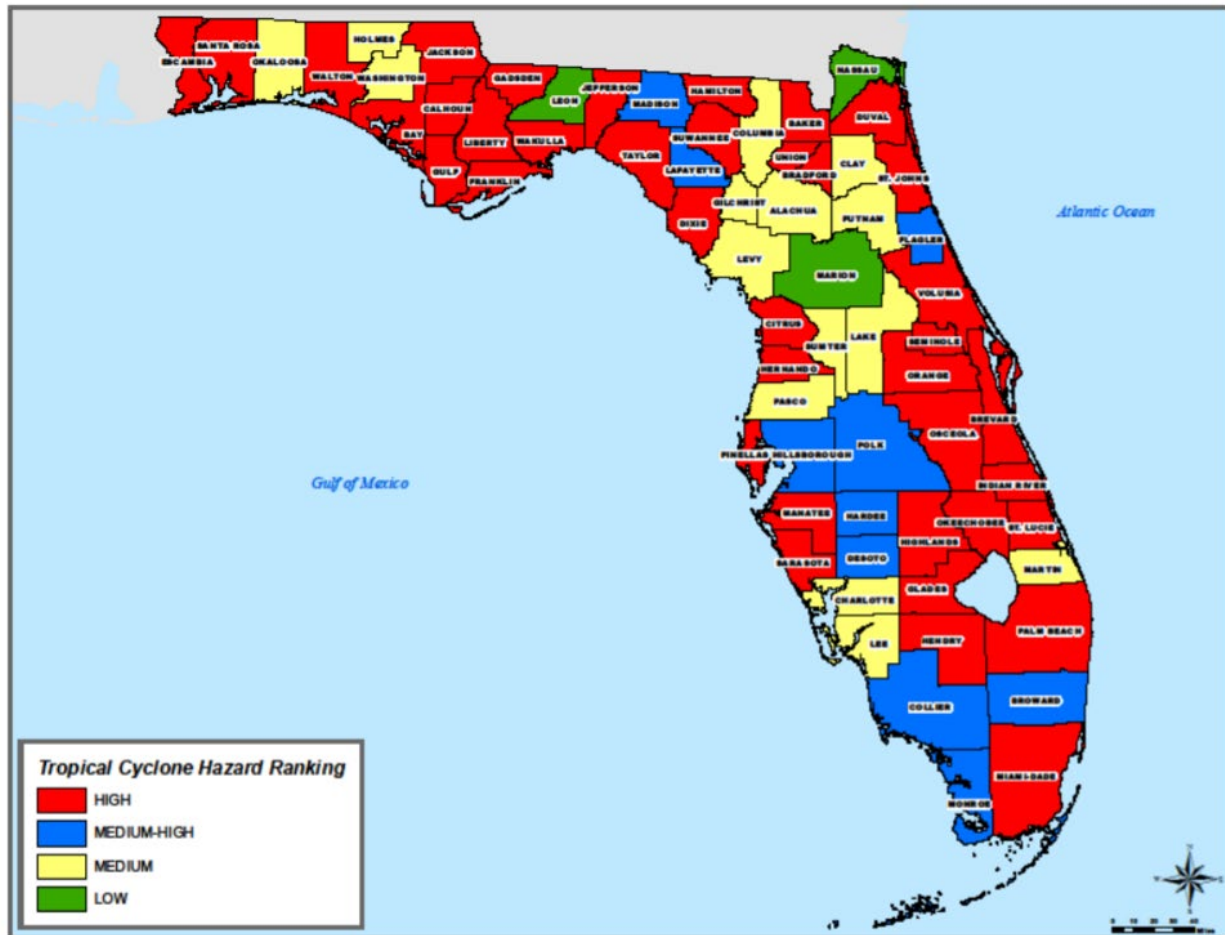
October 1999 – Hurricane Irene (DR-1306) developed and started a path towards south Florida. Initial projections were correct in stating the hurricane would impact the west coast of Florida, and Irene traveled through the state and, on October 15, passed just to the west of Miami-Dade County. Although the hurricane did not pass directly through the county and no exceptionally high winds were experienced, the heavy rainfall associated with this storm did hit Miami-Dade County, and the impacts were severe. Some roads were impassible for weeks, electricity was out in certain areas, and residents and businesses suffered heavy losses.

Probability of Future Occurrence

Given the 58 storm event reports across 28 separate days over the 24-year period from 1996 to 2020, an average of 2.4 hurricane or tropical storm related events affect Miami-Dade County on average each year, with over a 100% probability of a hurricane or tropical storm related event occurring in any given year.

According to a vulnerability analysis completed for the 2018 State of Florida Enhanced Hazard Mitigation Plan, Miami-Dade County is considered a high-risk jurisdiction as shown in Figure 4.45.

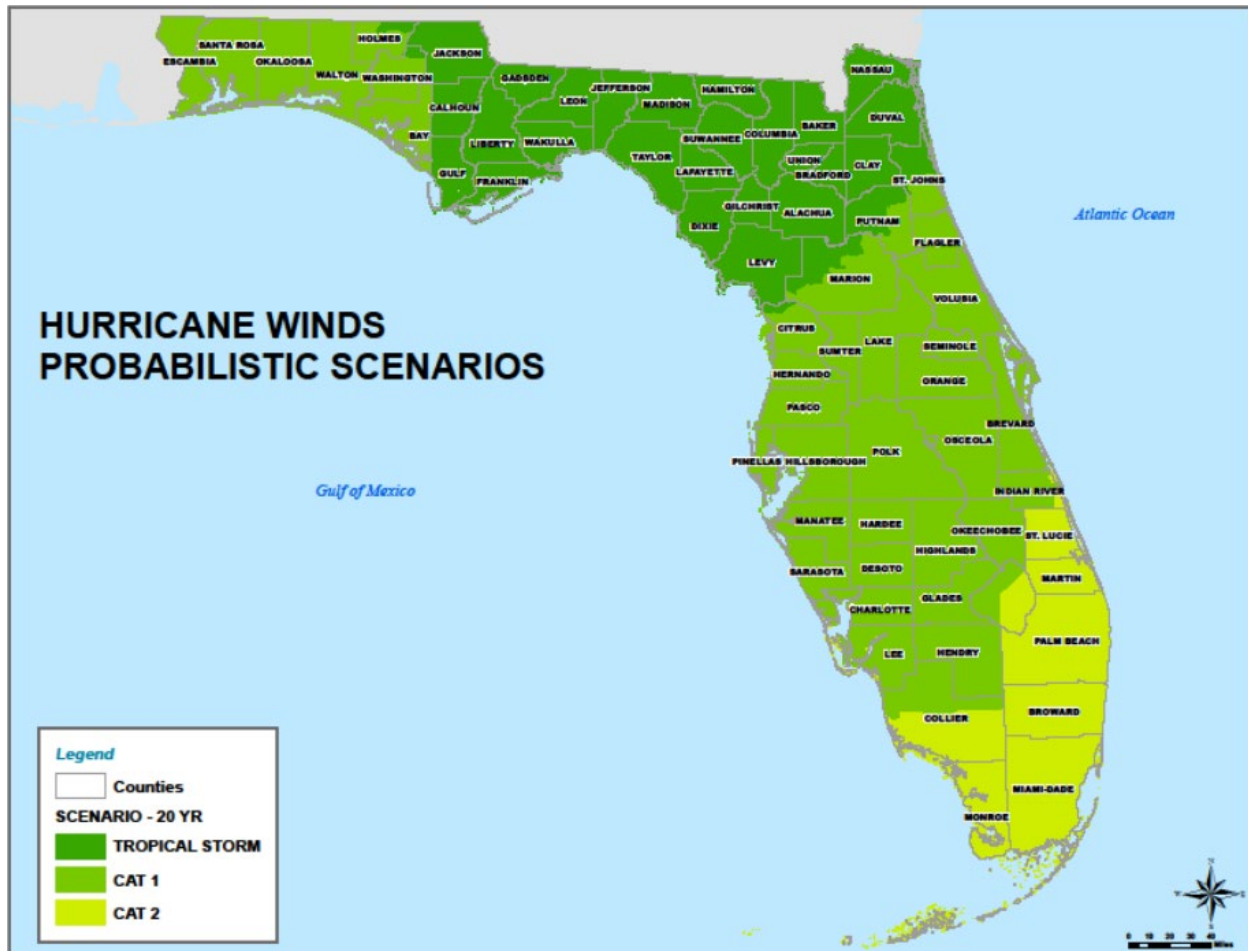
Figure 4.45 – Hurricane Hazard Ranking by County



Source: 2018 State of Florida Enhanced Hazard Mitigation Plan

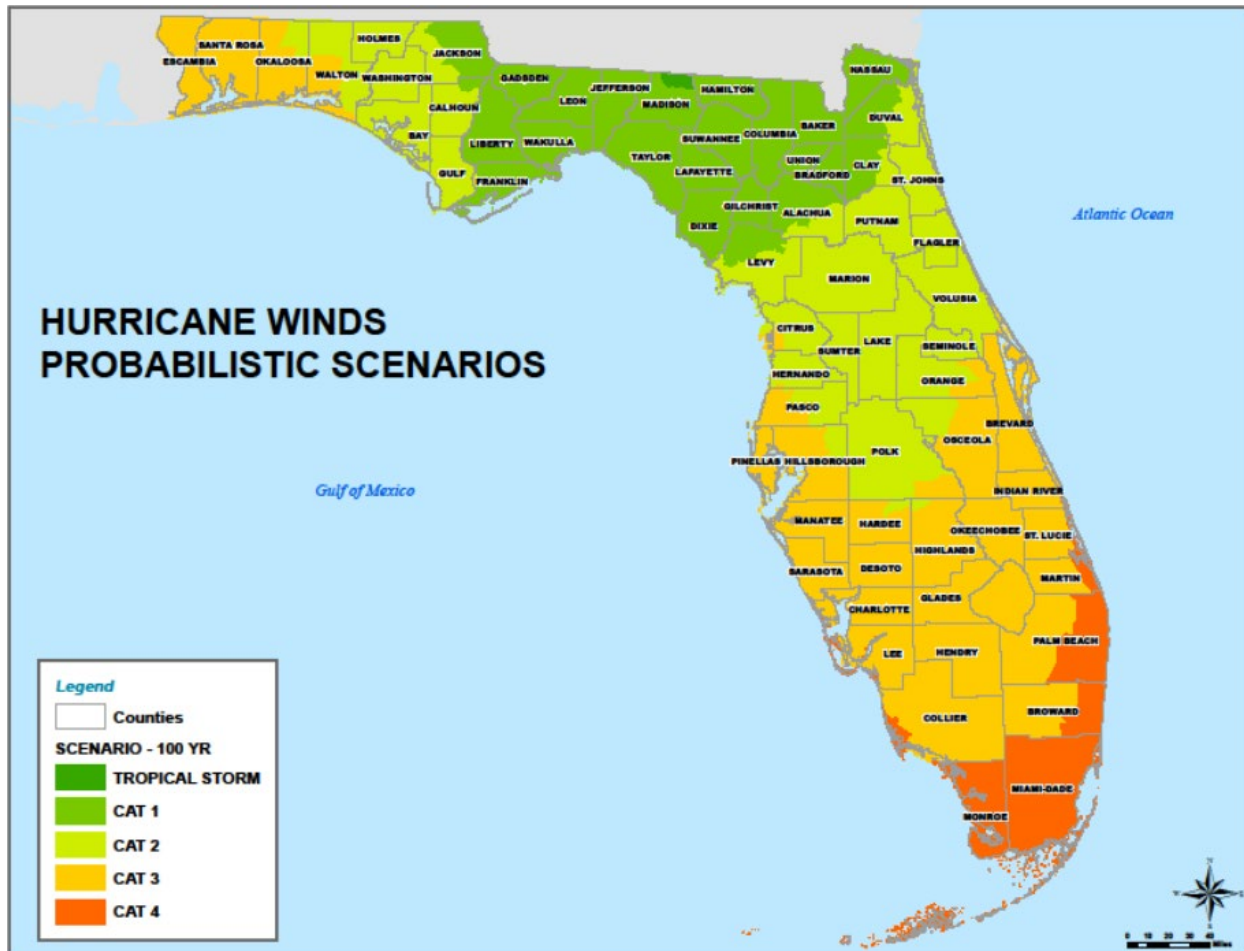
Figure 4.46 from the State plan summarizes the 20-year return period for hurricane winds across Florida; the Cutler Bay area has a probability of experiencing a Category 2 hurricane at least once every 20 years. Figure 4.47 summarizes the 100-year return period for hurricane winds across Florida; the Cutler Bay area has a probability of experiencing a Category 4 hurricane at least once every 100 years.

Figure 4.46 – Hurricane 20-Year Return Period



Source: State of Florida Enhanced Hazard Mitigation Plan

Figure 4.47 – Hurricane 100-Year Return Period



Source: State of Florida Enhanced Hazard Mitigation Plan

Climate Change and Hurricane and Tropical Storms

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

Hurricanes and other coastal storms may result in increased flooding, injuries, deaths, and extreme property loss. According to the US Government Accountability Office, national storm losses from changing frequency and intensity of storms is projected to increase anywhere from \$4-6 billion soon.

Sea level change will be particularly important in influencing storm surge flooding in the Cutler Bay area, since the area is already subject to flooding from above normal tides, surge and rainfall events from hurricanes and less powerful tropical storms. As a result of sea-level rise, flooding from just high tide events is becoming more common. The 7-foot storm surge in Miami-Dade County from Hurricane Wilma (Category 5) has a likelihood of occurring once every 76 years; a 2 foot sea level rise would increase the likelihood to once every 5 years (WRI, 2014).

Vulnerability Assessment

Vulnerability—Extremely High

Methodology

A hurricane surge analysis was conducted by intersecting the parcel layer provided by Miami-Dade County with the polygon shapefile for each hurricane surge layer. The polygon shapefiles depicting each hurricane surge zone were created using a Surge Modeling application created for the Florida Statewide Regional Evacuation Update Study. The data was derived from National Hurricane Center SLOSH model runs on all the NOAA SLOSH basins throughout Florida. The runs create outputs for all different storm simulations from all points of the compass. Each direction has a MEOW (maximum envelope of water) for each category of storm (1-5), and all directions combined result in a MOMs (maximum of maximums) set of data. The MOMs are used in this surge model. The application uses three input parameters or data: elevation (from LIDAR), SLOSH basin results, and contiguous shoreline or sea polygons.

Property at Risk

Figure 4.48 through Figure 4.52 and Table 4.40 through Table 4.44 provide a summary of assets at risk to hurricane surge based on each hurricane category. The assets at risk estimate for each hurricane category is based on the total of improved and contents value. The value of land is not included in the loss estimates as generally the land is not subject to loss from hurricane and tropical storm damage. When compared to the vulnerability of predicted flood level models (SLOSH) resulting from hurricane storm surge, almost the entire Town becomes vulnerable to property damaging flooding from a Category 3 or stronger hurricane.

Post-Disaster Mitigation Policies and Procedures

Cutler Bay falls under Miami-Dade County Emergency Management for post-disaster policies and procedures. The Miami-Dade guidance for post-disaster is located in the Comprehensive Emergency Management Plan (CEMP). The CEMP outlines strategies, assumptions, operational goals and objectives and mechanisms through which Miami-Dade County will mobilize resources to assist all communities including Cutler Bay in response, recovery, and mitigation.

The policies and procedures are as follows:

- As disaster response evolves into recovery operations, a Recovery Task Force (RTF), compiled of representatives from County Departments, will work in conjunction to continue operational initiatives until the County and all communities have fully recovered.
- The RTF will work in coordination with the Recovery Manager to oversee the transition from ESFs EOC to Recovery Support Functions (RSFs) in the Recovery Operations Center (ROC).
- The Recovery Plan addresses policies that promote an expedited, all-hazards disaster recovery process among all stakeholders including public sector agencies and organizations; non-profit and faith-based organizations; municipal jurisdiction and independent districts including water control districts, fire districts, and school districts.
- Comprehensive community recovery addresses decision-making and functional operation within twelve Recovery Support Functions (RSFs). This Plan details the processes, structures, and systems to employ local, State, Federal, and private sector disaster resources in support of recovery operations.
- The transition from response activities to recovery may not be clear. The return to an evacuated area may be an extended period of time due to:
 1. Uninhabitable conditions – caused by lingering hazards, flooding or building collapse

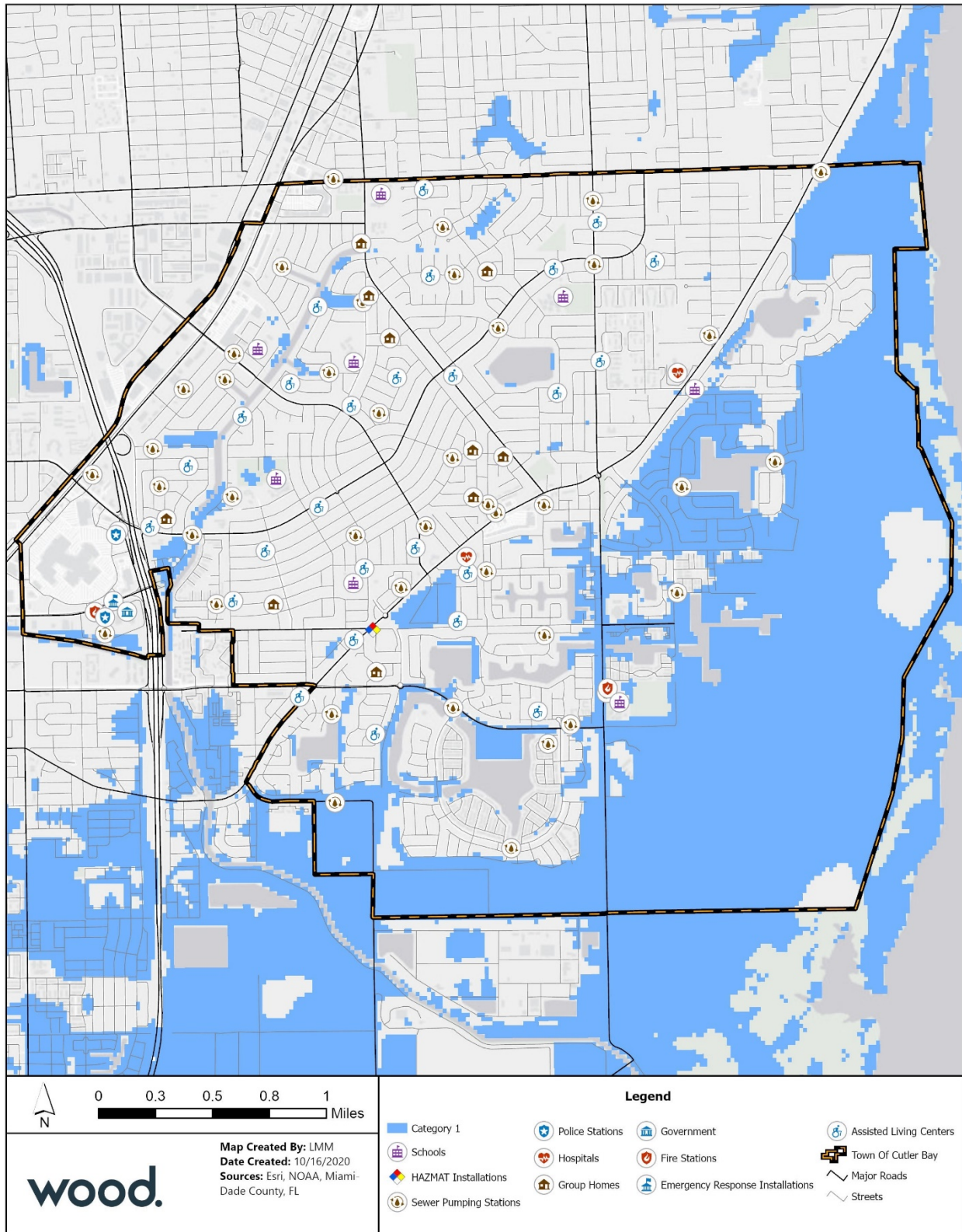
2. Lack of access or essential services – such as blocked roadways, lack of water, sewer, or electricity.
- Agencies responsible for recovery functions must be activated and ready to perform assigned functions before the response phase is finished. There is a marked difference in the action required during the initial or short-term recovery phase, and the extended or long-term recovery phase. The different phases occur simultaneously throughout the community.
 - The RTF will authorize policy level decisions and resources beyond normal internal capabilities. The RTF will also determine when to elevate decisions to the County Mayor that needs to be reviewed by the Board of County Commissioners. The RTF may consist of, but not be limited to the following members and/or their designees:
 - County Mayor's Chief of Staff
 - Deputy Mayor for Regulatory and Economic Resources
 - Deputy Mayor for Finance and Internal Support
 - Deputy Mayor for Health, Social Services and Public Safety
 - Deputy Mayor for Public Infrastructure and Services
 - Miami-Dade County Office of Emergency Management Director
 - County Attorney
 - Director of Water and Sewer
 - Director of Transportation and Public Works
 - Director of Seaport
 - Director of Aviation
 - Health Administrator for DOH Miami-Dade
 - Director of the Metropolitan Planning Organization
 - Recovery activities will require continued coordination even after the EOC deactivates. Based on this the Emergency Management Director may request that one or more RSFs be activated to coordinate their activities through the ROC.
 - This center is activated following the deactivation of the EOC. Depending on the size and complexity of the disaster the ROC will operate virtually or as a fixed facility. The ROC provides the ability for recovery organizations to engage in uninterrupted integrated planning, and long-term coordination of resources and personnel while maintaining centralized control of post-disaster redevelopment operations. To maintain situation awareness the RSFs will utilize WebEOC which will be used to share information and resources among the relevant partners
 - The RSFs maintain focus within each of the functional areas and provide leadership and guidance to address recovery needs. RSFs will staff the ROC, if necessary, and maintain active engagement of all stakeholders demanding decisive, expedited action to aid community recovery. Failure to organize immediate recovery efforts could be detrimental to the long-term redevelopment effort. For example, actions such as implementation of small business bridge loans could ensure survival of small businesses who do not maintain any type of contingency resources. A rapid disaster-housing program, similarly, may encourage displaced residents to remain within the area and support reconstruction efforts. These are just two examples that reveal the vital importance of an efficient, organized transitional organization in recovery.
 - During the recovery phase, the challenge of the RSF Infrastructure lies with prioritizing immediate infrastructure restoration efforts. Activities include demolition of dangerously damaged structures, debris clearance, emergency repair of water and sewer systems, roads, bridges and other public facilities. The goal is to initially reestablish basic infrastructure and services to areas which can begin to function again. The group must initially set priorities to the



restoration effort which may require temporary repairs or alternate facilities to meet immediate needs with a plan for permanent repairs.

- Areas that have been heavily damaged may require long-term reconstruction efforts which would be directed by the PDRP. This RSF coordinates the assessment, emergency repair, and estimation of these initial repairs. Ultimately the Infrastructure RSF will transition to the Infrastructure and Transportation Technical Advisory Committee to coordinate permanent repair, mitigation, and documentation of all damaged County owned structures and infrastructure including transportation infrastructure.
- RSF Public Information/Outreach will collect, compile, distribute, and coordinate recovery related public information through all available public, private, non-profit, electronic, and community-based means. They will coordinate all information releases from all the partners initially through the Joint Information Center with State and Federal partner agencies to ensure a unified message is maintained. During the Recovery Phase, the responsibilities of the Joint Information Center are transferred to the RSF Public Information/Outreach. During the recovery phase the function will focus more extensively on community relations activities; work with the electronic and print media; manage the website; conduct public meetings; monitor public perception and rumors; and ensure the accuracy of media information. The RSF will focus outreach and education topics to include general community redevelopment priorities and public input opportunities; residential and commercial mitigation strategies during reconstruction.
- The short-term recovery phase immediately follows the disaster event and entails the immediate, even if temporary, efforts to allow a return to normal life. The community may still be under emergency conditions if essential services have not been restored. Conditions for extending the emergency period during the short-term recovery phase include:
 - Residents are still in shelters.
 - Water or sewer systems are inoperative.
 - Electricity is not available.
 - There is a shortage of food, water, and other basic goods.
 - Curfew is in effect.
 - Re-entry is not possible because of debris or severe damage.
- The recovery process begins with an initial damage assessment conducted by Miami-Dade personnel and stakeholders using aircraft, ground vehicles, observer call-ins and reports via the internet. The size and type of incident and its overall impact on the community will determine who should participate in the damage assessment process. Minor emergencies or incidents may only require participation of local county agencies and organizations.

Figure 4.48 – Category 1 Storm Surge Impact in Cutler Bay



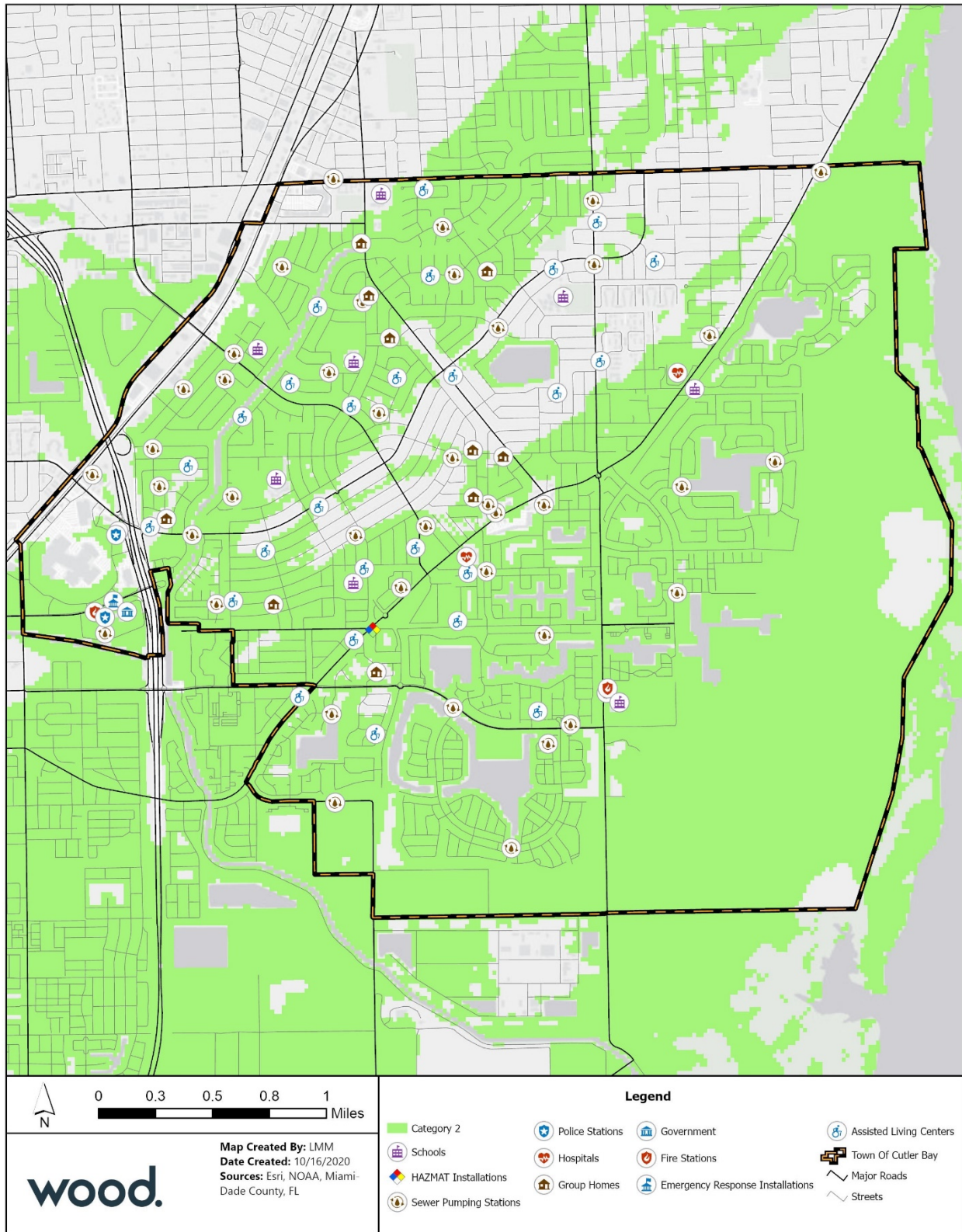
**Table 4.40 – Cutler Bay Assets at Risk to Category 1 Storm Surge**

Occupancy	Parcels Affected by Storm Surge	Land Value	Structure Value	Estimated Content Value	Total Value
Commercial	51	\$22,714,288	\$8,565,769	\$8,565,769	\$17,131,538
Education	1	\$179,031	\$960,969	\$960,969	\$1,921,938
Government	67	\$44,435,829	\$67,975,136	\$67,975,136	\$135,950,272
Other	148	\$1,486,919	\$0	\$0	\$0
Religious	2	\$1,767,572	\$2,167,496	\$2,167,496	\$4,334,992
Residential	2,035	\$166,093,242	\$364,021,300	\$182,010,650	\$546,031,950
Total	2,304	\$236,676,881	\$443,690,670	\$261,680,020	\$705,370,690

Source: Miami-Dade County 2019 Parcel Data, NOAA, FDEM

¹Total value does not include land value.

Figure 4.49 – Category 2 Storm Surge Impact in Cutler Bay



Source: Florida Division of Emergency Management (<http://www.floridadisaster.org>)

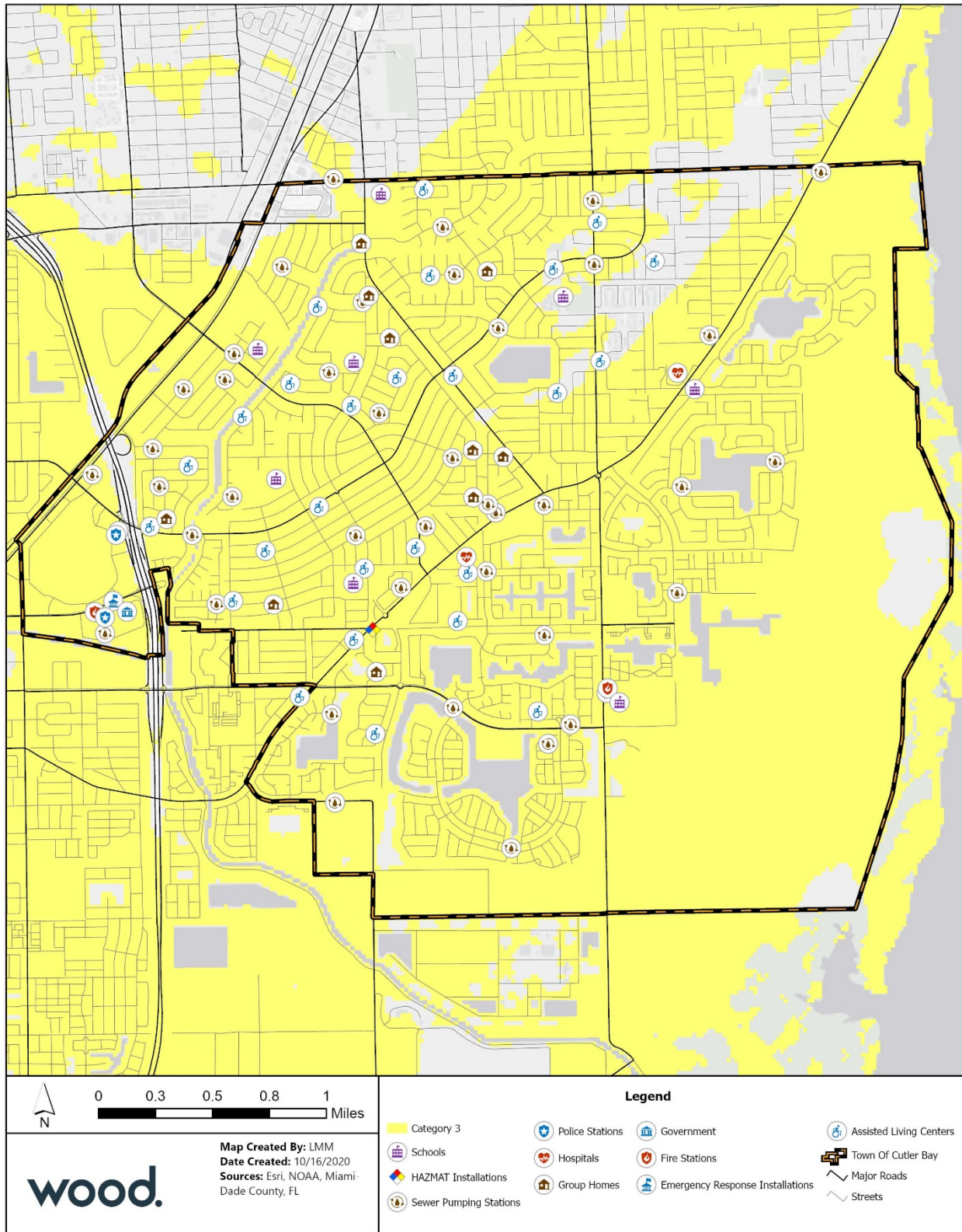
**Table 4.41 – Cutler Bay Assets at Risk to Category 2 Storm Surge**

Occupancy	Parcels Affected by Storm Surge	Land Value	Structure Value	Estimated Content Value	Total Value
Commercial	143	\$125,448,598	\$74,534,706	\$74,534,706	\$149,069,412
Education	3	\$1,246,785	\$1,060,969	\$1,060,969	\$2,121,938
Government	97	\$56,520,463	\$87,518,505	\$87,518,505	\$175,037,010
Other	411	\$3,397,251	\$0	\$0	\$0
Religious	8	\$8,794,303	\$14,881,318	\$14,881,318	\$29,762,636
Residential	10,937	\$913,288,111	\$1,571,090,609	\$785,545,305	\$2,356,635,914
Total	11,599	\$1,108,695,511	\$1,749,086,107	\$963,540,803	\$2,712,626,910

Source: Miami-Dade County 2019 Parcel Data, NOAA, FDEM

¹Total value does not include land value.

Figure 4.50 – Category 3 Storm Surge Impact in Cutler Bay



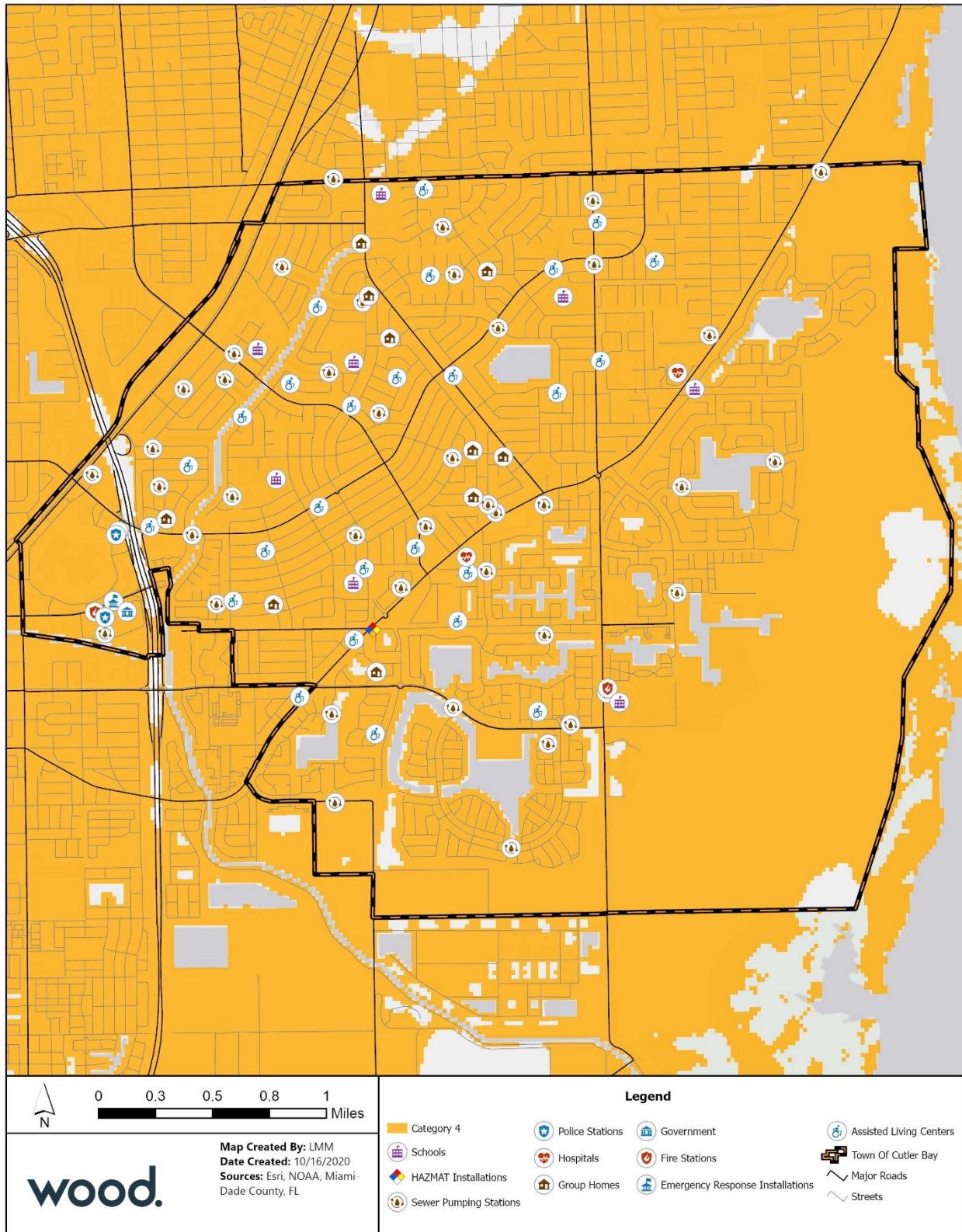
**Table 4.42 – Cutler Bay Assets at Risk to Category 3 Storm Surge**

Occupancy	Parcels Affected by Storm Surge	Land Value	Structure Value	Estimated Content Value	Total Value
Commercial	187	\$222,527,086	\$129,237,449	\$129,237,449	\$258,474,898
Education	3	\$1,246,785	\$1,060,969	\$1,060,969	\$2,121,938
Government	103	\$61,085,519	\$93,476,297	\$93,476,297	\$186,952,594
Other	441	\$3,397,251	\$0	\$0	\$0
Religious	8	\$8,794,303	\$14,881,318	\$14,881,318	\$29,762,636
Residential	12,388	\$1,090,547,885	\$1,794,894,936	\$897,447,468	\$2,692,342,404
Total	13,130	\$1,387,598,829	\$2,033,550,969	\$1,136,103,501	\$3,169,654,470

Source: Miami-Dade County 2019 Parcel Data, NOAA, FDEM

¹Total value does not include land value.

Figure 4.51 – Category 4 Storm Surge Impact in Cutler Bay



**Table 4.43 – Cutler Bay Assets at Risk to Category 4 Storm Surge**

Occupancy	Parcels Affected by Storm Surge	Land Value	Structure Value	Estimated Content Value	Total Value
Commercial	197	\$233,146,867	\$137,378,725	\$137,378,725	\$274,757,450
Education	3	\$1,246,785	\$1,060,969	\$1,060,969	\$2,121,938
Government	103	\$61,085,519	\$93,476,297	\$93,476,297	\$186,952,594
Other	451	\$4,288,106	\$0	\$0	\$0
Religious	8	\$8,794,303	\$14,881,318	\$14,881,318	\$29,762,636
Residential	12618	\$1,123,715,801	\$1,846,242,098	\$923,121,049	\$2,769,363,147
Total	13,380	\$1,432,277,381	\$2,093,039,407	\$1,169,918,358	\$3,262,957,765

Source: Miami-Dade County 2019 Parcel Data, NOAA, FDEM

¹Total value does not include land value.

Figure 4.52 – Category 5 Storm Surge Impact in Cutler Bay

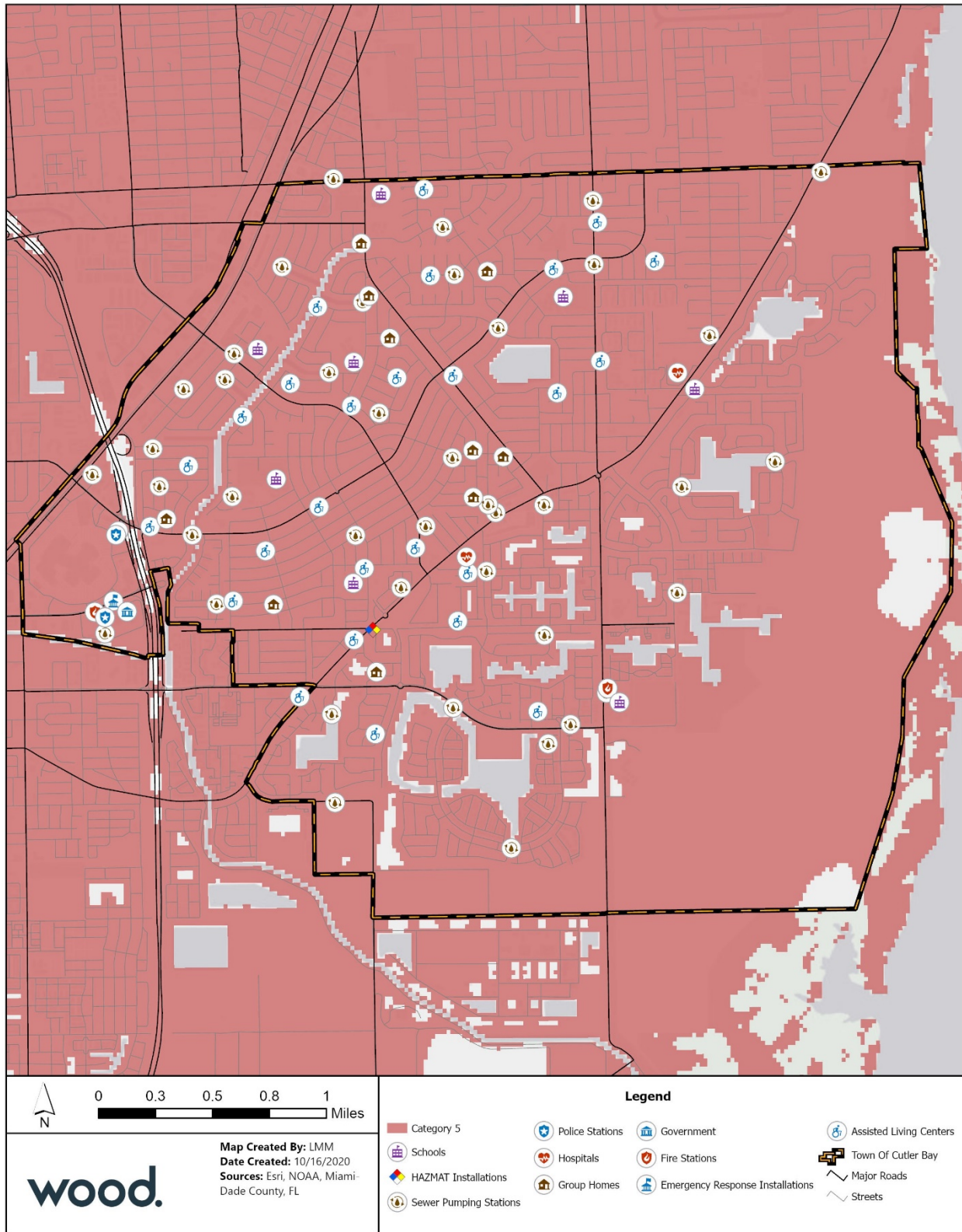


Table 4.44 – Cutler Bay Assets at Risk to Category 5 Storm Surge

Occupancy	Parcels Affected by Storm Surge	Land Value	Structure Value	Estimated Content Value	Total Value
Commercial	197	\$233,146,867	\$137,378,725	\$137,378,725	\$274,757,450
Education	3	\$1,246,785	\$1,060,969	\$1,060,969	\$2,121,938
Government	103	\$61,085,519	\$93,476,297	\$93,476,297	\$186,952,594
Other	451	\$4,288,106	\$0	\$0	\$0
Religious	8	\$8,794,303	\$14,881,318	\$14,881,318	\$29,762,636
Residential	12618	\$1,123,715,801	\$1,846,242,098	\$923,121,049	\$2,769,363,147
Total	13,380	\$1,432,277,381	\$2,093,039,407	\$1,169,918,358	\$3,262,957,765

Source: Miami-Dade County 2019 Parcel Data, NOAA, FDEM

¹Total value does not include land value.

Table 4.45 provides an overall summary of parcels at risk in the Town by hurricane category.

Table 4.45 – Overall Summary of Cutler Bay Assets at Risk to Storm Surge

Hurricane Category	Total Parcel Count	Land Value	Improved Value	Estimated Content Value	Total Value ¹
1	2,304	\$236,676,881	\$443,690,670	\$261,680,020	\$705,370,690
2	11,599	\$1,108,695,511	\$1,749,086,107	\$963,540,803	\$2,712,626,910
3	13,130	\$1,387,598,829	\$2,033,550,969	\$1,136,103,501	\$3,169,654,470
4	13,380	\$1,432,277,381	\$2,093,039,407	\$1,169,918,358	\$3,262,957,765
5	13,380	\$1,432,277,381	\$2,093,039,407	\$1,169,918,358	\$3,262,957,765

Source: Miami-Dade County 2019 Parcel Data, NOAA, FDEM

¹Total value does not include land value.

Critical Facilities at Risk

Table 4.46 and Table 4.47 provide an overall summary of critical facilities at risk due to storm surge from a Category 1 through a Category 5 hurricane.

Table 4.46 – Cutler Bay Critical Facilities at Risk by Storm Surge Category

Type	Facility Name	Address	Storm Surge				
			Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Hazmat Installations	Florida City Gas Sub Station #3	21210 SW 97TH CT	No	Yes	Yes	Yes	Yes
Schools	Bel-Aire Elementary	10205 SW 194TH ST	No	Yes	Yes	Yes	Yes
Schools	Whispering Pines Elementary	18929 SW 89TH RD	No	No	No	Yes	Yes
Schools	Whigham Elementary	21545 SW 87TH AVE	No	Yes	Yes	Yes	Yes
Schools	Whigham Learning Facility	8035 SW 196TH ST	No	Yes	Yes	Yes	Yes
Schools	Gulfstream Elementary	20900 SW 97TH AVE	No	Yes	Yes	Yes	Yes
Schools	Cutler Ridge Elementary	20210 CORAL SEA RD	No	No	Yes	Yes	Yes
Schools	Cutler Ridge Middle	19400 GULFSTREAM RD	No	No	Yes	Yes	Yes



Type	Facility Name	Address	Storm Surge				
			Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Schools	Our Lady of the Holy Rosary	9500 SW 184 St	No	No	Yes	Yes	Yes
Police Stations	Cutler Ridge Police Department	10800 SW 211TH ST	No	Yes	Yes	Yes	Yes
Police Stations	Cutler Bar Police Department	10720 CARIBBEAN BLVD	No	No	Yes	Yes	Yes
Hospitals	Health South	20601 Old Cutler Road	No	No	Yes	Yes	Yes
Hospitals	Purdue Medical Center	19590 OLD CUTLER RD	No	Yes	Yes	Yes	Yes
Group Homes	A Guardian Group Home	9700 STERLING DR	No	Yes	Yes	Yes	Yes
Group Homes	All Care Residential	18901 SW 97TH AVE	No	Yes	Yes	Yes	Yes
Group Homes	Campos Fleitas	9010 SW 200TH ST	No	No	Yes	Yes	Yes
Group Homes	Lizi's Garden Group Home	9220 NAUTILUS DR	No	Yes	Yes	Yes	Yes
Group Homes	Cutler Bay Group Home	10471 SW 204TH TER	No	No	Yes	Yes	Yes
Group Homes	Mains'L	19930 HOLIDAY RD	No	Yes	Yes	Yes	Yes
Group Homes	Sierra Developmental Enterprises	10030 NICARAGUA DR	No	Yes	Yes	Yes	Yes
Group Homes	Sunrise Opp. Inc	9031 SW 187TH TER	No	Yes	Yes	Yes	Yes
Group Homes	Sunrise Opp. Inc	9500 SW 191ST TER	No	Yes	Yes	Yes	Yes
Group Homes	Sunrise Opp. Inc	9765 SW 215TH LN	No	Yes	Yes	Yes	Yes
Government	Town Hall	10720 CARIBBEAN BLVD	No	No	Yes	Yes	Yes
Government	Government Center	10710 SW 211TH ST	No	No	Yes	Yes	Yes
Fire Stations	Miami-Dade Fire Rescue Station #34	10850 SW 211TH ST	No	Yes	Yes	Yes	Yes
Fire Stations	Miami-Dade Fire Rescue Station #55	21501 SW 87TH AVE	No	Yes	Yes	Yes	Yes
Emergency Response Installations	Miami-Dade County Vehicle Maintenance and Fueling	10740 SW 211TH ST	No	Yes	Yes	Yes	Yes
Assisted Living Centers	Bel-Air Alf II Inc.	19431 FRANJO RD	No	No	Yes	Yes	Yes
Assisted Living Centers	Living Well Alf	21280 OLD CUTLER RD	No	Yes	Yes	Yes	Yes
Assisted Living Centers	Nuestro Hogar ALF, Inc.	9384 SW 184TH TER	No	Yes	Yes	Yes	Yes
Assisted Living Centers	Best ALF	19010 BEL AIRE DR	Yes	Yes	Yes	Yes	Yes
Assisted Living Centers	Paradise Villa	21164 SW 92ND PL	No	Yes	Yes	Yes	Yes
Assisted Living Centers	Marlin Retirement	20610 MARLIN RD	No	Yes	Yes	Yes	Yes
Assisted Living Centers	Bel Aire Retirement Home	9955 SW 196TH ST	No	Yes	Yes	Yes	Yes
Assisted Living Centers	Welcome Home Alf	8950 SW 215TH TER	No	Yes	Yes	Yes	Yes
Assisted Living Centers	Genesis Care Centers	8395 SW 187TH TER	No	No	No	Yes	Yes
Assisted Living Centers	Blue Point Home Care	21910 SW 97TH CT	No	Yes	Yes	Yes	Yes
Assisted Living Centers	Good Time Home Care	8640 SW 185TH ST	No	No	Yes	Yes	Yes
Assisted Living Centers	Bel-Air ALF Inc.	8830 CARIBBEAN BLVD	No	No	No	Yes	Yes
Assisted Living Centers	Bertha Elderly Care	10051 HAITIAN DR	No	Yes	Yes	Yes	Yes
Assisted Living Centers	Precious Moments ALF	9480 DANA RD	No	Yes	Yes	Yes	Yes

Type	Facility Name	Address	Storm Surge				
			Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Assisted Living Centers	Kenneth Home Inc.	9760 MEMORIAL RD	No	Yes	Yes	Yes	Yes
Assisted Living Centers	The Haven	10601 CARIBBEAN BLVD	No	No	Yes	Yes	Yes
Assisted Living Centers	Old Cutler Retirement Home	21640 OLD CUTLER RD	No	Yes	Yes	Yes	Yes
Assisted Living Centers	Harmony Family Home	9245 SW 208TH TER	No	Yes	Yes	Yes	Yes
Assisted Living Centers	Bertha Elderly Care #2	10411 SW 200TH TER	No	Yes	Yes	Yes	Yes
Assisted Living Centers	Whispering Pines Home Care	8830 SW 196TH DR	No	No	No	Yes	Yes
Assisted Living Centers	Caribbean ALF	9860 CARIBBEAN BLVD	No	No	Yes	Yes	Yes
Assisted Living Centers	Roadesk One Inc.	9700 MONTEGO BAY DR	No	Yes	Yes	Yes	Yes
Assisted Living Centers	East Ridge Retirement Village	19301 SW 87TH AVE	No	No	Yes	Yes	Yes
Assisted Living Centers	Bel-View ALF Corp	19768 BEL AIRE DR	No	Yes	Yes	Yes	Yes
Assisted Living Centers	Bell Luna Retirement Home	18700 SW 93RD CT	No	Yes	Yes	Yes	Yes
Assisted Living Centers	Guardian Angle ALF	10265 NICARAGUA DR	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	0	20351 OLD CUTLER RD	No	No	Yes	Yes	Yes
Sewer Pumping Stations	516	10390 PUERTO RICO DR	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	517	18445 OLD CUTLER RD	No	No	Yes	Yes	Yes
Sewer Pumping Stations	540	21791 SW 98TH CT	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	577	10010 SW 224TH ST	Yes	Yes	Yes	Yes	Yes
Sewer Pumping Stations	583	21600 SW 93RD PATH	Yes	Yes	Yes	Yes	Yes
Sewer Pumping Stations	603	10800 SW 211TH ST	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	507	20299 SW 83RD AVE	Yes	Yes	Yes	No	No
Sewer Pumping Stations	609	20000 SW 79TH AVE	Yes	Yes	Yes	Yes	Yes
Sewer Pumping Stations	610	21001 SW 85TH AVE	Yes	Yes	Yes	Yes	Yes
Sewer Pumping Stations	684	20810 OLD CUTLER RD	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	702	8880 SW 220TH ST	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	703	10869 CARIBBEAN BLVD	No	No	Yes	Yes	Yes
Sewer Pumping Stations	704	9290 CUTLER RIDGE DR	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	705	9500 IRENE DR	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	708	10485 SW 202ND TER	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	744	20504 MANTA DR	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	750	20400 OLD CUTLER RD	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	1046	8781 SW 216TH ST	Yes	Yes	Yes	Yes	Yes
Sewer Pumping Stations	1051	18701 LENAIRE DR	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	1060	10325 MARLIN RD	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	1074	19300 SW 82ND AVE	No	No	Yes	Yes	Yes
Sewer Pumping Stations	1096	21301 SW 87TH AVE	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	578	SW Corner of Caribbean Blvd and SW 103 Ave	No	No	No	No	No
Sewer Pumping Stations	701	Martinique Drive between Eagle Nest Road and Gulfstream Road	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	706	SW 87th Avenue between Caribbean Blvd and Ridgeland Drive	No	No	Yes	Yes	Yes
Sewer Pumping Stations	707	192nd Drive between Caribbean Blvd and Ridgeland Drive	No	No	Yes	Yes	Yes



Type	Facility Name	Address	Storm Surge				
			Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Sewer Pumping Stations	734	Infront of 9190 SW 203 Terrace (Middle of Cul-de-sac)	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	1052	Belview Drive between Bonito Road and Dolphin Road	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	1053	10520 SW 199TH ST	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	1054	SW 97 Avenue Between SW 189 Street and SW 190 Street	Yes	Yes	Yes	Yes	Yes
Sewer Pumping Stations	1055	Intersection of SW 98 Avenue and SW 194 Terrace	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	1057	Infront of Property 10192 SW 202 Terrace	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	1058	On Tiffany Drive between SW 93 Avenue and SW 92 Court	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	1059	Infront of Property 9320 Sterling Drive	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	1063	SW Corner of Eureka Drive and SW 89 Place	No	No	Yes	Yes	Yes
Sewer Pumping Stations	1064	In front of 19531 SW 103 Court	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	1067	SW 87 Avenue between SW 184 Terrace and SW 184 Lane	No	No	Yes	Yes	Yes
Sewer Pumping Stations	1109	Across from 8881 SW 212 Terrace	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	1111	8981 SW 227TH TER	No	Yes	Yes	Yes	Yes
Sewer Pumping Stations	1119	Neighboring property- 9131 SW 208 Terrace	No	Yes	Yes	Yes	Yes

Source: Cutler Bay; Florida Division of Emergency Management

Table 4.47 – Summary of Cutler Bay Critical Facilities at Risk to Storm Surge

Facility Type	Category 1	Category 2	Category 3	Category 4	Category 5
Assisted Living Centers	1	18	23	26	26
Emergency Response Installations	0	1	1	1	1
Fire Stations	0	2	2	2	2
Government	0	0	2	2	2
Group Homes	0	8	10	10	10
Hazmat Installations	0	1	1	1	1
Hospitals	0	1	2	2	2
Police Stations	0	1	2	2	2
Schools	0	4	7	8	8
Sewer Pumping Stations	6	31	39	39	39
Total	7	67	89	93	93

Source: Cutler Bay; Florida Division of Emergency Management

Population at Risk

A hurricane surge analysis was conducted by intersecting the improved parcel layer provided by Miami-Dade County with the polygon shapefile for each hurricane surge layer. In evaluating populations at risk, only those people residing in the hurricane storm surge zones are included. Thus, those improved



residential parcels intersecting the hurricane surge zones were counted and multiplied by the American Community Survey 2019 estimated household factor for Cutler Bay (3.47). Cutler Bay's population at risk to storm surge is shown in Table 4.48

Table 4.48 – Cutler Bay Population at Risk to Storm Surge

Hurricane Category	Improved Residential Parcels	Population
Hurricane Category 1	1,642	5,698
Hurricane Category 2	8,994	31,209
Hurricane Category 3	10,427	36,182
Hurricane Category 4	10,654	36,969
Hurricane Category 5	10,654	36,969

Source: Miami-Dade County 2019 Parcel Data, FDEM, U.S. Census Bureau

The very young, the elderly and individuals with disabilities are especially vulnerable to harm from hurricanes and may face difficulty in evacuating. For those who are unable to evacuate for medical reasons, there should be provision to take care of special-needs patients and those in hospitals and nursing homes. Many of these patients are either oxygen-dependent, insulin-dependent, or in need of intensive medical care. There is a need to provide ongoing treatment for these vulnerable citizens, either on the coast or by air evacuation to upland hospitals. The stress from disasters such as a hurricane can result in immediate and long-term physical and emotional health problems among victims.

4.5 RISK AND VULNERABILITY CONCLUSIONS

4.5.1 Flood Hazards Profile Summary

Table 4.49 summarizes the degree of risk of each identified hazard for the Town of Cutler Bay according to the results of the Priority Risk Index (PRI).

Table 4.49 – Summary of Flood Hazard PRI Results

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Climate Change and Sea Level Rise	Highly Likely	Critical	Moderate	More than 24 hrs	More than 1 week	3.2
Coastal/Canal Bank Erosion	Likely	Minor	Small	More than 24 hrs	More than 1 week	2.1
Dam/Levee Failure	Unlikely	Limited	Small	6 to 12 hours	Less than 1 week	1.9
Flood: 100-/500-year	Likely	Catastrophic	Moderate	Less than 6 hours	Less than 1 week	3.4
Flood: Stormwater/Localized	Highly Likely	Critical	Small	Less than 6 hours	Less than 24 hours	3.1
Hurricane and Tropical Storm	Highly Likely	Catastrophic	Large	More than 24 hrs	Less than 1 week	3.6

4.5.2 Assessment of Areas Likely to Flood

Identified Area #1: SFHAs

According to a September 11, 2009 Flood Insurance Study prepared by FEMA, approximately half of the Town is already located within a Special Flood Hazard Area (SFHA). The population of the Town has increased by 8.5 percent between April 2010 and July 2019, and this trend is expected to continue, with overall Miami-Dade County population expected to increase by 27 percent between 2020 and 2045. Given this population increase, changes in floodplain development and development within the watershed in general is likely to increase the size of the SFHAs due to an increase in impervious area. Furthermore, with its porous geology and low topography, Cutler Bay's infrastructure and groundwater are particularly vulnerable to the effects of climate change and sea level rise, which may also increase the size of SFHAs.

Identified Area #2: Areas of Localized Stormwater Flooding

Due to the low elevations, a flat terrain, a consistent level of annual precipitation and the tidal influence on canal drainage resulting from heavy rainstorms, tropical storms, and hurricanes, it is highly likely that unmitigated properties will continue to experience localized flooding. The projected 27 percent increase in the County's population by 2045 will likely lead to new development. An increase in impervious area will only exacerbate the localizing flooding issues unless measures are taken to reduce the volume of runoff. Furthermore, the intensity of individual rainfall events is likely to increase in the future due to climate change which will further overwhelm stormwater drainage systems.

Identified Area #3: Repetitive Loss Areas

Properties categorized as repetitive loss properties have a greater need for flood protection. Repetitive loss can be attributed to development within the 1-percent-annual-chance floodplain as well as localized stormwater flooding. As mentioned above, both types of flooding are likely to increase in the future due to development in the floodplain and the watershed as well as due to the effects of climate change and sea level rise. Therefore, it is very likely that repetitive loss properties will continue to flood in the future.

Identified Area #4: Zone X (Unshaded)

There are 3,491 improved parcels within Cutler Bay that are located outside of the SFHA with a total value of \$879,369,584. Less than 13.6% of buildings within the X Zone are insured, and as repetitive loss figures



show, flooding is not limited to the 1-percent-annual-chance flood zones. As mentioned above, changes in floodplain development and development within the watershed in general are likely to increase the size of the SFHAs due to an increase in impervious area. Therefore, areas currently mapped as Zone X are likely subject to future flood risk.

Identified Area #5: The Entire Town of Cutler Bay

Sea level change will be particularly significant in influencing storm surge flooding in the Cutler Bay area. The 7-foot storm surge in Miami-Dade County from Hurricane Wilma (Category 5) has a likelihood of occurring once every 76 years; a 2-foot sea level rise would increase that likelihood to once every 5 years (WRI, 2014). As shown in Section 3.3.6, almost the entire Town already becomes vulnerable to property damaging flooding from storm surge associated with a Category 3 or stronger hurricane. Sea level rise will exacerbate this risk and lower the threshold for storm surge to impact the entire Town.

4.5.3 Impact of Future Flooding Conditions

Changes in the watersheds (particularly an increase in impervious area) as well as changes in climate could make these identified areas even more likely to flood in the future. The Town of Cutler Bay is composed of three watersheds: C-100, C-1 and D-4A.

The SFHA extends throughout the Town in all three watersheds. There is a small area of VE along the coast, Zone AE covering the area from the coast to Old Cutler Road as well as an area along the C-100B Canal, and Zone AH surrounding portions of the C-100B Canal and areas off of Old Cutler Road and SW 87 Ave. Areas of localized stormwater flooding are located throughout the Town, across all watersheds.

Repetitive loss properties are associated with both coastal flooding, flooding along the canals, and localized stormwater flooding, all of which may be vulnerable to increased risk in the future. Localized stormwater flooding can increase as a result of increased development. The Town recently developed a watershed master plan to identify locations where new development may occur, model potential peak runoff flows at these locations, and establish methods to control and minimize these flows. Additionally, the Town undertakes capital improvements and stormwater management projects to improve the capacity and operation of the stormwater system. These efforts can mitigate some of the potential impacts of future flooding conditions associated with development changes in the watersheds.

However, future flood conditions in all areas likely to flood will also be affected by climate change and sea level rise, as discussed in Section 3.4.1. As sea levels continue to rise, the SFHA may increase, meaning the 1% annual chance flood event will affect areas currently mapped as Zone X. Additionally, the Town's stormwater drainage capacity may decrease due to greater tidal effects, and as discussed above, storm surge risk will likely increase.

The impacts from the watersheds could make flooding worse as more development and impervious pavement upstream means Cutler Bay could be at risk to additional flooding. Future flooding impacts should be considered from the five flood hazards mentioned above and also from additional development upstream in the watersheds which could have an impact on properties with greater potential for flooding and for the disturbance of natural floodplain functions.

4.5.4 Health & Safety Consequence Analysis

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 National Weather Service warns that just 6 inches of fast-moving flood water can knock down an adult, 12 inches can carry away a small car, and 2 feet can carry away most vehicles. When someone drives through floodwaters, they put their life and the lives of first responders at risk. First responders are at risk when attempting to rescue people from floodwaters. They are subject to the same health hazards as the public and are more likely to be exposed to these hazards during their 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. Ocean water and salt spray can be particularly damaging to electrical equipment due to the corrosive and conductive nature of the salt-water residue. Damage to electrical equipment can also result from exposure to flood waters contaminated with chemicals, sewage, oil, and other debris.

Public Health

Certain health hazards are common to flood events. While such problems are often not reported, three general types of health hazards accompany floods. The first comes from the water itself. Floodwaters carry anything that was on the ground that the upstream runoff picked up, including dirt, oil, animal waste, and lawn, farm and industrial chemicals. Pastures and areas where farm animals are kept or their wastes are stored can contribute polluted waters to the receiving streams.

Floodwaters also saturate the ground, which leads to infiltration into sanitary sewer lines. 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. Residents with private wells will need to have their water quality tested to ensure it is safe for use.

The second type of health problem arises after most of the water has gone. Stagnant pools can become breeding grounds for mosquitoes, and wet areas of a building that have not been properly cleaned breed mold and mildew. A building that is not thoroughly cleaned becomes a health hazard, especially for small children and the elderly.

Another health hazard occurs when heating ducts in a forced air system are not properly cleaned after inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants. Flooding can also cause extensive mold growth in building walls and floors, which also poses a respiratory health hazard.

The third problem is the long-term psychological impact of having been through a flood and seeing one's home damaged and personal belongings destroyed. The cost and labor needed to repair a flood-damaged home 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.

Another health risk from flooding comes from animals, such as snakes and rodents, that make their way through floodwaters and come into contact with people. Animals can pose a risk of physical attack and/or spread of disease.



Debris also poses a risk both during and after a flood. During a flood, debris carried by floodwaters can cause physical injury from impact. During the recovery process, people may often need to clear debris out of their properties but may encounter dangers such as sharp materials or rusty nails that pose a risk of tetanus. People must be aware of these dangers prior to a flood so that they understand the risks and take necessary precautions before, during, and after a flood.

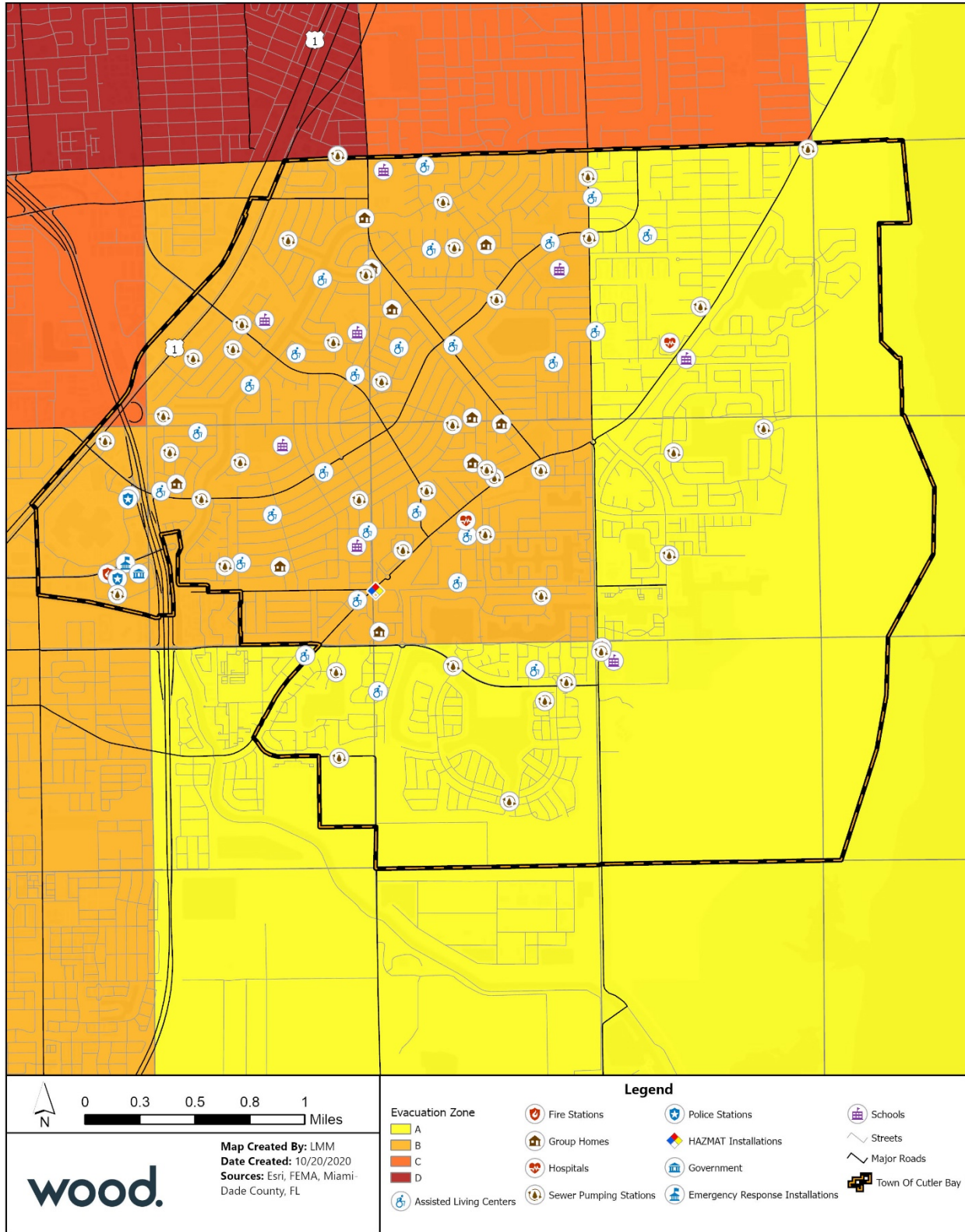
Warning and Evacuation

Figure 4.53 depicts hurricane evacuation zones for Cutler Bay. This figure utilizes a polygon set created by the county emergency management departments based on regional surge zones from a 2007-2010 statewide evacuation study initiated by FDEM.

Evacuation zones are correlated with storm surge planning zones. Cutler Bay falls primarily within Zone A and Zone B. Zone A is at greatest risk for storm surge for Category 1 and higher storms. Zone B is at risk for storm surge for Category 2 and higher storms.

Residents and visitors should use US 1 and the Florida Turnpike for evacuation from flooding and hurricanes and tropical storms as is shown of Figure 4.53.

Figure 4.53 – Cutler Bay Evacuation Zones

Source: Florida Division of Emergency Management (<http://www.floridadisaster.org>)

5 Capability Assessment

This section provides an assessment of the Town of Cutler Bay's capability to implement flood mitigation projects and reduce flood hazard risk. The assessment reviews existing mitigation activities and policies, regulations, and plans that pertain to mitigation and can affect net vulnerability.

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 Town of Cutler Bay. Excerpts from applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities.

Table 5.1 – Cutler Bay Planning & Regulatory Mitigation Capabilities

Regulatory Tool	Date	Comments
Repetitive Loss Area Analysis	2012	Prepared by Kimley-Horn and Associates, Inc.; new RLAA underway
Stormwater Master Plan	2008	Prepared by Kimley-Horn and Associates, Inc.
Watershed Master Plan (Basin or sub-basin flood studies)	2018	Prepared by Wood E&IS
Comprehensive Growth Management Plan	April 2008	Prepared by Corradino Group
Capital Improvement Plan	March 2008	Prepared by the Town of Cutler Bay; update underway
Land Development Regulations (Zoning and Subdivision Ordinances)	June 2012	Prepared by Corradino Group
Flood Insurance Study	September 2009	Prepared by FEMA
Flood Damage Prevention Ordinance	May 2019	Prepared by the Town of Cutler Bay
Building Code Ordinance	2020	Prepared by the State of Florida
Miami-Dade County Local Mitigation Strategy	January 2018	Prepared by Miami-Dade County Office of Emergency Management
Miami-Dade County Comprehensive Emergency Management Plan	November 2017	Prepared by Miami-Dade County Office of Emergency Management
Southeast Florida Regional Climate Action Plan	December 2017	Prepared by Southeast Florida Regional Climate Change Compact Counties
Biscayne Bay Task Force Report and Recommendations: A Unified Approach to Recovery for a Healthy & Resilient Biscayne Bay	June 2020	Prepared by Biscayne Bay Task Force

Repetitive Loss Area Analysis (2012)

The Town was classified as a Repetitive Loss Category “C” community under the 2012 CRS Coordinator’s Manual. As a result, the Town developed a Repetitive Loss Area Analysis (RLAA) in 2012 to provide more specific guidance on how to reduce damage from repetitive flooding. The RLAA was linked to the 2008 Stormwater Master Plan in that it illustrates the RL properties and their relationship to the priority basins identified in the Stormwater Master Plan. RL properties in “priority basins” were considered part of a Repetitive Loss Area (RLA). The “priority basins” became the Capital Improvement Plan for the Town.

The RLAA and updated repetitive loss data were used in the development of this FMP to help in identifying repetitive loss properties within the Town and to examine the locations of the RL properties as they relate to FEMA flood zones, flood depths and known localized flooding areas. In conjunction with this plan update, the RLAA is also being updated.

Stormwater Master Plan (2008)

The Stormwater Master Plan identifies opportunities to protect surface water quality and reduce flooding within the Town limits. The Stormwater Master Plan includes the following components:

- ▶ A review of existing stormwater and drainage data, reports and plans available through SFWMD, Miami-Dade County and Town sources
- ▶ A field inventory of existing drainage structures
- ▶ A drainage atlas including the type, size and general location of drainage infrastructure elements
- ▶ Basin and sub-basin delineations based on available survey data and other sources
- ▶ Hydrologic and hydraulic modeling analysis of the existing systems and their capacity to handle the 5-year/24-hour, 10-year/24-hour, 25-year/72-hour, 50-year/72-hour, and 100-year/72-hour storm events
- ▶ Identification and analysis of alternatives for improvements needed to alleviate deficiencies identified in the hydrologic and hydraulic modeling phase
- ▶ Development of an optional Capital Improvement Plan (CIP) to implement the identified improvements

Based on a review of the drainage deficiencies and input from Town staff, 17 drainage sub-basins were selected as a priority for detailed analysis. The performance goals representing the minimum standards for sub-basin performance are as follows:

- ▶ During the five-year return design storm event, flooding in local and collector roadways travel lanes should not exceed the edge of the roadway pavement. This goal is consistent with SFWMD and Miami-Dade County requirements.
- ▶ During the 10-year return design storm event, flooding in roadway travel lanes should be below the crown of the roadway. This goal is consistent with Miami-Dade County requirements.
- ▶ During the 100-year return design storm event, flooding should be below the building finish floor elevations. This goal is consistent with Miami-Dade County requirements.
- ▶ Drainage sub-basins which discharge directly into canals should have water quality pre-treatment for the first one inch of runoff. This standard is consistent with federal, state and county water quality treatment requirements.
- ▶ Drainage sub-basins which discharge directly into lakes or drainage wells should have water quality pre-treatment for the first one-half inch of runoff. This standard is consistent with federal, state and county water quality treatment requirements.

Projects were identified to bring each priority sub-basin into compliance with the performance goals, and the 17 priority sub-basins were ranked from worst to best according to current performance against goals. The ranking and budgets for improvements were used to develop a 10-year CIP.

The Stormwater Master Plan was used in the development of this FMP to identify potential flooding sources as well as known localized flooding areas within the Town.

Watershed Master Plan (2018)

The Watershed Master Plan provides a comparison of pre- and post-development peak flows on the watershed level and the individual sub-basin level for undeveloped parcels in the Town. The intent of the plan is to provide the Town with a tool to regulate future development in a way that doesn't increase runoff or flooding from future conditions. The Watershed Master Plan includes the following components:

- ▶ A profile of the Town including land use, topography, wetlands and drainage features
- ▶ Evaluation of climate adaptation including sea level rise



- ▶ A review of existing drainage data, reports and plans available through FEMA, SFWMD, Miami-Dade County, and the Town of Cutler Bay
- ▶ Basin and undeveloped parcel delineations based on data provided by the Town
- ▶ Hydrologic analysis to determine pre- and post-development peak flows for watersheds C-100, C-1 and D-4A (South Biscayne Bay)
- ▶ Hydrologic analysis to determine pre- and post-development peak flows for 18 vacant (undeveloped) parcels
- ▶ Examination of water quality standards
- ▶ Level of Service analysis for water quantity and water quality
- ▶ Examination of the Town's existing Capital Improvements Program and identification of needs regarding future projects
- ▶ Identification of key water quantity issues and recommendations for solutions on the vacant parcels
- ▶ Recommendations for the Town's regulatory and development codes as they relate to stormwater management

The plan also provided a review and update of the 2008 Capital Improvement Program, which was developed based on the results of the 2008 Stormwater Master Plan in order to bring each priority sub-basin into compliance with identified performance goals.

The Stormwater Master Plan was used in the development of this FMP to identify potential flooding sources as well as known localized flooding areas within the Town. The CIP projects were also reviewed to inform updates to the mitigation action plan.

Town of Cutler Bay Comprehensive Growth Management Plan (2008)

A Comprehensive Plan, in broad terms, is a policy statement to guide the future placement and development of community facilities. It is the basis for a community's zoning, subdivision and design regulations and a community's official maps and amendments to the zoning, subdivision and design ordinances. The Comprehensive Plan identifies a future vision, values, principals and goals for the community, determines the projected growth for the community and identifies policies to plan, direct and accommodate anticipated growth. This document was adopted by the Town in April 2008. Goals from the Cutler Bay Growth Management Plan are as follows:

- 1) Future Land Use Goal
 - a. Protect and improve the Town's built and natural environment through the use of land in a manner that enhances existing neighborhoods, conserves resources, ensures the availability of public facilities and services, and realizes the community's vision for its future.
- 2) Housing Goals
 - a. Ensure the availability of a decent, safe and sanitary housing stock to accommodate current and future residents.
 - b. Ensure the availability of housing that is affordable to current and future residents of all income and special needs groups in the Town of Cutler Bay.
- 3) Infrastructure Goals
 - a. Work with the town-wide service provider, Miami-Dade County Water and Sewer Department (WASD), to assure a sufficient, dependable, and high quality potable water supply to meet the needs of Cutler Bay residents and businesses on a timely basis, at a reasonable cost and in compliance with all state and federal requirements to protect the health and safety of the public.



- b. The Town will protect the health and safety of the public by ensuring wastewater treatment facilities and services are environmentally sound, cost effective, and meet the community's present and future needs.
 - c. To protect the health and safety of the public by ensuring stormwater management facilities and services are properly maintained, environmentally sound, cost effective, and meet the community's present and future demands.
 - d. The Town will promote efficient and economical balance of public and private solid waste collection and disposal services that will meet established requirements in a manner that will protect the public health, safety and environmental resources of the community.
 - e. The Town will continue to support and monitor county, South Florida Water Management District, state and federal efforts to protect, conserve and manage the quality and quantity of natural groundwater resources.
- 4) Coastal Management Goal
 - a. Provide for the conservation, environmentally sound use and protection of all natural and historic resources; limit public expenditures in areas subject to destruction by natural disasters; and protect human life and property in the coastal area of the Town.
- 5) Conservation Goal
 - a. Protect and enhance the long term environmental resources of the Town to ensure continued resource availability and environmental quality through prudent management, public education, appropriate regulations and enforcement, and active partnership with governmental and environmental entities.
- 6) Intergovernmental Coordination Goal
 - a. Continue to strengthen relationships through intergovernmental coordination with adjacent municipalities, the Miami-Dade County Planners Technical Committee, Miami-Dade County, Miami-Dade County Public School System, regional, state and other governmental entities and service providers that have regulatory, supply and/or jurisdictional authority to identify methods for information sharing and funding, assistance and support in order to protect the health, safety and welfare of the community and to ensure consistency between the local, county, regional and state policies and plans when implementing the Town's Growth Management Plan. The Town will offer to provide guidance and assistance to future municipalities in Miami-Dade County.
- 7) Capital Improvements Goals
 - a. Identify the public facilities and infrastructure capacity needed, as outlined in the Growth Management Plan, to accommodate existing and future residents and businesses in the Town of Cutler Bay, to provide such facilities and infrastructure in a timely and efficient manner and adopt financial policies in order to guide the funding, scheduling and construction of improvements.
 - b. Develop and maintain a concurrency management system, including the adopted level of service standards, to track and issue development orders in order to ensure the availability of public facilities and infrastructure needed to support development are available concurrent with the impacts of such development.
- 8) Transportation Goals
 - a. Provide for the citizens of Cutler Bay, a safe, convenient, accessible and efficient transportation system.
 - b. The Town shall develop a financially feasible transportation system that meets the needs of the Town residents.
- 9) Recreation & Open Space Goal



- a. To provide and ensure a comprehensive system of public parks, open spaces and recreational programs that are well planned, convenient and customized to the recreational needs of the residents of Cutler Bay while preserving and protecting valuable natural resources for future generations.

10) Educational Facilities Goal

- a. Develop, operate, and maintain a system of public education by Miami-Dade County public schools, in cooperation with the county and other appropriate governmental agencies, which will strive to improve the quality and quantity of public educational facilities available to the citizenry of Miami-Dade County, Florida.

The Comprehensive Growth Management Plan was used in the development of this FMP to identify existing and future land use; growth and development trends; and cultural, historic and natural resources within the Town.

Capital Improvement Plan (2008-2018)

The Town of Cutler Bay Stormwater Master Plan identified 17 priority sub-basins that were ranked from worst to best according to current performance against established Plan goals. The Capital Improvement Program (CIP) is based on the results of the 17 priority subbasin studies. Recommended improvements to achieve the stated performance goals were identified for each basin, and a ten-year CIP summary including preliminary budgets has been prepared for each basin.

An update to the CIP is currently underway. The 2018/19 through 2022/23 Capital Improvement Schedule was also reviewed as part of the identification of mitigation alternatives.

The CIP was used in the development of this FMP to identify potential flooding sources as well as known localized flooding areas within the Town. The CIP was also used to develop mitigation strategies and projects.

Land Development Regulations (2012)

The purpose of the Land Development Regulations is to provide the minimum regulations necessary to facilitate safe and orderly growth, and to also ensure that growth forms an integral part of a community of functional neighborhoods, retail and commercial centers; increases collective security and community identity to promote civic awareness and responsibility; and enhances the quality of life for the entire Town to ensure the greatest possible economic and social benefits for all residents. These regulations are intended to promote consistency with the goals, objectives and policies of the Town's Growth Management Plan.

The Land Development Regulations were used in the development of this FMP to identify mitigation strategies through protection of natural floodplain resources, open space preservation and identifying property protection measures.

Flood Insurance Study (2009)

A Flood Insurance Study (FIS) dated September 2009 was prepared by FEMA for Miami-Dade County, Florida and Incorporated Areas which includes the Town of Cutler Bay. The FIS identifies areas within Cutler Bay that are subject to flooding from the 100-year storm event. This information is used by Cutler Bay to implement floodplain regulations as part of participation 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 100-year storm event. The flood depths were then used to prepare the risk assessment for Cutler Bay. Based on the flood depth, a depth damage factor was applied to each



parcel based on its occupancy class in order to calculate an accurate damage assessment for each parcel located within the 100-year flood hazard area.

Flood Damage Prevention Ordinance (2019)

The Flood Damage Prevention Ordinance is perhaps the Town's most important flood mitigation tool. The Town first adopted the ordinance in May 2006, and the Town has been a participant in the NFIP since August 2006. The ordinance has been amended several times; the most recent amendment was made in May 2019.

The objectives of this ordinance are to:

- 1) Protect human life, health and to eliminate or minimize property damage;
- 2) Minimize expenditure of public money for costly flood control projects;
- 3) Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- 4) Minimize prolonged business interruptions;
- 5) Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, roadways, and bridges and culverts located in floodplains;
- 6) Maintain a stable tax base by providing for the sound use and development of flood prone areas in such a manner as to minimize flood blight areas; and
- 7) Ensure that potential homebuyers are notified that property is in a food hazard area.

The Flood Damage Prevention Ordinance was used in the development of this FMP to assist in the risk assessment and identification of potential mitigations strategies and projects.

Florida Building Code (2020)

Effective December 21, 2020, the Town of Cutler Bay enforces the 2020 Florida Building Code which includes provisions for all buildings and structures constructed in whole or in part in a flood hazard area to be constructed in accordance with specific elevation requirements. The Building Code also includes provisions for high-velocity hurricane zones to mitigate wind damage from hurricanes and other windstorms.

The Florida Building Code was used in the development of this FMP to assist in the risk assessment and identification of potential mitigations strategies and projects.

Miami-Dade County Local Mitigation Strategy (2018)

The Town of Cutler Bay has by ordinance adopted the 2018 Miami-Dade County Local Mitigation Strategy (LMS). The Town's Stormwater Master Plan identified several flood mitigation projects that were included in the County's 2010 LMS. The LMS also includes other flood mitigation related projects identified by Town staff, including:

- ▶ Canal Bank Erosion Protection
- ▶ Canal Cleaning and Shaping Town-wide
- ▶ Caribbean Boulevard Bridge Project
- ▶ Cutler Bay Waterway Conveyance Improvements
- ▶ Drainage Improvements (identified for 15 locations)
- ▶ Flood Insurance Research
- ▶ Flood Zone Data GIS System
- ▶ Reduction of Floating Debris
- ▶ Storm Water Outfalls

Detailed descriptions of these projects are included in Part 2 of the LMS. Goals from the Miami-Dade County LMS are as follows:

- 1) Reduce Miami-Dade's vulnerability to natural and man-made hazards
- 2) Minimize future losses from all hazard impacts by reducing the risk to people and property.
- 3) Implement mitigation projects that meet or exceed current codes.
- 4) Prevent flood related repetitive losses from natural disaster through education and regulation.
- 5) Promote and support the Community Rating System (CRS) for all communities in Miami-Dade.
- 6) Promote mitigation measures for critical facilities.
- 7) Provide whole community planning.

More detailed objectives were also developed to target ways to achieve each goal. The Miami-Dade County LMS was used in the development of this FMP to assist in the identification of potential mitigations strategies and projects.

Miami-Dade County Comprehensive Emergency Management Plan (Revised 2017)

The Miami-Dade County Comprehensive Emergency Management Plan (CEMP) is designed to address "all hazards" threats to the County. In the event of a countywide emergency declaration, the corporate resources of the County and each of its municipalities work together for the mutual benefit of all residents and visitors of Miami-Dade County. Goals from Miami-Dade County CEMP are as follows:

- 1) To provide an organized system of hazard vulnerability reduction to the citizens of and visitors to Miami-Dade County.
- 2) To develop an enhanced level of awareness relative to emergency preparedness, throughout the population at large.
- 3) To provide the most efficient response and recovery system possible through effective coordination and maximum utilization of all available resources.
- 4) To coordinate the return of essential services to a normal state as quickly and effectively as possible after a disaster.
- 5) To maintain a high level of readiness through community outreach and regular training.
- 6) To reduce the public's vulnerability to recurrent hazards by the promotion of hazard mitigation strategies, particularly in the areas of critical infrastructure, land use, and building codes.

The Miami-Dade County CEMP was used in the development of this FMP to assist in the identification of potential mitigations strategies and projects.

Southeast Florida Regional Climate Action Plan 2.0 (2017)

The Southeast Florida Regional Climate Action Plan (RCAP) is a guiding tool for coordinated climate action in Southeast Florida to reduce greenhouse gas emissions and build climate resilience. It provides recommendations for integrating climate resilience into existing decision-making systems, guidelines for implementation, and shared best practices that can be implemented through existing local and regional agencies, processes and organizations.

The RCAP was originally developed in 2012 and designed with a 5-year time horizon with the intent to update every five years. The RCAP 2.0, developed in 2017, reflects lessons learned and actions taken since 2012. RCAP 2.0 recommendations are provided by focus area to enable individuals to identify custom plans applicable to their capabilities and areas of interest and expertise. Recommendations are provided across the following focus areas:

- ▶ Agriculture
- ▶ Compact Coordination



- ▶ Energy and Fuel
- ▶ Natural Systems
- ▶ Public Health
- ▶ Public Outreach and Engagement
- ▶ Public Policy Advocacy
- ▶ Regional Economic Resilience
- ▶ Risk Reduction and Emergency Management
- ▶ Social Equity
- ▶ Sustainable Communities and Transportation
- ▶ Water

Some recommendations applicable to the Town of Cutler Bay's mitigation efforts include:

- 1) Reduce financial and physical losses in our building stock by reshaping where and how we build.
- 2) Reduce greenhouse gas emissions by planning, designing, and prioritizing walkable, affordable communities supported by sustainable multimodal transportation options.
- 3) Advance water management strategies and infrastructure improvements needed to mitigate for adverse impacts of climate change and sea level rise on water supplies, water and wastewater infrastructure, and water management systems.
- 4) Implement monitoring, management, and conservation programs designed to protect natural systems and improve their capacity for climate adaptation.
- 5) Ensure the continued viability of agriculture in Southeast Florida through policies which remove barriers to production, promote economic incentives, improve water reliability, and provide research on best management practices, thereby encouraging sustainable production in the face of a changing climate.
- 6) Increase renewable energy capacity and reduce consumption of electricity and fuel.
- 7) Provide a more resilient natural and built physical environment in light of climate change.
- 8) Communicate the risks related to climate change and the value of adapting policies and practices to achieve resilience throughout the region.
- 9) Guide and influence local, regional, state and federal climate change related policies and programs through collaboration and joint advocacy.

The Southeast Florida Regional Climate Action Plan was used in the development of this FMP to assist in the risk assessment for sea level rise and identification of potential mitigation strategies and projects.

Biscayne Bay Task Force Report and Recommendations (June 2020)

The Biscayne Bay Task Force was established by the Miami-Dade Board of County Commissioners to review prior studies, relevant data and evaluations, and management planning and policy documents related to Biscayne Bay and to receive recommendations related to the health and management of Biscayne Bay. This report summarizes key findings and recommendations to restore Biscayne Bay water quality. Recommendations are grouped under seven policy themes: water quality, governance, infrastructure, watershed habitat restoration and natural infrastructure, marine debris, education and outreach, and funding.

This report was used in the development and review of mitigation action alternatives.

5.1.1 Administrative and Technical Mitigation Capabilities

Table 5.2 identifies Town personnel responsible for activities related to mitigation and loss prevention in the Town of Cutler Bay.

**Table 5.2 – Cutler Bay Administrative/Technical Capabilities**

Resource	Y/N	Responsible Department	Comments
Planner/Engineer with knowledge of land development/land management practices	Y	Community Development Dept	
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	Y	Community Development Dept	
Planner/Engineer/Scientist with an understanding of natural hazards	Y	Community Development Dept	
Personnel skilled in GIS	N		Utilize consultants
Full time building official	Y	Community Development Dept	
Floodplain Manager	Y	Community Development Dept	
Emergency Manager	N		Miami-Dade County
Grant writer	N		
GIS data – hazard areas	N		Miami-Dade County
GIS data – critical facilities	N		Miami-Dade County
GIS data – building footprints	N		Miami-Dade County
GIS data – land use	N		Miami-Dade County
GIS data – links to assessor's data	N		Miami-Dade County
Warning systems/services	N		Miami-Dade County

5.1.2 Fiscal Mitigation Capabilities

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

Table 5.3 – Cutler Bay Fiscal Mitigation Capabilities

Resource	Accessible? Y/N	Comments
Community development block grants	Y	
Capital improvements project funding	Y	
Authority to levy taxes for specific purposes	Y	
Fees for water, sewer, gas or electric services	Y	
Impact fees for new development	Y	
Incur debt through general obligation bonds	Y	
Incur debt through special tax bonds	Y	
Incur debt through private activities	N	
Withhold spending in hazard prone areas	Y	

5.1.3 Mitigation Outreach and Partnerships

This section summarizes the Town's flood-related outreach activities. Additional details on the Town's outreach strategy and targeted flood-related outreach projects can be found in the Program for Public Information, included in Appendix A.

5.1.3.1 Mitigation Outreach

Annual Mailing of Hazard Information

Annually, the Town of Cutler Bay mails a brochure concerning flood-related subjects to every address in the Town. Subjects discussed in the brochure include flood safety, flood warning, flood hazard areas,

drainage system maintenance/stream ordinance, property protection measures, flood protection assistance, floodplain development regulations, substantial improvement/ damage requirements, the National Flood Insurance Program, natural and beneficial functions of wetlands, and flood-zone descriptions.

Since hurricanes and tropical storms are a major flood producer for the community, also included in the annual mailing is a Hurricane Evacuation Zone Map and a Hurricane Tracking Map with instructions concerning hurricane safety. The instructions provide information about sheltering, family disaster planning, flood hazards in Cutler Bay due to hurricane storm surge, and evacuation as well as definitions of terms used by weather forecasters.

Public Library

In addition to the direct distribution of educational brochures, hurricane tracking maps, and other information by the Town, the public library also houses and distributes a variety of emergency and disaster-related documents and brochures.

The Town has engaged in the following flood mitigation outreach activities as detailed in Table 5.4.

Table 5.4 – Flood Mitigation Outreach Activities

Project/Event	Message	Frequency
Project Kick-off – Public Meeting	Presentation, Informational Brochures and Flyers	Done Based on Project
Flood Mitigation Meeting	Presentation, Informational Brochures and Flyers	Quarterly
Miami Herald	Article and FMPC meeting announcement	One-time
South Dade News Leader	Article on 1 st FMPC Public Meeting	One-time
Cutler Bay News	FMPC Meeting Announcement	One-time
Movie Night	Public Service Announcement	Quarterly
Chili Cook-Off	Surveys and Information Materials	Annually
Neighborhood Roadway Resurfacing	Presentation, Informational Brochures and Flyers	Annually
Neighborhood Tree Trimming & Canopy Uplifting Project	Informational Brochures and Flyers	Annually
Vice mayor Michael P. Callahan	FMPC Meeting Announcement and update	Quarterly
Concerned Citizen's Meeting (2/4/14)	Presentation, Informational Brochures and Flyers	One-time
Sidewalk Repairs	Presentation, Informational Brochures and Flyers	Annually
Local School	Presentation, Informational Brochures and Flyers	Annually
Taste of the Bay	Surveys and Informational Materials	Annually
HOA Meetings	Presentation, Informational Brochures and Flyers	As invited/ at least annually
Movie Night at the Park	PSA, Informational Materials and Surveys	Quarterly
Relay for Life	Charity Event, Outreach	Annually
Make Mitigation Happen – Repetitive Loss Properties	Surveys and Informational Materials	Annually
CBBA Luncheon	Informational Materials and Surveys	Annually
CBBA Meeting	Presentation, Surveys and Informational Materials	Annually
Flood Surveys for Repetitive Loss Properties	Informational Brochures and Flyers	One-time
Enclave Fair at Enclave Club House	Informational Materials and Surveys	One-time
Centennial (Chanterelle) HOA Meeting	Information Materials	One-time
CBBA/EDC Luncheon	Informational Materials and Surveys	One-time
Cutler Bay Press Release	Announcing April 2014 Committee and Public Meeting	One-time



Project/Event	Message	Frequency
South Dade News Leader	Meeting Announcement	As needed
Miami Herald Neighbors Section	Meeting Announcement	As needed
Flood Mitigation Meeting	Presentation, Surveys and Informational Materials	Quarterly
Cutler Bay Website	Survey	Continuous/4 months
Cutler Bay Website	FMPC Meeting Announcement	Monthly
Cutler Bay Announcement Board	FMPC Meeting Announcement	Monthly

5.1.3.2 Partnerships

Local

The Town is a partner with Miami-Dade County Office of Emergency Management and South Florida Water Management District. The Town is an active participant in Miami-Dade County's Local Mitigation Strategy which includes flood mitigation projects for the Town. The Town also utilizes Miami-Dade County's Hurricane Preparedness and Emergency Evacuation Programs and provides links to this information on the Town's website. Furthermore, the Town uses flood mitigation publications prepared by Miami-Dade County and the South Florida Water Management District.

State

The Town is a partner with the State of Florida Department of Emergency Management. The Town utilizes the State's hurricane surge maps and hurricane evacuation zones to perform local risk assessments and to develop mitigation strategies. The Town also partners with the State on grant funding opportunities.

Federal

The Town is a partner with FEMA. The Town utilizes FEMA's flood insurance study to perform local risk assessments and to enforce local floodplain management ordinances. The Town also utilizes FEMA literature and brochures to promote flood risk awareness.

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 process and mitigation action plan for the Cutler Bay Flood Mitigation Plan. It describes how the Town met the following requirements from the 10-step planning process:

- ▶ Planning Step 6: Set Goals
- ▶ Planning Step 7: Review Possible Activities
- ▶ Planning Step 8: Draft an Action Plan

6.1 OVERVIEW

The results of the planning process, risk assessment, goal setting, and evaluation of mitigation alternatives led to the mitigation strategy and mitigation action plan for this FMP. Section 6.2 below identifies the goals and objectives of this plan and Section 0 details the new mitigation action plan. The following umbrella mitigation strategy was developed for this FMP:

- ▶ **Communicate** the hazard information collected and analyzed through this planning process as well as FMPC success stories so that the community better understands what can happen where and what they themselves can do to be better prepared.
- ▶ **Implement** the action plan recommendations of this plan.
- ▶ **Use** existing rules, regulations, policies, and procedures to support mitigation.
- ▶ **Monitor** multi-objective management opportunities to share and package funding opportunities and garner broader constituent support.

6.1.1 Continued Compliance with NFIP

Given the flood hazards in the planning area, an emphasis will be placed on continued compliance with the NFIP and participation in the Community Rating System. Detailed below is a description of the Town of Cutler Bay's flood management program to ensure continued compliance with the NFIP.

Cutler Bay's Flood Management Program

Cutler Bay joined the NFIP in August of 2006. Since then, the Town has administered floodplain management regulations that meet and exceed the minimum requirements of the NFIP. Under that arrangement, residents and businesses paid the same flood insurance premium rates as most other communities in the country.

The Community Rating System (CRS) was created in 1990. It is designed to recognize floodplain management activities that are above and beyond the NFIP's minimum requirements. Cutler Bay originally entered the CRS program in 2011 as a Class 6 community. The Town has since undertaken additional activities, and Cutler Bay is currently a Class 4 community, which gives a 30% premium discount to policyholders in Cutler Bay in the Special Flood Hazard Area, and a 10% discount to policyholders outside the Special Flood Hazard Area.

The activities credited by the CRS provide direct benefits to Cutler Bay and its residents, including:

- ▶ Enhanced public safety;



- ▶ A reduction in damage to property and public infrastructure;
- ▶ Avoidance of economic disruption and losses;
- ▶ Reduction of human suffering; and
- ▶ Protection of the environment.

The following is a summary of Cutler Bay's total CRS credit points by activity:

Activity 310 – Elevation Certificates: The Building Division maintains elevation certificates for new and substantially improved buildings. Copies of elevation certificates are made available upon request. Elevation certificates are also kept for post-FIRM buildings. (39 credit points received)

Activity 320 – Map Information: Credit is provided for furnishing inquirers with basic flood zone information from the community's latest FIRM. Credit is also provided for the community furnishing additional FIRM information, information about problems not shown on the FIRM, and historical flood information. (90 credit points received)

Activity 330 – Outreach Projects: Credit is provided for informational outreach projects that include, general outreach projects, and targeted outreach projects. These projects are disseminated annually. Credit is also provided for having a pre-flood plan for public information. Credit is enhanced by having a Program for Public Information (PPI), and by having the information disseminated by stakeholders outside the local government. (332 credit points received)

Activity 340 – Hazard Disclosure: Credit is provided for state regulations requiring disclosure of flood hazards. (10 credit points received)

Activity 350 – Flood Protection Information: Documents relating to floodplain management are available in the reference section of the Miami Dade Library. Credit is also provided for floodplain information displayed on the community's website. Credit is enhanced by having a PPI. (106 credit points received)

Activity 360 – Flood Protection Assistance: Credit is provided for offering one-on-one advice regarding property protection and making site visits before providing advice. Credit is also provided for giving advice on financial assistance programs and advisor training at appropriate EMI courses. Credit is enhanced by having a PPI. (85 credit points received)

Activity 420 – Open Space Preservation: Credit is provided for preserving approximately 44 percent of the SFHA as open space and preserving open space land in a natural state. Credit is also provided for regulations and incentives that minimize development in the SFHA. (776 credit points received)

Activity 430 – Higher Regulatory Standards: Credit is provided for enforcing regulations that require freeboard for new and substantial improvement construction, cumulative substantial improvement, lower substantial improvement, protection of critical facilities, enclosure limits, and local drainage protection. Credit is also provided for enforcement of building codes, a BCEGS classification of 3/2, other higher standards, state mandated regulatory standards, and regulations administration. (453 credit points received)

Activity 440 – Flood Data Maintenance: Credit is provided for maintaining and using digitized maps in the day to day management of the floodplain. Credit is also provided for establishing and maintaining a system of benchmarks and maintaining copies of all previous FIRMs and FIS Reports. (150 credit points received)

Activity 450 – Stormwater Management: The community enforces regulations for stormwater management, low impact development, soil and erosion control, and water quality. Credit is also provided for watershed master planning. (174 credit points received)



Section 510 – Floodplain Management Planning: Cutler Bay has 32 unmitigated repetitive loss properties and is a Category B community for CRS purposes. Credit is provided for the adoption and implementation of the Flood Mitigation Plan. A progress report must be submitted on an annual basis. Credit is also provided for the adoption and implementation of a Natural Floodplain Functions Plan. (384 credit points received)

Activity 540 – Drainage System Maintenance: All of Cutler Bay’s drainage system is inspected regularly throughout the year and maintenance is performed as needed. Credit is also provided for listing problem sites that are inspected more frequently, and for implementing an ongoing Capital Improvements Program. The community enforces a regulation prohibiting dumping in the drainage system, and annually publicizes the regulation or has appropriate signs posted. (345 credit points received)

Activity 610 – Flood Warning Program: Credit is provided for program that provides timely identification of impending flood threats, disseminates warnings to appropriate floodplain residents, and coordinates flood response activities. (249 credit points received)

6.2 GOALS AND OBJECTIVES

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

Section 4 documents the flood hazards and associated risks that threaten the Town of Cutler Bay including the vulnerability to structures, infrastructure, and critical facilities. Section 5 evaluates the capacity of the Town to reduce the impact of those hazards. The intent of Goal Setting is to identify targets and priorities that can guide the review of potential mitigation actions, including risk reduction activities and improvements to existing capabilities (policies and programs), so that community vulnerability is reduced. This plan needs to make sure that recommended actions are consistent with what is appropriate for Cutler Bay. Mitigation goals need to reflect community priorities and should be consistent with other plans in the Town and within Miami-Dade County.

Goals: are general guidelines that explain what it to be achieved. They are usually broad-based policy type statements, long term and represent global visions. Goals help define the benefits that the plan is trying to achieve.

Objectives: are short term aims, when combined, form a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

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. The primary planning document where the goals of this plan must complement and be consistent with is the Miami-Dade Local Mitigation Strategy and to a lesser degree the community’s comprehensive plan. The importance of Cutler Bay’s comprehensive plan is that this plan is developed and designed to guide the future growth within the Town. Therefore, there should be some consistency in the overall goals and how they relate to each other. Likewise, the goals of the county’s local mitigation strategy play an important role as Cutler Bay participates in this multi-jurisdictional plan and each plan focuses on the flood hazards.

6.2.2 Goal Setting Exercise

At the second FMPC meeting, held on August 11, 2020, the Cutler Bay FMPC reviewed the goals and objectives of the previous flood mitigation plan and conducted an open discussion to determine whether the goals and objectives were still applicable or whether any changes should be made. The goals and objectives from the 2015 plan were as follows:



Goal 1: Protect the health, safety and welfare of the citizens of Cutler Bay from the effects of flooding

- ▶ **Objective 1.1:** Reduce flood damage to insurable buildings and public infrastructure through stormwater improvement projects
- ▶ **Objective 1.2:** Preserve open space areas, especially where there are sensitive natural areas
- ▶ **Objective 1.3:** Promote higher development and design standards to protect new buildings from flood damage

Goal 2: Promote a public education program to encourage residents to promote mitigation measures that reduce the effects of flood damage on private property

- ▶ **Objective 2.1:** Encourage residents to assume an appropriate level of responsibility for their own flood protection
- ▶ **Objective 2.2:** Promote flood insurance as a property protection measure against potential flood damage
- ▶ **Objective 2.3:** Develop a public education program for the local schools

Goal 3: Protect critical and essential facilities from flood damage

- ▶ **Objective 3.1:** Seek county, state and federal support for mitigation projects
- ▶ **Objective 3.2:** Prioritize critical and essential facilities in need of protection from potential flood damage

Goal 4: Reduce the number of repetitively flooded structures

- ▶ **Objective 4.1:** Leverage local, state and federal grant funding to facilitate mitigation actions such as elevation, acquisition, or floodproofing
- ▶ **Objective 4.2:** Target repetitive loss properties for implementation of mitigation projects

The Town's planning consultant made recommendations for revisions to the goals, including explicitly incorporating resiliency into planning for growth and recovery. Additionally, some of the more specific goals, such as reducing repetitively flooded structures, were seen as more targeted objectives of the larger goal of protecting vulnerable populations and buildings. After an open discussion and brainstorming session, the FMPC arrived at a set of revised goals and objectives, presented below.

6.2.3 Resulting Goals & Objectives

At the end of the exercises, the FMPC agreed upon four revised general goals and several targeted objectives supporting each goal. The resulting goals and objectives are as follows:

Goal 1: Protect the public health, life, safety and welfare by increasing public awareness and education of the flood hazard by encouraging collective and individual responsibility for mitigating the flood risk.

- ▶ **Objective 1.1:** Promote flood insurance as a property protection measure against potential flood damage.
- ▶ **Objective 1.2:** Encourage residents to assume an appropriate level of responsibility for their own flood protection.
- ▶ **Objective 1.3:** Develop a public education program for the local schools.

Goal 2: Improve technical capability (including administrative resources, tools, data, and equipment) to implement hazard mitigation and respond to flood events.

- ▶ **Objective 2.1:** Seek county, state and federal support for mitigation projects.
- ▶ **Objective 2.2:** Acquire additional tools and training to support mitigation.



Goal 3: Minimize the flood threat to life and property by protecting vulnerable populations and buildings and critical facilities through the implementation of cost-effective and technically feasible mitigation actions.

- ▶ **Objective 3.1:** Reduce flood damage to insurable buildings and public infrastructure through stormwater improvement projects.
- ▶ **Objective 3.2:** Prioritize critical and essential facilities in need of protection from potential flood damage.
- ▶ **Objective 3.3:** Leverage local, state and federal grant funding to facilitate mitigation actions such as elevation, acquisition, or floodproofing.
- ▶ **Objective 3.4:** Target repetitive loss properties for implementation of mitigation projects.

Goal 4: Incorporate resiliency into future growth by ensuring that flood risk is considered for both new development and post-disaster redevelopment and recovery.

- ▶ **Objective 4.1:** Promote higher development and design standards to protect new buildings from flood damage.
- ▶ **Objective 4.2:** Preserve open space areas, especially where there are sensitive natural areas.

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, each hazard identified in Section 4 Flood Risk Assessment was evaluated. The following hazards were determined based on the Priority Risk Index scores to be high and moderate priority hazards:

- ▶ Climate Change and Sea Level Rise
- ▶ Coastal/Canal Bank Erosion
- ▶ Flood: 100-/500-year
- ▶ Flood: Stormwater/Localized
- ▶ Hurricane and Tropical Storm (including Storm Surge)

Once it was determined which hazards warranted the development of specific mitigation actions, the FMPC analyzed viable mitigation options that supported the identified goals and objectives. The FMPC was provided with the following list of mitigation categories, which are utilized as part of the CRS planning process:

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

The FMPC was also provided with examples of potential mitigation actions for each of the above categories. The FMPC was instructed to consider both future and existing buildings in evaluating possible mitigation actions. The FMPC also considered which actions from the previous plan and

subsequent annual updates that were not already completed should be continued in this action plan. A facilitated discussion was held at the third FMPC meeting to examine and analyze mitigation options. Appendix C contains a detailed review of the possible activities within each CRS mitigation category that were reviewed by the FMPC. This comprehensive review of activities details why some were appropriate for implementation and others were not.

The result of this discussion was a list of mitigation actions to be pursued for implementation in the next five years, including newly identified actions and actions carried forward from the 2015 plan. Actions that were completed or not carried forward (deleted) are detailed in Table below.

Table 6.1 – Completed and Deleted Actions from the 2015 Flood Mitigation Plan

Action ID & Description	Status & Comments
1. Inventory all canals (town-owned or other) to identify segments where erosion is causing banks to collapse, and prepare a prioritized list so that a capital improvement strategy can be put in place for maintenance.	Deleted – This effort is ongoing, but the Town will not be improving the canals unless a grant is awarded. This project is deferred until funding can be identified.
3. Improve drainage along the C-100 canal through a dredging project in order to mitigate flooding in the sub-basin that currently outfalls to the canal	Completed – This project is pending with MDC and SFWD, and implementation will soon be done.
5. Implement program to inventory all catch basins located on private streets in gated communities in order to assess the severity of drainage issues and develop a plan for regular maintenance to ensure adequate drainage.	Completed – Part A was completed. The Town will respond to complaints and cite as needed with the code compliance department.
7. Improve drainage along SW 212th Street with construction of a new outfall to ensure sufficient discharge.	Completed
11. Revise local codes to require landscapers to obtain licenses to ensure landscape businesses are aware of the requirement not to put debris into catch basins.	Deleted – The Town will respond to complaints about landscaping debris and drainage issues as needed.
12. Work with the Miami-Dade Association of Realtors to require flood zones to be included in the MLS to better inform potential buyers as to whether a property is in a flood zone.	Deleted

6.3.1 Prioritization Process

Once the mitigation actions were identified, the FMPC was provided with several decision-making tools, including FEMA's recommended STAPLEE prioritization criteria. The FMPC was asked to consider each of the following STAPLEE elements:

- ▶ **Socially Acceptable:** Is the action acceptable to the community? Does it have a greater impact on a certain segment of the population? Are the benefits fair?
- ▶ **Technically Feasible:** Is the action technically feasible? Is it a long-term solution to the problem? Does it capitalize on existing planning mechanisms for implementation?
- ▶ **Administrative Resources:** Are there adequate staffing, funding and other capabilities to implement the project? Is there adequate additional capability to ensure ongoing maintenance?
- ▶ **Politically Supported:** Will there be adequate political and public support for the project? Does the project have a local champion to support implementation?
- ▶ **Legally Allowable:** Does the community have the legal authority to implement the action?



- ▶ **Economically Sound:** Can the action be funded locally? Will the action need to be funded by an outside entity, and has that funding been secured? How much will the project cost? Can the benefits be quantified, and do they outweigh the costs?
- ▶ **Environmentally Sound:** Does the action comply with environmental regulations? Does the action meet the community's environmental goals? Does the action impact land, water, endangered species, or other natural assets?

Next, the FMPC was asked to consider each action's potential efficacy by answering the following questions:

- ▶ Will the action result in lives saved?
- ▶ Will the action reduce property damages?
- ▶ Will the action reduce the need for response actions?
- ▶ Will the benefits exceed the cost?

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 process of identification and analysis of mitigation alternatives allowed the FMPC to come to consensus and to prioritize recommended mitigation actions. The team agreed that prioritizing the actions collectively enabled the actions to be ranked 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.

In accordance with the DMA requirements, an emphasis was placed on the importance of a benefit-cost analysis in determining action priority, as reflected in the prioritization criteria above. However, this was not a quantitative analysis. 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

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

6.4 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.

The action plan was developed to present the recommendations developed by the FMPC for how the Town of Cutler Bay can reduce the risk and vulnerability of people, property, infrastructure, and natural and cultural resources to future flood events. Emphasis was placed on protecting both future and existing development. The action plan summarizes who is responsible for implementing each of the prioritized actions as well as when and how the actions will be implemented. Estimated costs and benefits are also identified for each action to support the benefit-cost review conducted to meet the regulatory



requirements of the Disaster Mitigation Act. Table 6.2 details the mitigation actions identified for implementation through this planning process.

It is important to note that the Town of Cutler Bay has many existing, detailed action descriptions, which include benefit-cost estimates, in other planning documents, such as stormwater plans and capital improvement budgets and reports. These actions are considered to be 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.

It should also 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 Town is not obligated by this document to implement any or all of these projects. This mitigation strategy represents the desires of the community to mitigate the risks and vulnerabilities from identified hazards. The actual selection, prioritization, and implementation of these actions will also be further evaluated in accordance with the CRS mitigation categories and criteria contained in Appendix C.

Table 6.2 – Town of Cutler Bay Mitigation Action Plan

Action ID & Description	Issue/Background	Related to Goal(s)	Mitigation Category	Hazards Addressed	Responsible Office	Existing Planning Mechanisms	Priority	Cost Estimate	Benefits / Losses Avoided	Potential Funding Source	Timeline	Status
1. Ensure that storm drains are cleaned on a regular and consistent bi-annual basis in order to maintain adequate stormwater drainage as they were designed.	Storm drains throughout the Town's jurisdiction need regular cleaning/ maintenance so that nearby properties are not adversely affected by inadequate drainage and ponding of stormwater.	3	P, PP	Stormwater/ Localized Flooding	Department of Public Works	Capital Improvement Program	H	\$300,000	Reduces potential damage to buildings from catch basins not draining properly.	Town Capital Improvement Funds and Town Operating Budget	Every 2 years	Carried Forward – This project requires continuous implementation.
2. Improve drainage capacity in the Saga Bay sub basin through upgraded stormwater piping in order to discharge the volume of runoff necessary to meet desired performance criteria for modeled storm events, as determined through hydrologic and hydraulic calculations.	Observed flooding across roadway and localized ponding in roadway in multiple locations within the sub-basins. Multiple complaints have been received.	3	P, PP, SP	Stormwater/ Localized Flooding	Department of Public Works	Capital Improvement Program	H	Detailed phasing and cost estimates in Stormwater Master Plan	Reduces potential damage to buildings from stormwater ponding. Eliminates hazardous driving conditions during heavy rainfall events.	Town Capital Improvement Funds	Phased through 2025	Carried Forward – Saga Bay 1.7 is scheduled for construction 2022. Saga Bay 1.5 is under design.
3. Continue implementation of drainage system maintenance on all surface water channels, canals and ditches to ensure proper storage, disposal, and water quality treatment of runoff.	Drainage features throughout the Town are in need of regular maintenance so that nearby properties are not adversely affected by reduced function.	3	P, PP	Stormwater/ Localized Flooding	Department of Public Works	Capital Improvement Program	H	\$100,000	Reduces damages to buildings from channels, canals, and ditches not operating properly.	Town Capital Improvement Funds	Annually	Carried Forward – Implementation is ongoing through Miami Dade interlocal canal maintenance agreement
4. Promote an Enviro Scape model to elementary school students to help them understand sources of flooding and prevention of water pollution.	Town is committed to public outreach programs dedicated to informing the public about flood risk and pollution prevention	1	PIO	Stormwater/ Localized Flooding	Town Manager and Department of Public Works	Town's Outreach Program	L	\$2,000	Educates children on how to avoid flood damage and the benefits of reduced stormwater pollution	Town Operating Budget	Annually	Carried Forward – This project requires continuous implementation.
5. Work with local, state and federal partners to target repetitive loss properties for acquisition or elevation to eliminate potential for future flooding.	The Town has a number of repetitive loss buildings including some which are located in X - Zones.	3, 4	PP	100-/500-year Flooding, Stormwater/ Localized Flooding	Department of Community Development	Flood Damage Prevention Ordinance, federal grant programs	M	Varies per fiscal year and grant applications	Reduces losses to buildings with known vulnerability to flood; May convert flood-prone land to open space	Local, State, and Federal Grant Funding	2021-2026	Carried Forward – This project requires continuous implementation.
6. Promote public outreach encouraging retrofitting techniques where residents can help themselves to potentially eliminate damage from low level flooding to their structure.	There are simple things residents and business can do to reduce damage from the floods. Applying a moisture barrier with adhesive along the bottom few feet of a residence along with barriers for openings in doors can help eliminate flood damage to slab on grade homes.	1	PP	All	Department of Public Works and Planning & Zoning	Flood Damage Prevention Ordinance	L	\$5,000	Reduces damages to buildings from all types of flooding	Town Operating Budget	2021-2026	Carried Forward – This project requires continuous implementation.
7. Promote the purchase of flood insurance to residents and businesses to increase policy base and ensure protection from flood losses.	A majority of the Town is located in a 100-year floodplain. The more buildings that have flood insurance the fewer properties that will have to cover flood damage repairs out of pocket.	1	PP, PIO	All	Department of Community Development and Public Works	Town's Outreach Program	L	\$10,000	N/A – Public outreach and awareness that flood insurance is a homeowner's first line of defense against losses.	Town Operating Budget	2021-2026	Carried Forward – This project requires continuous implementation.

Action ID & Description	Issue/Background	Related to Goal(s)	Mitigation Category	Hazards Addressed	Responsible Office	Existing Planning Mechanisms	Priority	Cost Estimate	Benefits / Losses Avoided	Potential Funding Source	Timeline	Status
8. Protect the natural floodplain functions within the Town including the Cutler Wetlands.	The Cutler Wetlands is a natural barrier to storm surge and sea-level rise from the Atlantic Ocean, that protects buildings from flood damage. The Town of Cutler Bay is fortunate to have this large wetland area in the east part of the Town and should protect it from infiltration of development.	4	NRP	Storm Surge, Sea Level Rise	Department of Community Development / Building and Zoning	Town's Comprehensive Plan and Zoning Ordinance	M	Local Staff Time	Reduces potential damages to buildings from storm surge and sea-level rise.	Town Operating Budget	2021-2026	Carried Forward – This project requires continuous implementation.
9. Increase awareness of the flood hazard through development of a PPI.	Improving upon the overall messaging, dissemination methods, and who the Town is targeting with those messages will improve the overall effectiveness of the outreach program and may result in a better informed public.	1	PIO	All	Department of Public Works	Town's Outreach Program	H	Local Staff Time	N/A – Better informed public can result in better protection to buildings and support for mitigation	Town Operating Budget	2021-2026	Carried Forward – This project requires continuous implementation of outreach and regular update of the PPI. PPI update underway in conjunction with FMP.
10. Work with Miami-Dade County Emergency Management on identifying vulnerable populations who may need assistance for evacuations.	Emergency managers may not know where vulnerable populations are located. Having this information in a database/GIS mapping can better equip responders to assist in evacuations	2	ES, PIO	All	Town Manager and Police Department	Miami-Dade Emergency Management procedures	H	Unknown	Enables support to individuals who may otherwise be unable to evacuate.	State Emergency Management Grant Funding	2021-2026	Carried Forward – This project requires continuous implementation.
11. Work with Miami-Dade County Emergency Management, state and federal governments, to protect vulnerable critical facilities to ensure they can operate properly during flooding conditions.	Critical facilities which operate as either evacuation centers or pump flood waters, or sewage should be protected from flood damage so they perform without interruption.	3	ES	All	Town Manager and Police Department	Miami-Dade Local Mitigation Strategy	M	Unknown	Reduces potential damage to critical facilities; enables continuity of operations	HMGP Grant Funding, State Emergency Management Funding	2021-2026	Carried Forward – This project requires continuous implementation.
12. Complete the Cutler Bay Wetlands Restoration Project Plan to prevent flood damages and restore mitigation property to a world-class birding sanctuary. Share information about this project with stakeholders and the public.	Flood prone wetland property in the Town serves as an important habitat for birds. Preserving this property for flood mitigation is being paired with an effort to restore its natural and beneficial functions as a bird habitat.	4	NRP, PIO	All	Town Manager	Capital Improvement Program, Town's Outreach Program	H	Staff Time; implementation cost	Reduced potential flood damage; protects natural resources and preserves natural and beneficial functions	Town Operating Budget, Town Capital Improvement Funds	2025	New
13. Acquire or redevelop parcels for recreational open space and natural and beneficial functions.	Preserving flood prone land as open space would prevent new development from increasing exposure and would allow natural floodplain functions including flood hazard reduction and wildlife habitat.	3, 4	PP, NRP	All	Department of Community Development, Public Works Department	Federal Grant Programs	M	To be determined on case-by-case basis	Reduced losses and improved floodplain functions in high risk areas	Local, State, and Federal Grant Funding	2021-2026	New
14. Educate repetitive loss property owners on ways to protect their building from flood damage.	Repetitive losses are a drain on the NFIP. Teaching property owners how to protect their buildings and contents may reduce future losses.	1, 3, 4	PP, PIO	All	Department of Public Works	Town's Outreach Program	M	Staff time	Reduced losses to known high-risk properties	Town Operating Budget	2021-2026	New

Mitigation Categories: P = Prevention, PP = Property Protection, NRP = Natural Resource Protection, SP = Structural Project, ES = Emergency Services, PIO = Public Information & Outreach



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 buy-in from the Town of Cutler Bay, 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 DMA 2000. The Town Council has adopted the Flood Mitigation Plan by passing a resolution. A copy of the executed resolution will be shown below.

8 Plan Implementation and Maintenance

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

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. This is Planning Step 10 of the 10-step planning process. This section provides an overview of the overall strategy for plan implementation and maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The section also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

8.1 IMPLEMENTATION

Once adopted, this plan must be implemented to be effective in mitigating flood risk. While this plan contains many worthwhile actions, the Town of Cutler Bay will need to decide which action(s) to undertake first. The priority assigned the actions in the planning process and funding availability will affect that decision. Low or no-cost actions most easily demonstrate progress toward successful plan implementation.

Mitigation is most 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 each program and the Cutler Bay 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.

Simultaneous to these efforts, it is important to maintain a constant monitoring of funding opportunities that can be leveraged to implement some of the more costly recommended actions. This will include creating and maintaining a bank of ideas on how to meet local match or participation requirements. When funding does become available, the Town will be positioned to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, state and federal earmarked funds, benefit assessments, and other grant programs, including those that can serve or support multi-objective applications.

8.1.1 Integration with Existing Planning Mechanisms

An important implementation mechanism that is highly effective and low-cost is incorporation of the Flood Mitigation Plan recommendations and their underlying principles into other Town plans and mechanisms, such as the Town's Comprehensive Growth Management Plan and Stormwater Management Plan. As reviewed in the capability assessment in Section 5, the Town of Cutler Bay already implements policies and programs to 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 program mechanisms.

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 program mechanisms. These existing mechanisms include:

- ▶ Town Capital Improvement Program



- ▶ Town Comprehensive Growth Management Plan
- ▶ Town Emergency Operations Plan
- ▶ Town Code of Ordinances
- ▶ Flood/stormwater management/master plans
- ▶ Other plans, regulations, and practices with a mitigation focus

Those involved in these other planning mechanisms will be responsible for integrating the findings and recommendations of this plan with these other plans, programs, etc, as appropriate. As described in Section 8.1 Implementation, incorporation into existing planning mechanisms will be done 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 community program opportunities.

The successful implementation of this mitigation strategy will require constant and vigilant review of existing plans and programs for coordination and multi-objective opportunities that promote a safe, sustainable community.

Efforts should continuously be made to monitor the progress of mitigation actions implemented through other planning mechanisms and, where appropriate, other priority actions should be incorporated into updates of this flood mitigation plan.

Responsibility for Implementation of Goals and Activities

The elected officials and officials appointed to head each department within the Town 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 will 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.

8.1.2 Role of FMPC in Implementation, Monitoring and Maintenance

With adoption of this plan, the Town of Cutler Bay will be responsible for the plan implementation and maintenance. The FMPC Steering Committee identified in Section 3 will reconvene quarterly to ensure mitigation strategies are being implemented and the City continues to maintain compliance with the NFIP. As such, Cutler Bay agrees to continue its relationship with the FMPC Steering Committee and:

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

The primary duty is to see the plan successfully carried out and report to the Town Council, FDEM, FEMA, and the public on the status of plan implementation and mitigation opportunities. Other duties include



reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on the Town's website (and others as appropriate).

8.2 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.

8.2.1 Maintenance Schedule

The Town of Cutler Bay's Community Rating System Coordinator is responsible for initiating plan reviews. In order to monitor progress and update the mitigation strategies identified in the action plan, Cutler Bay will revisit this plan quarterly and following a hazard event. The Town will submit a five-year written update to FDEM and FEMA Region IV, 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 2021, the next plan update for the Town will occur in 2026.

8.2.2 Maintenance Evaluation Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

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

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 be reviewed as well 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 Town Council. In keeping with the five-year update process, the FMPC will convene public meetings to solicit public input on the plan and its routine maintenance, and the final product will be adopted by the Town Council.

Quarterly Plan Review Process

For the 2021 flood mitigation plan update review process, the Town's Community Rating System Coordinator, on behalf of the Town Council, will be responsible for facilitating, coordinating, and scheduling reviews and maintenance of the plan. Reviews of the Flood Mitigation Plan will normally occur on a quarterly basis each year and will be conducted as follows:

- ▶ The Town's Fire Chief/Civil Defense Coordinator/Community Rating System Coordinator will place an advertisement in the local newspaper advising the public of the date, time, and place for each quarterly review of the plan and will be responsible for leading the meeting to review the plan.
- ▶ Notices will be mailed to the members of the FMPC; federal, state, and local agencies; non-profit groups; local planning agencies; representatives of business interests; neighboring communities; and other interested stakeholders advising them of the date, time, and place for the review.
- ▶ Town officials will be notified by email and phone or personal visit and urged to participate.
- ▶ Members of the Town's Planning Commission and other appointed commissions and groups will also be notified by email and either by phone or personal visit.
- ▶ 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.
- ▶ The local news media will be contacted and a copy of the current plan will be available for public comment.
- ▶ After the review meeting, minutes of the meeting and a quarterly report will be prepared by the FMPC and forwarded to the news media (public) and the ISO/CRS specialist for the CRS program. The report will also be presented to the Town Council for review, and a request will be made that the Council take action to recognize and adopt any changes resulting from the review.

Criteria for Quarterly Reviews

The criteria recommended in 44 CFR 201 and 206 will be utilized in reviewing and updating the plan. Specifically, the quarterly reviews will include 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 or not the event resulted in a presidential disaster declaration.
- ▶ Natural hazard occurrences that were not of a magnitude to warrant activation of the EOC or a federal disaster declaration but were severe enough to cause damage in the community or closure of businesses, schools, or public services.
- ▶ The dates of hazard events descriptions.
- ▶ Documented damages due to the event.
- ▶ 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 Flood Mitigation 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.



8.2.3 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 hearings.

Public Involvement Process for Quarterly Reviews

The public will be noticed by placing an advertisement in the newspaper specifying the date and time for the review and inviting public participation. The FMPC/Steering Committee, local, state, and regional agencies will be notified and invited to attend and participate.

Public Involvement for Five-year Update

When the FMPC reconvenes for the 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 Steering Committee and FMPC will develop a plan for public outreach to coordinate the activities necessary to involve the greater public. Outreach will include 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. The FMPC will also coordinate this public outreach process with the Program for Public Information established pursuant to the 2017 guidelines from the Community Rating System (CRS).



Appendix A Program for Public Information



Appendix B Planning Process

B.1 PLANNING STEP 1: ORGANIZE TO PREPARE THE PLAN

Table B.1 – FMPC Meetings

Meeting Type	Meeting Topic	Meeting Date	Meeting Location
FMPC #1 (Kick-off)	1) Introduction to DMA, CRS and the planning process 2) Organize resources: the role of the FMPC, planning for public involvement, and coordinating with other agencies and stakeholders 3) Introduction to hazard identification	February 25, 2020 5:30pm	Town of Cutler Bay, 2nd Floor Conference Room 220
FMPC #2	1) Review and update of FMP goals 2) Review existing project implementation status 3) Review localized flooding areas of concern 4) Overview of Program for Public Information (PPI) 5) Discussion of Repetitive Loss properties and Repetitive Loss Area Analysis (RLAA)	August 11, 2020 5:30pm	Town of Cutler Bay, 2nd Floor Conference Room 220 & Adobe Connect
FMPC #3	1) Review of Flood Risk Assessment (Assess the Hazard) 2) Review of Vulnerability Assessment (Assess the Problem) 4) Discussion of mitigation goals, objectives, and action alternatives	October 22, 2020 5:30pm	Town of Cutler Bay, 2nd Floor Conference Room 220 & Adobe Connect
FMPC #4	1) Review of the draft plan	May 18, 2021 5:30pm	Town of Cutler Bay, 2nd Floor Conference Room 220 & Zoom Video Conference Call

FMPC Meetings were open to the public. Meeting notices were posted on the Town's website.



B.1.1 FMPC Meeting Agendas, Minutes, and Attendance Records

FMPC Meeting 1: February 25, 2020



Cutler Bay, FL Floodplain Mitigation Plan

Flood Mitigation Planning Committee Kick-Off Meeting Agenda

Tuesday, February 25, 2020, 5:30-6:30 p.m.

Held at Town of Cutler Bay, 2nd Floor Conference Room 220, 10720 Caribbean Boulevard
Cutler Bay, FL 33189

1. Introductions
2. Background on the Community Rating System (CRS) program
3. Project Overview
 - a. Requirement for Update
 - b. Trends in Disasters – Why Plan?
 - c. Disaster Mitigation Act (DMA) Requirements
 - i. Planning Requirements
 - ii. Planning Process Review
4. CRS 10-step planning process
5. Program for Public Information (PPI)
6. Next Steps
7. Questions
8. Adjourn



Cutler Bay, FL Floodplain Mitigation Plan

Flood Mitigation Planning Committee Meeting Minutes

Tuesday, February 25, 2020, 5:30-6:30 p.m.

Held at Town of Cutler Bay, 2nd Floor Conference Room 220, 10720 Caribbean Boulevard
Cutler Bay, FL 33189

This meeting kicks off the five-year update to the Town's Flood Mitigation Plan and the Program for Public Information. Members of the Floodplain Management Planning Committee (FMPC) introduced themselves at the beginning of the meeting. There were eight participants in attendance: Bruce Foerster, Janice Routon, Danielle Maschinot, Luis Badillo, Jorge Acevedo, Michael Callahan, Yenier Vega, and Alfredo Quintero.

David Stroud, the Town's planning consultant from Wood, facilitated the meeting, beginning with an overview and background information on the Community Rating System (CRS), the goals of the CRS, and the benefits to the Town of Cutler Bay. Cutler Bay is currently a Class 4 community, which provides a 30% discount on flood insurance to policyholders (an average of \$272 per policy, or an estimated \$2,039,235 in total). An improvement to a Class 3 would provide a 35% discount, which would amount to an average \$317 per policy or \$2,378,138 community-wide.

The Town of Cutler Bay prepared a Flood Mitigation Plan in 2015, which must be updated every 5 years per FEMA's local hazard mitigation planning requirements. Additionally, it is important to update the plan and address changes in the community and the hazards the community faces because trends in disasters, including more frequent and intense events and more people and property in harm's way, are resulting in increased costs for disaster response and recovery. Mitigation planning is important because it addresses the spiraling costs of hazards, many flood hazards are predictable and repetitive, loss reduction activities are effective, and there are funds to support these activities. The goal of mitigation is to end the damage-rebuild cycle through sustained action to reduce or eliminate long-term risk.

David review the four phases of the Disaster Mitigation Action planning process, which Wood blends with the 10-Step planning process of the CRS program. David emphasized the importance of public involvement, which accounts for 31% of total credit in Activity 510 Floodplain Management Planning. This means the public must be involved as 50% of the FMPC membership and should receive outreach and engagement in multiple other ways throughout the process. Examples of outreach efforts include a local website, webcasts, speaking at neighborhood group meetings, conducting a survey, staffing an information booth at a festival, or having an article published in local news.



David provided a review of the process for updating the hazard identification and risk assessment and reviewed the other 10-Steps of the planning process and how Wood will work to maximize credit under Activity 510 through this plan. David also provided a review of

The next part of the meeting involved a review of the process for updating the Program for Public Information. The FMPC formed for the update of the FMP will also serve for the update of the PPI, and these updates will occur simultaneously. The PPI helps the community think outside the box to develop flood-related outreach projects. It entails a 7-Step planning process. The FMPC will review the existing PPI and update it accordingly.

End of meeting.



TOWN OF CUTLER BAY
February 25, 2020 Floodplain Mitigation Plan Advisory Committee Meeting
SIGN-IN SHEET
PLEASE PRINT CLEARLY.

COMMITTEE MEMBER NAME	NEXT MEETING DATE IS:
	MAY 28, 2020 IN ORDER TO DETERMINE WHETHER THERE WILL BE A QUORUM AT THE NEXT MEETING, PLEASE INDICATE IF YOU PLAN TO ATTEND BY MARKING Y/N NEXT TO YOUR NAME. THANK YOU.
Bruce Foerster	
Opinice Fouton	Y
Danielle Maschinot	
Luis A. Basillo	Y
Jorge Acevedo	Y
Michael Callahan	Y
YENIER VEGA	
ALFREDO GUINIERO	

NOTE TO COMMITTEE CHAIRMAN/LIAISON:
 PLEASE RETURN THIS SIGN-IN SHEET TO THE TOWN CLERK AT THE END OF THE MEETING. THANK YOU.



FMPC Meeting 2: August 11, 2020



Cutler Bay, FL Floodplain Mitigation Plan

Flood Mitigation Planning Committee Meeting Agenda

Tuesday, August 11, 2020, 5:30-6:30 p.m.

Held at Town of Cutler Bay, 2nd Floor Conference Room 220, 10720 Caribbean Boulevard
Cutler Bay, FL 33189 (Via Adobe Connect)

1. Introductions
2. Review the goals from Previous FMP
 - a. Update existing goals
 - b. Add any additional goals
3. Discuss projects in the Program for Public Information (PPI)
 - a. Update existing projects
 - b. Add any additional projects
4. Discuss Repetitive Loss Area Analysis (RLAA)
5. Next Steps
6. Questions
7. Adjourn



Cutler Bay, FL Floodplain Mitigation Plan

Flood Mitigation Planning Committee Meeting Minutes

Tuesday, August 11, 2020, 5:30-6:30 p.m.

Held at Town of Cutler Bay, 2nd Floor Conference Room 220, 10720 Caribbean Boulevard
Cutler Bay, FL 33189 (via Adobe Connect)

The Town of Cutler Bay, FL Floodplain Management Planning Committee (FMPC) met via Adobe Connect for its second meeting. During this meeting Yenier Vega reported on the status of the current mitigation projects in the Town's 2015 Floodplain Management Plan. There were eight participants in attendance: Alfredo Quintero, Yenier Vega, Bruce Foerster, Janice Rowton, Luis Badillo, Jorge Acevedo, Danielle Maschinot, and Maria Herrera-Mendoza.

The second part of the meeting centered on a more detailed look of the existing Program for Public Information (PPI) which is credited under Activity 330 Outreach Projects in FEMA's National Flood Insurance Program's Community Rating System.

Mr. David Stroud provided a background of the PPI including research which is designed to change people's behavior. Some of the keys to good outreach programs are:

- Tailored locally,
- Positive messages,
- Tell people what to do,
- Repeat the message, and
- Repeat the message from different sources,

Mr. Stroud provided an assessment of the flooding problems in the Town with the primary flooding problem caused by heavy rains which creates more frequent nuisance localized stormwater or urban flooding.

The current Target Areas for the PPI include:

- Special Flood Hazard Area,
- Repetitive Loss Areas, and
- Areas of Localized Stormwater Flooding



Mr. Stroud suggested that the FMPC should consider adding “Realtors, Lenders and Insurance Agents as a Target Audience/ Target Area since the CRS already requires them to be notified annually for Activity 320 Map Information Service.

Mr. Stroud asked Town Staff to update this listing of areas subject to localized stormwater flooding to account for any improvements to the drainage system which may have improved the situation.

Area	Street Name or Intersection
1	Sterling Dr and SW 93 St
2	Parcels between SW 195 St and SW 196 St
3	The parcels bordered by Caribbean Blvd, Anchor Rd, Pan American Dr and Blue Water Rd
4	Manta Drive at Old Cutler Rd
5	Old Cutler Rd southwest of the intersection of Franjo Rd
6	The intersection of SW 89 Ct, Franjo Rd and SW 200 St
7	The intersection of SW 186 th St. and 82 nd Avenue.
8	SW 77 Ave and SW 188 St through the intersection of SW 78 Ave
9	SW 79 Ave at SW 79 Ct
10	SW 197 Terrace at SW 196 Terrace
11	SW 84 Ave at SW 199 Terrace
12	SW 212 St between SW 85 Ave and SW 87 Ave
13	SW 92 Ave between Old Cutler Road and SW 208 St
14	SW 24 Terrace between SW 97 Ct and SW 97 Pl
15	SW 216 St between SW 97 Ave and SW 98 Ct
16	SW 97 Ave between SW 219 St and SW 224 St
17	The quadrant of parcels bordered by SW 97 Ave, SW 221 Street/Terrace, SW 99 Pl and SW 224 St
18	The intersection of SW 92 Ave/SW 93 Path and SW 216 St
19	Parcels between SW 216 St and the eastern portion of SW 215 Terrace
20	SW 216 St between SW 87 Pl and SW 88 Pl

Mr. Stroud discuss the 6 primary topics that must be covered in outreach projects along with the 4 additional topics a community can also get credit for having a PPI. Mr. Stroud suggested the additional topic of “Beware of other Hazards – Sinkholes” be changed to Reduce Stormwater Runoff – LID Techniques to fit more in line with the primary flooding problem in the town.

The next work for the FMPC is to look at the existing projects and decide if they should be deleted, revised or carried forward to the 2020 update of the PPI.



Mr. Stroud went on to explain the process that was followed to develop the goals and objectives in the 2015 plan. Part of the goal development then asked two questions. One, “What would you like to see in Cutler Bay’s Future,” and Two, “What should be the goals of the Mitigation Program.” The goals of the 2015 plan are listed below:

Existing Goals and Objectives (2015 Plan)

- **Goal 1:** Protect the health, safety and welfare of the citizens of Cutler Bay from the effects of flooding
- **Goal 2:** Promote a public education program to encourage residents to undertake mitigation measures that reduce the effects of flood damage on private property
- **Goal 3:** Protect critical and essential facilities from flood damage
- **Goal 4:** Reduce the number of repetitively flooded structures

Mr. Stroud indicated that he would propose some revised goals for the FMPC to consider. Below are proposed goals to review and comment on:

Goal 1: Protect the public health, life, safety and welfare by increasing public awareness and education of the flood hazard by encouraging collective and individual responsibility for mitigating the flood risk.

Goal 2: Improve technical capability (including administrative resources, tools, data and equipment) to implement hazard mitigation and respond to flood events.

Goal 3: Minimize the flood threat to life and property by protecting vulnerable populations and buildings and critical facilities through the implementation of cost-effective and technically feasible mitigation actions.

Goal 4: Incorporate resiliency into future growth by ensuring that flood risk is considered for both new development and post-disaster redevelopment and recovery.

End of meeting.



TOWN OF CUTLER BAY
August 11, 2020 Floodplain Mitigation Community Meeting

SIGN-IN SHEET
PLEASE PRINT CLEARLY.

<u>NAME</u>
Janice Rowton
Luis Badillo
Jorge Acevedo
Danielle Maschinot
Bruce Foerster
Maria Herrera-Mendoza
Yenier Vega
Alfredo Quintero
David Stroud



FMPC Meeting 3: October 22, 2020



Cutler Bay, FL Floodplain Mitigation Plan

Flood Mitigation Planning Committee Meeting Agenda

Thursday, October 22, 2020, 5:30-6:30 p.m.

Held at Town of Cutler Bay, 2nd Floor Conference Room 220, 10720 Caribbean Boulevard
Cutler Bay, FL 33189 (Via Adobe Connect)

1. Floodplain Management Plan (FMP)
 - a. Review the Hazard Identification & Risk Assessment (HIRA)
 - i. Identified Hazards
 - ii. Past Events
 - iii. Asset Inventory
 - iv. PRI Methodology
 - v. Hazard Profiles
 - b. Finalize Goals & Objectives
2. Program for Public Information
 - a. Review & Update Outreach Projects
3. Questions
4. Adjourn



Cutler Bay, FL Floodplain Mitigation Plan

Flood Mitigation Planning Committee Meeting Minutes

Thursday, October 22, 2020, 5:30-6:30 p.m.

Held at Town of Cutler Bay, 2nd Floor Conference Room 220, 10720 Caribbean Boulevard
Cutler Bay, FL 33189 (via Adobe Connect)

For this meeting, members of the Floodplain Management Planning Committee (FMPC) met via Adobe Connect to review the findings of the updated Hazard Identification & Risk Assessment and finalize the plan goals. There were nine participants in attendance: Alfredo Quintero, Yenier Vega, Bruce Foerster, Janice Rowton, Luis Badillo, Jorge Acevedo, Danielle Maschinot, Michael Callahan, and Maria Herrera-Mendoza.

David Stroud, the Town's planning consultant from Wood, facilitated the meeting, beginning with a summary of the HIRA findings. The summary PRI scores for the hazards are shown below:

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Climate Change and Sea Level Rise	Highly Likely	Critical	Moderate	More than 24 hrs	More than 1 week	3.2
Coastal/Canal Bank Erosion	Likely	Minor	Small	More than 24 hrs	More than 1 week	2.1
Dam/Levee Failure	Unlikely	Limited	Small	6 to 12 hours	Less than 1 week	1.9
Flood: 100-/500-year	Likely	Catastrophic	Moderate	Less than 6 hours	Less than 1 week	3.4
Flood: Stormwater/Localized	Highly Likely	Critical	Small	Less than 6 hours	Less than 24 hours	3.1
Hurricane and Tropical Storm	Highly Likely	Catastrophic	Large	More than 24 hrs	Less than 1 week	3.6

Hazard priority ratings are based on the Priority Risk Index (PRI) methodology, which rates each hazard on five weighted criteria to produce an overall score, allowing hazards to be ranked.

David reviewed a summary of past events from the NCEI Storm Event database and FEMA's Disaster Declarations. He also reviewed the asset inventory of the Town's exposed property and critical facilities based on parcel data and GIS data from Miami-Dade County. He then highlighted findings within each of the hazard profiles to explain how the PRI scores were determined and provide more detail on the risks and vulnerabilities associated with each hazard. This was an opportunity for FMPC members to review the hazards and provide feedback regarding any additional data or necessary revisions. Below are highlights on each of the profiled hazards:

- Climate Change & Sea Level Rise:



- in the short term (2040) the region is projected to experience 10-17 inches of rise above 2000 mean sea level
 - Cutler Bay has a High Coastal Vulnerability Index per NOAA
 - 1 foot of inundation impacts approximately 712 homes, 1,694 people, and \$169m
- Coastal/Canal Bank Erosion:
 - No coastal erosion reported by FDEP Critically Eroded Beaches Report
 - Cutler Bay coast is protected by Biscayne National Park
- Dam/Levee Failure:
 - 35 dams in Miami-Dade County, none in Cutler Bay
 - No data on inundation areas available
 - 2 levees (L-31 East & L-31 North) protect portions of Cutler Bay
- 100-/500-year Flood:
 - 74.5% of Town is within SFHA
 - An estimated \$279m in damages would result from a 1% annual chance flood which equates to a 13% loss ratio
 - 65 critical facilities located in SFHA;
 - Flood insurance coverage exceeds loss estimate, but many properties are uninsured
- Stormwater/Localized Flooding:
 - 13 localized flooding areas identified
 - 8 areas from previous list have been mitigated
- Hurricane/Tropical Storm:
 - 58 events reported by NCEI across 28 separate days from 1996-2020, causing \$253,722,000 and 10 deaths
 - Miami-Dade County has received 6 major disaster declarations for hurricane/tropical storm
 - Nearly all of Cutler Bay is estimated to be impacted by storm surge Category 3
 - \$3,169,654,470 in buildings and contents value is exposed to Category 3 estimated surge, 89 critical facilities are exposed to Category 3 estimated surge

David also reviewed the proposed plan goals, which were approved by the FMPC. The plan goals are as follows:

- **Goal 1:** Protect the public health, life, safety and welfare by increasing public awareness and education of the flood hazard by encouraging collective and individual responsibility for mitigating the flood risk.
- **Goal 2:** Improve technical capability (including administrative resources, tools, data and equipment) to implement hazard mitigation and respond to flood events.
- **Goal 3:** Minimize the flood threat to life and property by protecting vulnerable populations and buildings and critical facilities through the implementation of cost-effective and technically feasible mitigation actions.
- **Goal 4:** Incorporate resiliency into future growth by ensuring that flood risk is considered for both new development and post-disaster redevelopment and recovery.



Finally, David concluded with a review of the PPI Outreach projects from the 2015 PPI and explained that the FMPC needs to identify whether each project should be carried forward, revised, or deleted.

End of meeting.



TOWN OF CUTLER BAY
October 22, 2020 Floodplain Mitigation Community Meeting

SIGN-IN SHEET
PLEASE PRINT CLEARLY.

<u>NAME</u>
Michael Callahan
Janice Rowton
Luis Badillo
Jorge Acevedo
Danielle Maschinot
Bruce Foerster
Maria Herrera-Mendoza
Yenier Vega
Alfredo Quintero
David Stroud



FMPC Meeting 4: May 18, 2021



Cutler Bay, FL Floodplain Mitigation Plan

Flood Mitigation Planning Committee Meeting Agenda

Tuesday, May 19, 2021, 5:30-6:30 p.m.

Held at Town of Cutler Bay, 2nd Floor Conference Room 220, 10720 Caribbean Boulevard
Cutler Bay, FL 33189 (Via Zoom)

1. Floodplain Management Plan (FMP)
 - a. Review the Organization of the Plan
 - b. Review Key Plan Components
 - i. Hazard & Priority Risk Index
 - ii. Goals & Objectives
 - iii. Mitigation Action Plan
 - c. Plan Implementation and Maintenance
2. Program for Public Information
 - a. Review Target Areas & Audiences
 - b. Review Outreach Projects
3. Questions
4. Adjourn



Cutler Bay, FL Floodplain Mitigation Plan

Flood Mitigation Planning Committee Meeting Minutes

Tuesday, May 19, 2021, 5:30-6:30 p.m.

Held at Town of Cutler Bay, 2nd Floor Conference Room 220, 10720 Caribbean Boulevard
Cutler Bay, FL 33189 & Zoom Video Conference Call

For this meeting, members of the Floodplain Management Planning Committee (FMPC) met in person in the Town of Cutler Bay and the Wood consultants joined the meeting via Zoom to provide an overview of the final Floodplain Mitigation Plan and Program for Public Information. There were ten participants in attendance: Alfredo Quintero, Yenier Vega, Maria Herrera-Mendoza, Janice Rowton, Jorge Acevedo, Damien Cuesta, Martha Pantin, Luis Badillo, Julian Perez, and Vince Seijas.

To begin the meeting, Yenier provided the committee with an update on the progress made on the 18 existing mitigation actions from the 2015 Floodplain Mitigation Plan (FMP).

Following this update, David Stroud and Abby Moore, the Town's planning consultants from Wood, facilitated the meeting according to the following agenda:

- Floodplain Management Plan
 - Review the Organization of the Plan
 - Review Key Plan Components
 - Hazard & Priority Risk Index
 - Goals & Objectives
 - Mitigation Action Plan
 - Plan Implementation and Maintenance
- Program for Public Information
 - Review Target Areas & Audiences
 - Review Outreach Projects

David reviewed a summary of past events from the NCEI Storm Event database and FEMA's Disaster Declarations. He also reviewed the asset inventory of the Town's exposed property and critical facilities based on parcel data and GIS data from Miami-Dade County. He then highlighted findings within each of the hazard profiles to explain how the PRI scores were determined and provide more detail on the risks and vulnerabilities associated with each hazard. This was an opportunity for FMPC members to review the hazards and provide feedback regarding any additional data or necessary revisions. Below are highlights on each of the profiled hazards:

- Climate Change & Sea Level Rise:
 - in the short term (2040) the region is projected to experience 10-17 inches of rise above 2000 mean sea level
 - Cutler Bay has a High Coastal Vulnerability Index per NOAA
 - 1 foot of inundation impacts approximately 712 homes, 1,694 people, and \$169m
- Coastal/Canal Bank Erosion:
 - No coastal erosion reported by FDEP Critically Eroded Beaches Report

- Cutler Bay coast is protected by Biscayne National Park
- Dam/Levee Failure:
 - 35 dams in Miami-Dade County, none in Cutler Bay
 - No data on inundation areas available
 - 2 levees (L-31 East & L-31 North) protect portions of Cutler Bay
- 100-/500-year Flood:
 - 74.5% of Town is within SFHA
 - An estimated \$279m in damages would result from a 1% annual chance flood which equates to a 13% loss ratio
 - 65 critical facilities located in SFHA;
 - Flood insurance coverage exceeds loss estimate, but many properties are uninsured
- Stormwater/Localized Flooding:
 - 13 localized flooding areas identified
 - 8 areas from previous list have been mitigated
- Hurricane/Tropical Storm:
 - 58 events reported by NCEI across 28 separate days from 1996-2020, causing \$253,722,000 and 10 deaths
 - Miami-Dade County has received 6 major disaster declarations for hurricane/tropical storm
 - Nearly all of Cutler Bay is estimated to be impacted by storm surge Category 3
 - \$3,169,654,470 in buildings and contents value is exposed to Category 3 estimated surge, 89 critical facilities are exposed to Category 3 estimated surge

David also reviewed the proposed plan goals, which were approved by the FMPC. The plan goals are as follows:

- **Goal 1:** Protect the public health, life, safety and welfare by increasing public awareness and education of the flood hazard by encouraging collective and individual responsibility for mitigating the flood risk.
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- **Goal 4:** Incorporate resiliency into future growth by ensuring that flood risk is considered for both new development and post-disaster redevelopment and recovery.

Finally, David concluded with a review of the PPI Target Areas and Audiences as well as the Outreach projects from the 2015 PPI. David explained that the FMPC needs to identify whether each project should be carried forward, revised, or deleted.

End of meeting.



TOWN OF CUTLER BAY
May 18, 2021 Floodplain Mitigation Plan Advisory Committee Meeting
SIGN-IN SHEET
 PLEASE PRINT CLEARLY

COMMITTEE MEMBER NAME		NEXT MEETING DATE IS: AUGUST 10, 2021 IN ORDER TO DETERMINE WHETHER THERE WILL BE A QUORUM AT THE NEXT MEETING, PLEASE INDICATE IF YOU PLAN TO ATTEND BY MARKING Y/N NEXT TO YOUR NAME. THANK YOU.	
JORGE ACEVEDO		N	*
Janice Rowton		Y	*
DAMIAN GUESTA		Y	
ALFREDO QUINTANA, TOWN OF CUTLER BAY		Y	
YENIER VELA TOWN OF CUTLER BAY		Y	
MARLYN PARRON City of Coral Gables			
LUIS A. BASILLO		Y	*
JULIAN H. PEREZ, City of Coral Gables		Y	
MARIA HERRERA-MENDOZA Town of Cutler Bay		Y	

NOTE TO COMMITTEE CHAIRMAN/LIAISON:
 PLEASE RETURN THIS SIGN-IN SHEET TO THE TOWN CLERK AT THE END OF THE MEETING. THANK YOU.



TOWN OF CUTLER BAY
May 18, 2021 Floodplain Mitigation Plan Advisory Committee Meeting

SIGN-IN SHEET
PLEASE PRINT CLEARLY

COMMITTEE MEMBER NAME	NEXT MEETING DATE IS: AUGUST 10, 2021 IN ORDER TO DETERMINE WHETHER THERE WILL BE A QUORUM AT THE NEXT MEETING, PLEASE INDICATE IF YOU PLAN TO ATTEND BY MARKING Y/N NEXT TO YOUR NAME. THANK YOU.
VINIE SETIAS	
MIMI-DUDE PER	

NOTE TO COMMITTEE CHAIRMAN/LIAISON:
 PLEASE RETURN THIS SIGN-IN SHEET TO THE TOWN CLERK AT THE END OF THE MEETING. THANK YOU.


**B.2 PLANNING STEP 2: INVOLVE THE PUBLIC****Table B.2 – Public Meetings**

Meeting Type	Meeting Topic	Meeting Date	Meeting Locations
Public Meeting #1	1) Introduction to DMA, CRS and the planning process 2) Overview of Program for Public Information (PPI)	February 25, 2020 7:00pm	Town of Cutler Bay, 2nd Floor Conference Room 220
Public Meeting #2	1) Review of the draft plan	June 3, 2021 5:00pm	Zoom Video Conference Call




B.2.1 Public Meeting Attendance Records

Public Meeting 1: February 25, 2020



TOWN OF CUTLER BAY
February 25, 2020 Floodplain Mitigation Community Meeting
SIGN-IN SHEET
PLEASE PRINT CLEARLY.

<u>NAME</u>	<u>PHONE NUMBER</u>
ALFRED QUINIERA - TOWN OF CUTLER BAY	305 234-4262
JENIER VEGA - TOWN OF CUTLER BAY	305-898-5329
DEGREE DURASTA	




TOWN OF
CUTLER BAY


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[Home](#) | [Town Council](#) | [Departments](#) | [Online Services](#) | [Your Community](#) | [How Do I?](#) | [Contact Us](#)

Calendar Month View

Floodplain Mitigation Committee AND Community Meetings
Kick-off Meeting to Update the Town's Floodplain Mitigation Plan
 Date: 02/25/2020 5:30 PM
 Location: Town Hall Community Room, Suite 220
 10720 Caribbean Blvd., Suite 220
 Cutler Bay, Florida 33189

 Add to my Calendar



PUBLIC WORKS

Public Involvement Meeting

FLOODPLAIN MITIGATION ADVISORY COMMITTEE (FMAC) KICK-OFF MEETING TO UPDATE THE TOWN'S FLOODPLAIN MITIGATION PLAN




TUESDAY, FEBRUARY 25, 2020
 5:30 PM - FMAC MEETING
 7:00 PM - COMMUNITY MEETING

CUTLER BAY TOWN CENTER | COMMUNITY ROOM
 10720 CARIBBEAN BLVD, SUITE 220, CUTLER BAY, FL

We want to hear from you! Join the conversation about the Town's 2015 Floodplain Mitigation Plan and learn about our planning process!

The Town of Cutler Bay is a participant in FEMA's National Flood Insurance Program (NFIP) Community Rating System (CRS) program. The CRS program rewards communities that go above and beyond the minimum requirements of the NFIP with flood insurance premium discounts. As part of this voluntary program, the Town has achieved one of the highest ratings in the country and policy holders in the Town receive a **30% discount** each year on the cost of flood insurance.

For more information, please contact the Town's Public Works Department at (305) 234-4262.




We want to hear from you! Join the conversation about the [Town's 2015 Floodplain Mitigation Plan](#) and learn about our planning process!

- 5:30 p.m.: Floodplain Mitigation Advisory Committee Meeting
- 7:00 p.m.: Community Meeting

The Town of Cutler Bay is a participant in FEMA's National Flood Insurance Program (NFIP) Community Rating System (CRS) program. The CRS program rewards communities that go above and beyond the minimum requirements of the NFIP with flood insurance premium discounts. As part of this voluntary program, the Town has achieved one of the highest ratings in the country and policy holders in the Town receive a 30% discount each year on the cost of flood insurance.

For more information, please contact our Public Works Department at (305) 234-4262.

Town of Cutler Bay
 10720 Caribbean Blvd., Suite 105
 Cutler Bay, FL 33189

[Return to full list >>](#)

22SE

Tropical Life

NEIGHBORS

SUNDAY FEBRUARY 16 2020
MIAMIHERALD.COM


February 22 & 23, 2020

36TH ANNUAL
South Miami Rotary
ART Festival

- Free Admission • Fine Arts & Crafts
- 122 Top Artists • Ample Parking
 - Dog Comfort Station
 - Multi-ethnic Food Court
 - Live Music • Beer Garden


Saturday, 10 am - 6 pm
Sunday, 10 am - 5 pm
southmiamiartfest.org

 With the support of the Miami-Dade County Department of Cultural Affairs and the Cultural Affairs Council, Miami-Dade County Mayor and Board of County Commissioners

Sunset Drive
 Between US 1 & Red Road
 Across US 1 from Metrorail







**FLOODPLAIN MITIGATION PLAN
NOTICE OF PUBLIC MEETING**

The Town of Cutler Bay will hold a public meeting of the Floodplain Mitigation Advisory Committee on **Tuesday, February 25, 2020 at 5:30 PM** in the Cutler Bay Town Center Community Room, 10720 Caribbean Blvd, Suite 220, Cutler Bay, FL 33189.

The Committee meeting will be followed at 7:00 PM by a Community Meeting to discuss updates to the Town's adopted 2015 Floodplain Mitigation Plan and to inform property owners how to save on your flood insurance policies. The Town has achieved a Community Rating System Class 4 Rating. This program rewards communities with flood insurance premium discounts for going above and beyond the minimum requirements of the National Flood Insurance Program.

Effective October 1, 2019, all flood insurance policy holders within the Town of Cutler Bay are eligible to receive a thirty percent (30%) discount each year on the cost of flood insurance.

In accordance with the Americans with Disabilities Act of 1990 (ADA), persons needing special accommodations to participate in these proceedings should contact the Town Clerk's Office for assistance at (305) 234-4262, no later than four (4) business days prior to such proceeding.

Debra E. Eastman, MMC
Town Clerk

Luis Galindo's
LATIN#3
AMERICAN
 CAFETERIA - RESTAURANT

The same quality & tradition as the Latin American of 57th Avenue

BREAKFAST SPECIAL
 7am-NOON Monday-Friday \$5.15
 7am-NOON Saturday-Sunday \$6.15
 2 Fried or Scrambled Eggs;
 Ham, Bacon or Sausage;
 Potatoes or Grits;
 Toast and Coffee

DAILY LUNCH SPECIALS

WE CATER
 Special Prices for Parties!

NEW ADMINISTRATION
 Owners of 57th Avenue are BACK!!

Open 7AM-11PM
9606 SW 72 Street (Sunset Drive) 305.270.1017

DISCOUNTS TO: UNIFORMED POLICE OFFICERS (25%)

All major credit cards accepted-
 including Primecard



PUBLIC WORKS

Public Involvement Meeting

FLOODPLAIN MITIGATION ADVISORY COMMITTEE (FMAC) KICK-OFF MEETING TO UPDATE THE TOWN'S FLOODPLAIN MITIGATION PLAN

TUESDAY, FEBRUARY 25, 2020

5:30 PM - FMAC MEETING

7:00 PM - COMMUNITY MEETING

CUTLER BAY TOWN CENTER | COMMUNITY ROOM

10720 CARIBBEAN BLVD, SUITE 220, CUTLER BAY, FL

We want to hear from you! Join the conversation about the Town's 2015 Floodplain Mitigation Plan and learn about our planning process!

The Town of Cutler Bay is a participant in FEMA's National Flood Insurance Program (NFIP) Community Rating System (CRS) program. The CRS program rewards communities that go above and beyond the minimum requirements of the NFIP with flood insurance premium discounts. As part of this voluntary program, the Town has achieved one the highest ratings in the country and policy holders in the Town receive a **30% discount** each year on the cost of flood insurance.

For more information, please contact the Town's Public Works Department at (305) 234-4262.





Public Meeting 2: June 3, 2021

 TOWN OF CUTLER BAY June 3, 2021 Floodplain Mitigation Public Involvement Meeting	
<u>SIGN-IN SHEET</u> <u>PLEASE PRINT CLEARLY.</u>	
<u>NAME</u>	
Michael Callahan	
Suzy Lord	
Desiree Ducasa	
Francesca Zito	
Damian Cuesta	
Maria Herrera-Mendoza	
Yenier Vega	
Alfredo Quintero	
David Stroud	

SUNDAY MAY 30 2021

| NEIGHBORS

| TIME

CITY OF MIAMI BEACH COMMISSION BUDGET WORKSHOP

JUNE 4, 2021 AT 8:30 A.M.

NOTICE IS HEREBY given that the Mayor and Commissioners of the City of Miami Beach will host a Commission Budget Workshop on **June 4, 2021 at 8:30 a.m.** During Commission Budget Workshop, the City Commission and staff will be physically present in a socially distanced manner at the Miami Beach Convention Center, Room To Be Determined*, 1901 Convention Center Drive, Miami Beach, FL 33139. Members of the public who wish to attend the Commission Budget Workshop or provide public comment in person may appear at the Miami Beach Convention Center. Members of the public are required to wear facial coverings and observe social distancing, consistent with CDC guidance to limit the spread of COVID-19.

*Please email or call Francis Frances at FrancisFrances@miamibeachfl.gov or 305.673.7000 X 26788 for room location.

The public may submit written comments by sending an email to CityClerk@miamibeachfl.gov. Emails received will be forwarded to the Mayor and Commissioners and will be included as a part of the Workshop record.

Copies of Commission Budget Workshop Agenda Items are available for public inspection at: <https://www.miamibeachfl.gov/city-hall/city-clerk/agenda-archive-main-page-2/> or during normal business hours in the Office of the City Clerk, 1700 Convention Center Drive, 1st Floor, City Hall, Miami Beach, Florida 33139.

This Workshop, or any item therein, may be continued, and under such circumstances, additional legal notice need not be provided.

To request this material in alternate format, sign language interpreter (five-day notice required), information on access for persons with disabilities, and/or any accommodation to review any document or participate in any City-sponsored proceedings, call 305.604.2489 and select option 6; TTY users may call via 711 (Florida Relay Service).

MIAMI BEACH

Rafael E. Granado, City Clerk
City of Miami Beach
CityClerk@miamibeachfl.gov
305.673.7411

Ad 06042021-01



FLOODPLAIN MITIGATION PLAN NOTICE OF PUBLIC MEETING

THURSDAY, JUNE 3, 2021 AT 5:30 PM

The Town of Cutler Bay will hold a public involvement meeting of the Floodplain Mitigation Advisory Committee through the use of Zoom communications media technology platform. Members of the public may access the meeting virtually following these instructions.

TO WATCH OR LISTEN TO THE VIRTUAL PUBLIC MEETING:

- The meeting is accessible to the public live via web link:
<https://zoom.us/j/94957359234>
Enter the **Meeting ID:** 949 5735 9234
- You may listen to the meeting via telephone by dialing
786-635-1003


If you cannot attend via Zoom Communications media technology OR have questions regarding the meeting procedure, please email mmelinu@cutlerbay-fl.gov by 1:00 pm on Thursday June 3, 2021.

In accordance with the Americans with Disabilities (ADA), persons needing reasonable special accommodations to participate in these proceedings should contact the Town Clerk for assistance at (305) 234-4262 no later than four days prior to the meeting.

This meeting will be recorded and available to the public post meeting. Persons wishing to appeal any decision made by the Board with respect to any matter considered will need a record of the proceedings and for such purpose may need to ensure that a verbatim record of the proceedings is made, which includes the testimony and evidence upon which the appeal is based.

Mauricio Melinu
Interim Town Clerk

3



THURSDAY, JUNE 3, 2021 AT 5:30 PM EDT

Floodplain Mitigation Plan Advisory Committee Meeting

Online Event

Go To Link
Insights
Boost Event

About
Discussion

Invite
Edit
Share
More

Details

2 people responded

Event by Town of Cutler Bay

Online: zoom.us

Thursday, June 3, 2021 at 5:30 PM EDT

Price: Free

Public · Anyone on or off Facebook

Cutler Bay residents and businesses are invited to attend this virtual public meeting that has been scheduled to review the draft floodplain management plan, which must be updated every 5 years. The meeting will include a review of the planning process, hazard identification and risk assessment, mitigation projects and implementation procedures.

The meeting will be held on Zoom and you may participate as follows:

To watch or listen to the virtual public meeting:

- Web link: <https://zoom.us/j/94957359234>
- Zoom Meeting ID: 949 5735 9234
- Call (786) 635-1003

Add a Few Final Details

0 of 3 steps completed
✕

Completing this list could help your event attract more guests.

Share Event

Start Discussion

Link a Group

Insights

Last 7 Days: May 21 - May 28



✓ **Town of Cutler Bay**

Public Information Officer Desiree D • Just now



Virtual Floodplain Mitigation Plan Meeting on Thursday, June 3, at 5:30 p.m.

Join our virtual Floodplain Mitigation Plan meeting on Thursday, June 3, at 5:30 p.m. to learn about what the Town is doing to mitigate the risk of flooding and how you can reduce your risk.

During this virtual public meeting the draft floodplain management plan will be reviewed—which must be updated every 5 years. The meeting will include a review of the planning process, hazard identification and risk assessment, mitigation projects and implementation procedures.

The meeting will be held on Zoom you may participate as follows:

To watch or listen to the virtual public meeting:


- Web link: <https://zoom.us/j/94957359234>
- Zoom Meeting ID: 949 5735 9234
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If you cannot attend via Zoom Communications media technology OR have questions regarding the meeting procedure, please email mmelinu@cutlerbay-fl.gov by 1:00 pm on Thursday June 3, 2021.

B.2.2 Other Public Outreach Efforts


Table B.3 – Public Outreach Efforts

Project/Event	Message	Frequency
Cutler Bay Website	Flood Awareness Webpage	Continuous
Cutler Bay Website	Meeting Announcements and Calendar	Monthly
Newspaper Ad	Plan Update Information and Meeting Announcement	Feb. 2020
Public Works Flyer	Plan Update Information and Meeting Announcement	Feb. 2020
Cutler Bay Website	Announcement about the plan update and survey, with web link to online survey inviting public input in the plan update	Dec 2020
Press Release	Announcement about the plan update and public survey	Dec. 2020
Online Public Survey	Public input requested via online survey	Dec. 2020 – Apr. 2021



TOWN OF CUTLER BAY

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[Government](#)
[Departments](#)
[Services](#)
[Business](#)


[Select Language](#)

Public Works

- Flood Awareness
- Florida City Gas Projects
- Florida Department of Transportation (FDOT)
- Garbage Trash and Recycling
- Miami-Dade Water and Sewer
- Public Works FAQ
- Stormwater Utility
- Town Improvement Projects
- Town Transportation

Flood Awareness

ARE YOU PREPARED FOR A FLOOD IN YOUR NEIGHBORHOOD?

Many properties in Cutler Bay are located in or near a flood-prone area. Take a few moments to learn how to prepare and protect yourself and your home from the risk of flooding through the information provided below:

Sources of Flooding in the Town of Cutler Bay, Florida:

The Town of Cutler Bay is located in very close proximity to Biscayne Bay and the Atlantic Ocean. Flooding in the Town can be attributed to three sources:

1. Tidal flooding and storm surge resulting from hurricanes and tropical storms
2. Flash flooding resulting from heavy rainfall that overburdens the drainage system within the Town
3. Riverine flooding resulting from heavy and prolonged rainfall which causes the capacity of canals and stream channels to be exceeded. Being prepared is your best defense against a flood

[Here are 11 steps to help you prepare for a flood.](#)

Step 1: Know Your Flood Hazard

Regulated floodplains are illustrated on inundation maps called Flood Insurance Rate Maps (FIRMs). It is the official map for a community on which FEMA has delineated both the Special Flood Hazard Areas (SFHAs) and the risk premium zones applicable to the community. SFHAs represent the areas subject to inundation by the 1-percent-annual chance flood event. Structures located within the SFHA have a 26-percent chance of flooding during the life of a standard 30-year mortgage. FEMA FIRM maps are available for free public viewing online at msc.fema.gov/portal. Also, upon request, the Public Works Department at (305) 234-4262, will make free flood zone determinations for properties located within the Town. It is critical to note that properties located outside of the SFHA are not guaranteed to be safe from flooding.


Step 2: Insure Your Property


Flooding is not covered by a standard homeowner's insurance policy. Flood insurance is available to homeowners, condo owners, commercial owners, and all renters. Renters are encouraged to purchase flood insurance for their contents. Note that there is a 30-day waiting period before coverage goes into effect. That means now is the best time to buy flood insurance. Contact your preferred insurance agency for more information. Additional information can be found online at www.floodsmart.gov or by calling 1-888-379-9531.

The Town has been keeping Elevation Certificates on file for new construction and substantially improved buildings since 2006. To find out if your property is in a flood zone, to request the Elevation Certificate we may have on file, and for other flood protection information, please call the Town's Public Works Department at (305) 234-4262.

Step 3: Protect Yourself and Your Family

- Should a storm threaten South Florida, the Town of Cutler Bay will update this website based on advisories from the Miami-Dade County Office of Emergency Management
- Tune-in to local radio stations such as WIOD (610 AM) or WBGG (105.9 FM) and television channels 4, 7 and 10
- All hazard NOAA Weather Radios (NWR) are available for purchase in local electronic retail or department stores and





TOWN OF CUTLER BAY

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Floodplain Mitigation Plan Advisory Committee


[Communities for a Lifetime Committee](#)
[Economic Growth Committee](#)
[Education Advisory Committee](#)
[Environmental Task Force](#)
[Floodplain Mitigation Plan Advisory Committee](#)
[Parks and Recreation Advisory Committee](#)
[Youth Council Committee](#)

UPCOMING EVENTS

Floodplain Mitigation Plan Advisory Committee Meeting
05/18/2021 - 5:30pm

Floodplain Mitigation Plan Advisory Committee Meeting
08/10/2021 - 5:30pm

Floodplain Mitigation Plan Advisory Committee



The purpose of the Floodplain Mitigation Plan Advisory Committee is to promote the public health, safety and welfare of Town residents while minimizing public and private losses due to flood conditions. The Floodplain Mitigation Plan Advisory Committee assisted the Town in the development of the Flood Mitigation Plan adopted via Resolution #15-27 on May 20, 2015. This committee continues to meet as needed to monitor the implementation of the Flood Mitigation Plan (Resolution #13-56).

The Floodplain Mitigation Plan Advisory Committee is made up of the following:

Voting Members:


- Local Residents: Two (2) members - residing in the Special Flood Hazardous Area (SFHA)
- Local Business: One (1) member - a business active in the community
- Insurance Agent: One (1) member - services the NEIR insurance

CONTACT INFORMATION

Cutler Bay Town Hall
10720 Caribbean Boulevard
Cutler Bay, FL 33189

Phone: (305) 234-4262
Fax: (305) 234-4251
Email: info@cutlerbay-fl.gov

[View Full Contact Details](#)





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Public Works

- Flood Awareness
- Florida City Gas Projects
- Florida Department of Transportation (FDOT)
- Garbage Trash and Recycling
- Miami-Dade Water and Sewer
- Public Works FAQ
- Stormwater Utility
- Town Improvement Projects
- Town Transportation

Cutler Bay Seeks Public Input to Update Town's Floodplain Management Plan

Cutler Bay, FL (December 4, 2020)—In order to update its Floodplain Management Plan (FMP), a process required for the participation in FEMA's Community Rating System (CRS) Program, the Town of Cutler Bay is requesting the input of its residents by completing the Floodplain Management Plan survey.

By participating in this survey, businesses, organizations, and residents will help the Town continue improving mitigation strategies, identify flooding concerns and help keep the Town's reputable CRS Class 4 status.

The Town became a CRS Class 4 in October of 2019, an achievement that benefits Cutler Bay flood insurance policy holders by providing a 30% discount on their premiums—a yearly average savings of \$243 per flood insurance policy or \$1,823,789 savings Town-wide. The Town became the first municipality in Broward, Miami-Dade and Monroe Counties to reach Class 4 and only the third municipality in Florida to do so.

"Reaching the distinguished CRS Class 4 rating has been made possible through feedback from our residents as well as the collective efforts of our Town Council, Floodplain Mitigation Plan Advisory Committee, and Town staff who used that feedback to construct this plan," stated Town Manager Rafael Casals. "We want to continue improving our flood mitigation efforts—so we are urging our residents to give us their input. Completing this survey should only take a few minutes and the valuable information gathered from it will help keep our CRS Class 4 rating and improve our Floodplain Management Plan."

Every five years the FMP must be updated to evaluate the flooding problems and come up with mitigation strategies and projects for addressing those identified problems—whether flooding from heavy rainfall and inadequate drainage, to coastal storms and Hurricanes.

The information from the surveys will be analyzed and incorporated into the updated FMP and will help create mitigation projects for the next five years. The public is invited to participate in this online survey by visiting: <http://ow.ly/S8Wo50CDj1q>

For more information on this plan update and the questionnaire, please contact the Town's Public Works Director, Alfredo Quintero, at (305) 234-4262 or aquintero@cutlerbay-fl.gov.

CONTACT INFORMATION

Cutler Bay Town Hall - Suite 105
10720 Caribbean Boulevard
Cutler Bay, FL 33189

Phone: (305) 234-4262
Fax: (305) 234-4251

Hours
Monday - Friday
8:00 AM - 5:00 PM (excluding holidays)

[View Full Contact Details](#)

**PRESS RELEASE**

For immediate release
Contact: Rafael Casals
(305) 234-4262



December 3, 2020

Cutler Bay Seeks Public Input to Update Town's Floodplain Management Plan

Cutler Bay, FL (December 3, 2020)—In the process of updating its Floodplain Management Plan (FMP) as part of participation in FEMA's Community Rating System (CRS) Program, the Town of Cutler Bay is requesting the input of its residents by completing the [Floodplain Management Plan survey](#).

By participating in this survey, businesses, organizations, and residents will help the Town continue improving mitigation strategies, identify flooding concerns and help keep the Town's reputable CRS Class 4 status.

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The information from the surveys will be analyzed and incorporated into the updated FMP and will help create mitigation projects for the next five years. The public is invited to participate in this online survey by visiting: <http://shorturl.at/vxKXY>

For more information on this plan update and the questionnaire, please contact the Town's Public Works Director, Alfredo Quintero, at (305) 234-4262 or aquintero@cutlerbay-fl.gov

TOWN OF CUTLER BAY | 10720 Caribbean Boulevard, Suite 105 | Cutler Bay, FL 33189
(305) 234-4262 | www.cutlerbay-fl.gov | Facebook, Instagram, Twitter: @townofcutlerbay



Cutler Bay FMP Survey

1. Have you ever experienced or been impacted by high water or flooding in the Town of Cutler Bay?

☐ Yes

☐ No

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

☐ Extremely concerned

☐ Somewhat concerned

☐ Not concerned

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

☐ Yes

☐ No

☐ I don't know

4. Do you have flood insurance for your home/personal property?

☐ Yes

☐ No

☐ I don't know

5. If you answered "No" to question 4, why not?

☐ My home is not in a floodplain

☐ I rent

☐ I never really considered it

☐ It's too expensive

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

☐ I don't need it because it never floods

☐ Other



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

☐ Yes

☐ No

7. If you answered "Yes" to question 6, please explain what actions you've taken.

Enter your answer

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

☐ Yes

☐ No

9. What is the most effective way for you to receive information about how to make your home or neighborhood more resistant to flood damage?

☐ Newspaper

☐ Televisions advertising or programs

☐ Radio advertising or programs

☐ Public workshops/meetings

☐ School meetings

☐ Mail

☐ Email

☐ Text message

☐ Town website

☐ Town social media

☐ Other

10. What are some steps your local government could take to reduce the risk of flooding in your neighborhood?

Enter your answer

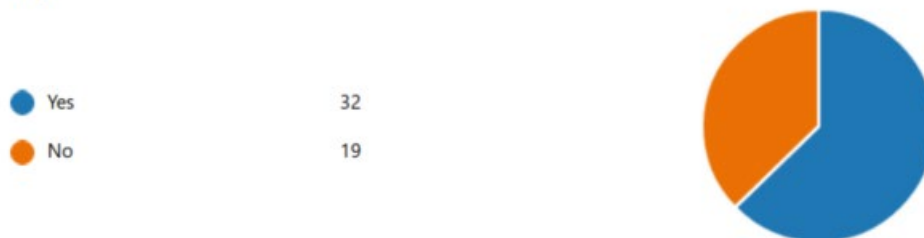
Submit

B.2.3 Public Survey Results

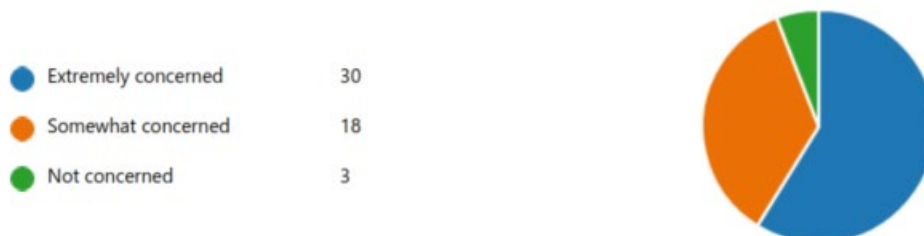
The Town received 51 responses to the public survey. Summary results of the survey are presented below, followed by response data for each question.

- 63% of respondents have experienced flooding in Cutler Bay and 94% of respondents are “somewhat” or “extremely” concerned about being impacted by flooding.
- 65% of respondents say their home is located in a FEMA mapped floodplain. An additional 14% don’t know whether or not their home is in the floodplain, yet all of these respondents said they have been impacted by a flood.
- 78% of respondents have flood insurance, 18% do not have flood insurance, and 4% don’t know if they have flood insurance. Of the 4% who don’t know whether they have insurance, all responded that they have experienced flooding and are extremely concerned about flooding. Of those that do not have insurance, the most common reasons were that their home is not in a floodplain or that they rent. Increased outreach to areas outside the regulatory floodplain and to renters may improve insurance coverage.
- Only 20% of respondents report having taken actions to protect their homes from flood damage. These actions include sand bagging, storm drain maintenance, and other drainage improvement projects.
- Nearly half of respondents don’t know who to contact for more information regarding the risks associated with flooding.
- Email, social media, and mail are the preferred methods for receiving information about flood protection.
- Respondents provided numerous suggestions for flood mitigation including, additional storm drain maintenance, protection of wetlands/mangroves, limiting and/or regulating development, implementing green infrastructure and drainage improvement projects, continued public education, and code enforcement.


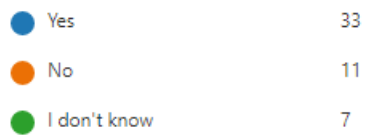
1. Have you ever experienced or been impacted by high water or flooding in the Town of Cutler Bay?



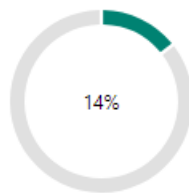
2. How concerned are you about the possibility of your community being impacted by flooding?



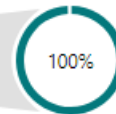
3. Is your home located in a Federal Emergency Management Agency (FEMA) mapped floodplain?

[More Details](#)
 Insights


14% of people answered **I don't know** for this question, and the majority answered **"Yes"** for Question 1.



14% people answered "I don't know" for question 3

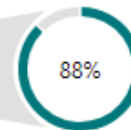


100% of them answered "Yes" for question 1

65% of people answered **Yes** for this question, and the majority answered **"No"** for Question 6.



65% people answered "Yes" for question 3



88% of them answered "No" for question 6

4. Do you have flood insurance for your home/personal property?

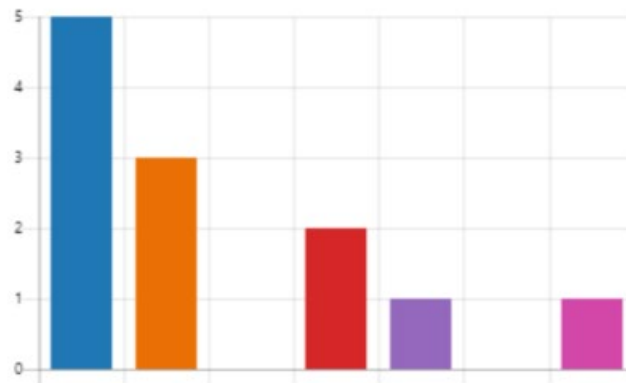
💡 Insights

Yes	40
No	9
I don't know	2



5. If you answered "No" to question 4, why not?

My home is not in a floodplain	5
I rent	3
I never really considered it	0
It's too expensive	2
I don't need it because my ho...	1
I don't need it because it neve...	0
Other	1



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

Yes	10
No	41



7. If you answered "Yes" to question 6, please explain what actions you've taken.

9 Responses

ID ↑	Name	Responses
1	anonymous	sandbags
2	anonymous	Sand Bags ,
3	anonymous	Have sandbags ready and all electronics off the floor
4	anonymous	keep storm drains clean
5	anonymous	I get sandbags for door openings in case of flooding.
6	anonymous	Call 311 yearly to clean out storm drains around my block . I think everyone should do this call once a year not only when the whole town is under water right after a storm. To be protected you have to plan ahead and protect. I see the storm drain cleaning truck all day driving around or sitting under the trees give them something to do in the dry months
7	anonymous	I filled my back yard with sand and gravel to absorb rain water. Otherwise it puddles and gathers at the house's foundation. I also packed the sand tightly enough that it runs off at the sides and back fence to divert the flow from my house.
8	anonymous	Sand bags
9	anonymous	Added a drain outside

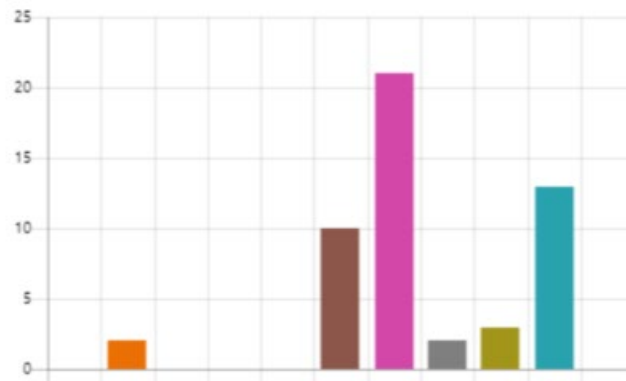
8. Do you know what government agency/office to contact regarding the risks associated with flooding?

💡 Insights



9. What is the most effective way for you to receive information about how to make your home or neighborhood more resistant to flood damage?

Newspaper	0
Televisions advertising or prog...	2
Radio advertising or programs	0
Public workshops/meetings	0
School meetings	0
Mail	10
Email	21
Text message	2
Town website	3
Town social media	13
Other	0



10. What are some steps your local government could take to reduce the risk of flooding in your neighborhood?

37 Responses

ID ↑	Name	Responses
1	anonymous	Clean out neighborhood drains more often in Santa Barbara
2	anonymous	Increase mangroves.
3	anonymous	use more pumps in my steet, since the sewage station is in front of it
4	anonymous	Ensure sewer drainage isn't blocked by leaves and other debris -
5	anonymous	Clean out the drain system, update any outdated drainage systems, offer program for citizens to send pictures of flooding to update government officials.
6	anonymous	We have French drains to drain off rain water runoff. They back up in heavy rains and cause the streets to flood. They are cleaned regularly but still back up. Regular storm sewers would help. My drain is on SW 192 Dr. at SW 89 Ct.
7	anonymous	Check and keep drainage system clean and updated to keep up with the housing growth and climate change
8	anonymous	Research has shown time and again that developments increase risk of flooding. Stop developing.
9	anonymous	Protect wetlands which act as natural sponges and increase spending for storm water defenses.

10	anonymous	Ensure drains are not clogged and are in working condition
11	anonymous	Work on the pocket holes and create more drains for the water to recede
12	anonymous	Repave and replace street drain lines on 216th St in Lakes By The Bay
13	anonymous	Flush out storm drains several times a year.
14	anonymous	Ensure that flood control canal levels are lowered prior to forecasted possible flood events. This is not currently being done.being done.
15	anonymous	No idea
16	anonymous	Limit the construction and paving and increase open ground with vegetation to absorb rain.
17	anonymous	Have drainage. Caribbean Blvd has drainage yet most of the other streets don't
18	anonymous	My neighborhood doesn't flood, but there are areas I've traveled through that are greatly impacted such as the Saga Bay Area. Continue to improve drainage in those areas.
19	anonymous	My local government is already taking steps which I've already noticed
20	anonymous	My neighborhood is fine (on my street) it's the low lying street to get in (196 St) that floods in time of heavy rain.
21	anonymous	Practicing green infrastructure
22	anonymous	they regularly maintain the storm drains
23	anonymous	Drainage improvements
24	anonymous	Projects to minimize Hurricane Storm Surge
25	anonymous	Plant more trees
26	anonymous	stop developing commercial residence, instead re-build over old neighborhoods, streets and leave the untouched greenland alone.
27	anonymous	Give out sandbags to your residents and keep the sewers clean from rubbish. Most of all continue to keep your residents informed of any flooding and instructions.

28	anonymous	Sadly, Saga Bay and Cutler Cay—from what I understand, were never supposed to be rebuilt/developed post-Andrew due to their extreme low-lying—direct wave action status. No idea why these communities were allowed to be built when even a Cat 1 hurricane can cause waves to wash over these homes. I would assume the Sam is true of Isles at Bayshore. For this reason I decided to move from Saga Bay despite it being a wonderful neighborhood.
29	anonymous	Regular maintenance of storm drainage cleanup
30	anonymous	My local government can actually enforce the rules that they have put into place. The house was built next-door to my property and the Cutler Bay building official said himself that the property did not follow the approved plans for grading their property and the stormwater retention. However, nothing is being done about it. So my house floods in the rain while the neighbor's water pours onto my property. Cutler Bay is aware of this information, and not only are they doing nothing about it, but public works in the building officials are giving contradictory information because their lies don't match.
31	anonymous	Work with Le Club to mitigate risk in Cutler Bay. Major flooding in parking lots.
32	anonymous	Raise driveways and sidewalks to create a physical barrier
33	anonymous	Put more drainage tanks
34	anonymous	Install more drains in the streets of residential neighborhoods
35	anonymous	Save the wetlands
36	anonymous	ensure proper drainage; ensure codes are followed in regards to enough green spaces, grassy areas to soak up rain; stop cementing over everything
37	anonymous	Support county efforts to keep sewer pipes and system upgraded.



B.3 PLANNING STEP 3: COORDINATE

This planning step credits the incorporation of other plans and other agencies' efforts into the development of the Flood Mitigation Plan. Other agencies and organizations must be contacted to determine if they have studies, plans and information pertinent to the Flood Mitigation Plan, to determine if their programs or initiatives may affect the community's program, and to see if they could support the community's efforts. Town representatives were asked to identify stakeholders to invite to participate on the FMPC at the beginning of the planning process. Additionally, to further incorporate stakeholder input into the plan, a variety of stakeholders were identified by the FMPC and sent a letter inviting them to provide data or information relevant to the planning process, review the draft plan documents, and provide feedback and comments. An example coordination letter sent by the Town is provided on the following page. A list of the stakeholders who were contacted is provided in Table B.4.

Stakeholders were also involved in development of the plan through specific requests for data.



DEPARTMENT OF PUBLIC WORKS

Alfredo Quintero, EI, CFM, CGC, CCC, ISA-CA
Director of Public Works

March 8, 2021

Josett Valdez
SF Region of the American Red Cross, Greater Miami and the Keys Chapter
1250 Northpoint Parkway
West Palm Beach, FL 33407

RE: Town of Cutler Bay Flood Mitigation Plan

Dear Mr. Valdez

The Town of Cutler Bay is updating its flood mitigation plan to address the flood hazards and associated stormwater and local drainage issues that impact the community. This planning process incorporates the four phases of the Disaster Mitigation Act (DMA) of 2000 as well as the 10 steps of Activity 510 Floodplain Management Planning of the National Flood Insurance Program's (NFIP) Community Rating System (CRS) Program.

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 issues within Cutler Bay. Any information, studies, etc. that may supplement the work of the established Floodplain Mitigation Planning Committee (FMPC) would be welcomed. Additionally, we invite your participation at our committee and public meetings. Dates for future meetings are posted on the Town's website: www.cutlerbay-fl.gov.

If you have any questions or would like to submit data or information for the FMPC's consideration, please contact the program manager for this project, Alfredo Quintero, Director of Public Works, at aquintero@cutlerbay-fl.gov. You may also contact our planning consultant, David Stroud with Wood Environment & Infrastructure, Inc., at david.stroud@woodplc.com.

We thank you for your support of this important planning process.

Sincerely,

Alfredo Quintero, EI, CFM, CGC, CCC, ISA-CA
Director of Public Works
Town of Cutler Bay



10720 Caribbean Boulevard, Suite 105 • Cutler Bay, FL 33189 • (305) 234-4262 • www.cutlerbay-fl.gov

Table B.4 - Stakeholders

Name	Organization	Address	City	State	Zip
<i>Non-Profit Organizations</i>					
Josett Valdez	South Florida Region of the American Red Cross, Greater Miami and the Keys Chapter	1250 Northpoint Parkway	West Palm Beach	FL	33407
Deborah Koch	Executive Director, South Florida Region of the American Red Cross, Greater Miami and the Keys Chapter	335 SW 27th Avenue	Miami	FL	33135
<i>Educational Institutions</i>					
To Whom It May Concern	Fortis College - Cutler Bay Campus	19600 S. Divie Highway	Cutler Bay	FL	33157
To Whom It May Concern	CBT - College - Cutler Bay Campus	19151 S. Dixie Highway	Cutler Bay	FL	33157
<i>Neighboring Communities</i>					
Yocelyn Galiano Gomez	Village Manager, Village of Pinecrest	12645 Pinecrest Parkway	Pinecrest	FL	33156
Steven Losner	Mayor, Homestead	100 Civic Court	Homestead	FL	33033
Peter Iglesias	City Manager, City of Coral Gables	405 Biltmore Way	Coral Gables	FL	33134
Ron E. Lewis	Village Manager, Village of Palmetto Bay	9705 East Hibiscus Street	Palmetto Bay	FL	33157
To Whom It May Concern	Miami-Dade Regulatory and Economic Development Agency, Environmental Resources Management Department	Overtown Transit Village North, 701 NW 1st Court	Miami	FL	33136
Lourdes Gomez	Director, Miami-Dade County Regulatory and Economic Resources Department	Stephen P. Clark Center, 111 NW 1st Street, 11th Fl.	Miami	FL	33128
Frank Rollason	Director, Miami-Dade Emergency Management	9300 NW 41st Street	Miami	FL	33178
Alberto M. Carvalho	Superintendent, Miami-Dade Public Schools	1450 NE 2nd Avenue, Suite 912	Miami	FL	33132
Daniella Levine Cava	Mayor, Miami-Dade County	Stephen P. Clark Center, 111 NW 1st Street, 29th Fl.	Miami	FL	33128
Alice N. Bravo	Director, Miami-Dade County Transportation & Public Works	Overtown Transit Village, 701 NW 1st Court, 17th Fl.	Miami	FL	33128
<i>Regional Planning Organizations</i>					
Armando Vilaboy	Intergovernmental & Outreach Representative, South Florida Water Management District	3301 Gun Club Road	West Palm Beach	FL	33406
Cheryl Meads	Governing Board Member, SFWMD	3301 Gun Club Road	West Palm Beach	FL	33406
Carlos "Charlie" E. Martinez	Governing Board Member, SFWMD	3301 Gun Club Road	West Palm Beach	FL	33406
Jacqui Thurlow-Lippisch	At Large Member, Governing Board, SFWMD	3301 Gun Club Road	West Palm Beach	FL	33406
Scott Wagner	Vice Chair, Governing Board, SFWMD	3301 Gun Club Road	West Palm Beach	FL	33406
Isabel Cosio Carballo	Executive Director, South Florida Regional Planning Council	1 Oakwood Boulevard, Suite 250	Hollywood	FL	33020
<i>State Government</i>					



Name	Organization	Address	City	State	Zip
Miles Anderson	State Hazard Mitigation Officer, Florida Department of Community Affairs, Emergency Management	2555 Shumard Oak Boulevard	Tallahassee	FL	32399
Conn H. Cole, MBA/PA, CFM	Interim State NFIP Coordinator/ State Floodplain Manager	2555 Shumard Oak Boulevard	Tallahassee	FL	32399
Shannon Riess	State Floodplain Management Office, Community Rating System	2555 Shumard Oak Boulevard	Tallahassee	FL	32399
Jason Andreotta	Director of District Management, FL DEP - Southeast District	3301 Gun Club Road, MSC 7210-1	West Palm Beach	FL	33406
Victor M. Marrero	District Surveyor, Florida Department of Transportation District 6 Office	1000 NW 111th Avenue	Miami	FL	33172
<i>Federal Government</i>					
Craig Carpenter	ISO/CRS Specialist	284 Sabal Palm Place	Longwood	FL	32779
Dave Arkens	ISO/CRS Specialist	3635 Sandy Street	Logandale	NV	89021
Roy McClure	FEMA Region IV	3303 Chamblee Tucker Road	Atlanta	GA	30341
Pablo Santos, PhD	Meteorologist in Charge, National Weather Service Miami Field Office	11691 SW 17th Street	Miami	FL	33165
To Whom It May Concern	US Army Corp of Engineers, Miami Resident Office	3300 SW 148th Avenue	Miramar	FL	33027
To Whom It May Concern	Public Information Officer, Key Biscayne National Park	9700 SW 328th Street	Homestead	FL	33033
Roxanna Hinzman	US Fish and Wildlife Service, SE Florida Ecological Field Office	1339 20th Street	Vero Beach	FL	32960
Tyree Davis	Information Resource Management Director, NOAA SE Fisheries Science Ctr	75 Virginia Beach Drive	Miami	FL	33149



Appendix C Mitigation Alternatives

As part of the process of developing the mitigation action plans found in Section 6, the FMPC reviewed and considered a comprehensive range of mitigation options before selecting the actions identified for implementation. This section summarizes the full range of mitigation measures evaluated and considered by the FMPC, including a review of the categories of mitigation measures outlined in the 2017 CRS Coordinator's Manual, a discussion of current local implementation and CRS credits earned for those measures, and a list of the specific mitigation projects considered and recommended for implementation.

Mitigation alternatives identified for implementation by the FMPC were evaluated and prioritized using the criteria discussed in Section 6.3 of this plan.

C.1 TOWN OF CUTLER BAY PRIORITY HAZARDS

Priority Hazards

- ▶ Climate Change and Sea Level Rise
- ▶ Coastal/Canal Bank Erosion
- ▶ Flood: 100/500 year
- ▶ Flood: Stormwater/ Localized Flooding
- ▶ Hurricane and Tropical Storms (including Storm Surge)

Non-Priority Hazards

- ▶ Dam/Levee Failure

C.2 MITIGATION GOALS & OBJECTIVES

Goal 1: Protect the public health, life, safety and welfare by increasing public awareness and education of the flood hazard by encouraging collective and individual responsibility for mitigating the flood risk.

- ▶ **Objective 1.1:** Promote flood insurance as a property protection measure against potential flood damage.
- ▶ **Objective 1.2:** Encourage residents to assume an appropriate level of responsibility for their own flood protection.
- ▶ **Objective 1.3:** Develop a public education program for the local schools.

Goal 2: Improve technical capability (including administrative resources, tools, data, and equipment) to implement hazard mitigation and respond to flood events.

- ▶ **Objective 2.1:** Seek county, state and federal support for mitigation projects.
- ▶ **Objective 2.2:** Acquire additional tools and training to support mitigation.

Goal 3: Minimize the flood threat to life and property by protecting vulnerable populations and buildings and critical facilities through the implementation of cost-effective and technically feasible mitigation actions.

- ▶ **Objective 3.1:** Reduce flood damage to insurable buildings and public infrastructure through stormwater improvement projects.
- ▶ **Objective 3.2:** Prioritize critical and essential facilities in need of protection from potential flood damage.
- ▶ **Objective 3.3:** Leverage local, state and federal grant funding to facilitate mitigation actions such as elevation, acquisition, or floodproofing.



- ▶ **Objective 3.4:** Target repetitive loss properties for implementation of mitigation projects.

Goal 4: Incorporate resiliency into future growth by ensuring that flood risk is considered for both new development and post-disaster redevelopment and recovery.

- ▶ **Objective 4.1:** Promote higher development and design standards to protect new buildings from flood damage.
- ▶ **Objective 4.2:** Preserve open space areas, especially where there are sensitive natural areas.

C.3 CATEGORIES OF MITIGATION MEASURES CONSIDERED

Once it was determined which flood hazards warranted the development of specific mitigation actions, the FMPC analyzed viable mitigation options that supported the identified goals and objectives. The FMPC reviewed mitigation alternatives within the following list of mitigation categories which are utilized as part of the CRS planning process:

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

C.4 ALTERNATIVE MITIGATION MEASURES PER CATEGORY

Note: the CRS Credit Sections are based on the 2017 CRS Coordinator's Manual.

C.4.1 Preventative Measures

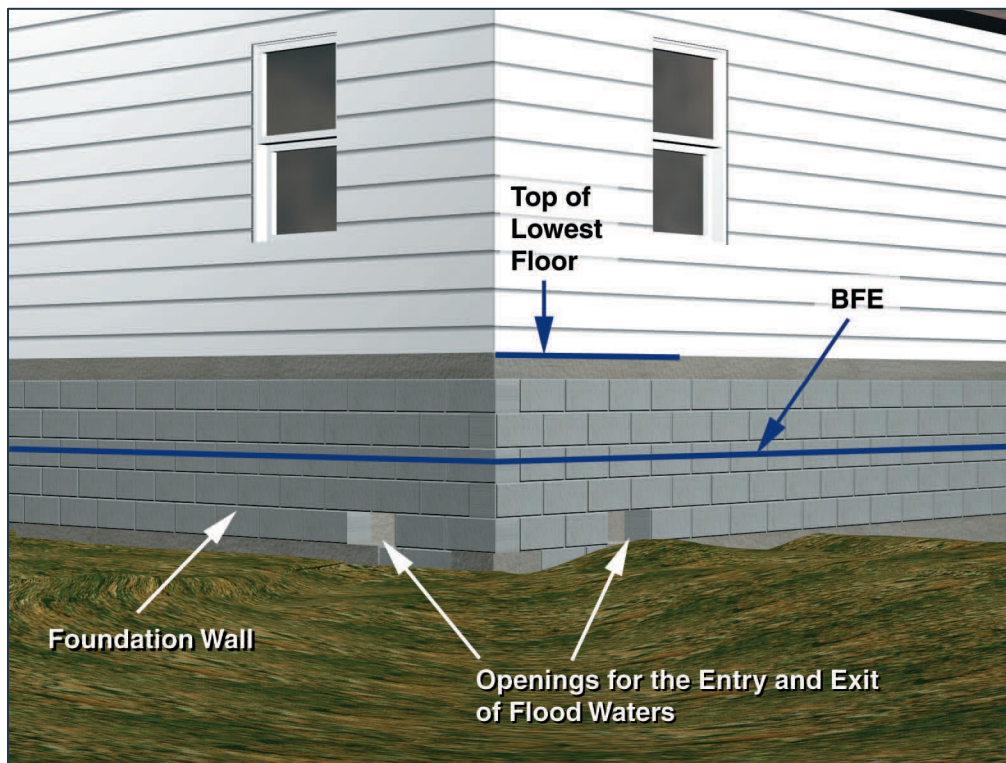
Preventive measures are designed to keep a problem - such as flooding - from occurring or from getting worse. The objective of preventive measures is to ensure that future development is not exposed to damage and does not cause an increase in damages to other properties. Building, zoning, planning and code enforcement offices usually administer preventive measures. Some examples of types of preventive measures include:

- ▶ Building codes
- ▶ Planning and zoning
- ▶ Open space preservation
- ▶ Floodplain regulations
- ▶ Stormwater management

Building Codes

Building codes provide one of the best methods of addressing natural hazards. When properly designed and constructed according to code, the average building can withstand many of the impacts of natural hazards. Hazard protection standards for all new and improved or repaired buildings can be incorporated into the local building code. Building codes can ensure that the first floors of new buildings are constructed to be higher than the elevation of the 100-year flood (the flood that is expected to have a one percent chance of occurring in any given year). This is shown in Figure C.1.

Just as important as having code standards is the enforcement of the code. Adequate inspections are needed throughout construction to ensure that the builder understands the requirements and is following them. Making sure a structure is properly elevated and anchored requires site inspections at each step.

Figure C.1 – Building Codes and Flood Elevations

Source: FEMA Publication: Above the Flood: Elevating Your Floodprone House, 2000

Local Implementation

The Town of Cutler Bay has adopted the *2020 Florida Building Code*.

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. Cutler Bay's BCEGS rating is a Class 3 for residential and a Class 2 for commercial. The Town of Cutler Bay has adopted the *2020 Florida Building Code* which is based on national model building codes and national consensus standards which are amended where necessary for Florida's specific needs. The Florida Building Code is updated every three years. Cutler Bay currently receives credit for Activity 430 – Higher Regulatory Standards.

Planning and Zoning

Building codes provide guidance on how to build in hazardous areas. Planning and zoning activities direct development away from these areas, particularly floodplains and wetlands. They do this by designating land uses that are compatible with the natural conditions of land that is prone to flooding, such as open space or recreation. Planning and zoning activities can also provide benefits by simply allowing developers more flexibility in arranging improvements on a parcel of land through the planned development approach.

Local Implementation

Comprehensive Plan

The Town of Cutler Bay Comprehensive Growth Management Plan was adopted in April 2008. A Comprehensive Plan, in broad terms, is a policy statement to guide the future placement and



development of community facilities. It is the basis for a community's zoning, subdivision and design regulations and a community's official maps and amendments to the zoning, subdivision and design ordinances. The future land use element of the plan represents the Town's vision for its development and redevelopment during the five, 10 and 15 year planning periods. The future land use maps and districts will serve as the foundation for subsequent development of more detailed Land Development Regulations and special area plans. These regulations and plans must be consistent with and further the implementation of the future land use element of the Comprehensive Growth Management Plan and its goals, objectives and policies in accordance with the Town's master planning document.

Zoning and Subdivision Regulations

The Town of Cutler Bay's Land Development Regulations were adopted in June 2012. The purpose of the Town's Land Development Regulations is to provide the minimum regulations necessary to facilitate safe and orderly growth, and to also ensure that growth forms an integral part of a community of functional neighborhoods, retail and commercial centers; increases collective security and community identity to promote civic awareness and responsibility; and enhances the quality of life for the entire Town to ensure the greatest possible economic and social benefits for all residents. These regulations are intended to promote consistency with the goals, objectives and policies of the Town's Growth Management Plan.

Capital Improvement Plan

The Town of Cutler Bay 2008 Stormwater Master Plan identified 17 priority sub-basins that were ranked from worst to best according to current performance against established Plan goals. The Capital Improvement Program is based on the results of the 17 priority subbasin studies. Recommended improvements to achieve the stated performance goals were identified for each basin, and a ten-year CIP summary (2008-2018) including preliminary budgets was prepared for each basin. The Town of Cutler Bay 2018 Watershed Master Plan evaluated pre- and post-development peak flows within watersheds C-100, C-1 and D-4A (South Biscayne Bay) for 18 undeveloped parcels. This plan incorporated a review and update of the CIP based on identification of water quantity issues and recommended solutions.

CRS Credit

Many planning activities support CRS activity implementation but are not directly credited by the program. However, the Town receives credit for watershed master planning under Activity 450.

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. These are usually linear areas along property lines or channels. Maintenance easements also can be donated by streamside property owners in return for a community maintenance program.

Local Implementation

The Town currently preserves approximately 44 percent of the SFHA as open space and maintains regulations and incentives that minimize development in the SFHA.



CRS Credit

Cutler Bay currently receives credit for Activity 420 – Open Space Preservation. Preserving flood prone areas as open space is one of the highest priorities of the Community Rating System. Credit is based on the area of the floodplain that is designated as public undeveloped properties, parks, wildlife refuges, golf courses, or other uses that can be kept vacant through ownership or regulations.

Floodplain Regulations

The National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (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 100-year (base) flood. The floodplain subject to these requirements is shown as an A or V Zone on the Flood Insurance Rate Map (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 100-year 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 (BFE). 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.

Local Implementation

Manufactured Homes

Manufactured or mobile homes are usually not regulated by local building codes. They are typically built in a factory in another state and are shipped to a site. They do have to meet construction standards set by the U.S. Department of Housing and Urban Development. All mobile homes constructed after 1976 must comply with HUD's National Manufactured Home Construction and Safety Standards. These standards apply uniformly across the country and it is illegal for a local unit of government to require additional construction requirements. Local jurisdictions may regulate the location of these structures and their on-site installation.



The NFIP allows communities to exempt mobile homes in existing mobile home parks from some of the flood protection requirements. Cutler Bay's Floodplain Management Ordinance does not exempt manufactured homes from protection requirements; therefore, they must meet the requirements for residential structures.

There are additional requirements for recreational vehicles.

Residential Construction

The Town's Floodplain Management Ordinance requires that all new residential construction or substantial improvement shall have the lowest floor, including the basement, elevated to no lower than one foot above the base flood elevation. Should solid foundation perimeter walls be used to elevate a structure, openings sufficient to facilitate automatic equalization of flood hydrostatic forces on both sides of the exterior walls shall be provided.

Non-Residential Construction

For non-residential new construction or substantial improvement, the Town's Code requires that the lowest floor, including the basement, be elevated to no lower than one foot above the base flood elevation. All buildings located in A-Zones may be flood-proofed, in lieu of being elevated, provided that all areas of the building components below the base flood elevation plus one foot are water tight with walls substantially impermeable to the passage of water, and use structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effects of buoyancy.

CRS Credit

Cutler Bay currently receives credit for Activity 430 – Higher Regulatory Standards. The Town receives credit for enforcing regulations that require freeboard for new and substantial improvement construction, cumulative substantial improvement, lower substantial improvement, other higher regulatory standards, and state mandated regulatory standards. Credit is also provided for a BCEGS classification of 3/2 and for staff education and certification as a floodplain manager.

Stormwater Management

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, and
- 2) Regulating all development to ensure that the post-development peak runoff will not be greater than it was under pre-development conditions.
- 3) Set construction standards so buildings are protected from shallow water.

Local Implementation

The Town's Stormwater Master Plan created in March 2008 identifies opportunities to protect surface water quality and reduce flooding within the Town limits. The Stormwater Master Plan includes the following components:

- ▶ A review of existing stormwater and drainage data, reports and plans available through SFWMD, Miami-Dade County and Town sources
- ▶ A field inventory of existing drainage structures



- ▶ A drainage atlas including the type, size and general location of drainage infrastructure elements
- ▶ Basin and sub-basin delineations based on available survey data and other sources
- ▶ Hydrologic and hydraulic modeling analysis of the existing systems and their capacity to handle the 5-year/24-hour, 10-year/24-hour, 25-year/72-hour, 50-year/72-hour, and 100-year/72-hour storm events
- ▶ Identification and analysis of alternatives for improvements needed to alleviate deficiencies identified in the hydrologic and hydraulic modeling phase
- ▶ Development of an optional Capital Improvement Plan (CIP) to implement the identified improvements

The performance goals representing the minimum standards for sub-basin performance are as follows:

- ▶ During the five-year return design storm event, flooding in local and collector roadways travel lanes should not exceed the edge of the roadway pavement. This goal is consistent with SFWMD and Miami-Dade County requirements.
- ▶ During the 10-year return design storm event, flooding in roadway travel lanes should be below the crown of the roadway. This goal is consistent with Miami-Dade County requirements.
- ▶ During the 100-year return design storm event, flooding should be below the building finish floor elevations. This goal is consistent with Miami-Dade County requirements.
- ▶ Drainage sub-basins which discharge directly into canals should have water quality pre-treatment for the first one inch of runoff. This standard is consistent with federal, state and county water quality treatment requirements.
- ▶ Drainage sub-basins which discharge directly into lakes or drainage wells should have water quality pre-treatment for the first one-half inch of runoff. This standard is consistent with federal, state and county water quality treatment requirements.

The Town's 2018 Watershed Master Plan provides a comparison of pre- and post-development peak flows on the watershed level and the individual sub-basin level for undeveloped parcels in the Town, providing the Town with a tool to regulate future development in a way that doesn't increase runoff or flooding from future conditions. The Watershed Master Plan includes the following components:

- ▶ A profile of the Town including land use, topography, wetlands and drainage features
- ▶ Evaluation of climate adaptation including sea level rise
- ▶ A review of existing drainage data, reports and plans available through FEMA, SFWMD, Miami-Dade County, and the Town of Cutler Bay
- ▶ Basin and undeveloped parcel delineations based on data provided by the Town
- ▶ Hydrologic analysis to determine pre- and post-development peak flows for watersheds C-100, C-1 and D-4A (South Biscayne Bay)
- ▶ Hydrologic analysis to determine pre- and post-development peak flows for 18 vacant (undeveloped) parcels
- ▶ Examination of water quality standards
- ▶ Level of Service analysis for water quantity and water quality
- ▶ Examination of the Town's existing Capital Improvements Program and identification of needs regarding future projects
- ▶ Identification of key water quantity issues and recommendations for solutions on the vacant parcels
- ▶ Recommendations for the Town's regulatory and development codes as they relate to stormwater management



CRS Credit

Cutler Bay currently receives credit for Activity 450 – Stormwater Management. The community enforces regulations for stormwater management, low-impact development, soil and erosion control and water quality. The Town also earns credit for watershed master planning.

The table below summarizes prevention measures considered by the FMPC and provides the rationale for whether or not the FMPC recommended pursuing each alternative.

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Recommended?
1.	Ensure that storm drains are cleaned on a regular and consistent bi-annual basis in order to maintain adequate stormwater drainage as they were designed.	Storm drains throughout the Town's jurisdiction need regular cleaning/maintenance so that nearby properties are not adversely affected by inadequate drainage and ponding of stormwater.	Yes
2.	Improve drainage capacity in the Saga Bay sub basin through upgraded stormwater piping in order to discharge the volume of runoff necessary to meet desired performance criteria for modeled storm events, as determined through hydrologic and hydraulic calculations.	Observed flooding across roadway and localized ponding in roadway in multiple locations within the sub-basins. Multiple complaints have been received.	Yes
3.	Continue implementation of drainage system maintenance on all surface water channels, canals and ditches to ensure proper storage, disposal, and water quality treatment of runoff.	Drainage features throughout the Town are in need of regular maintenance so that nearby properties are not adversely affected by reduced function.	Yes
-	Complete a Post-Disaster Redevelopment Plan to determine if and how development changes should be enacted to incorporate mitigation in post-disaster redevelopment	There is not currently local or political support to develop a post-disaster redevelopment plan. Policies controlling post-flood redevelopment are included in the flood damage prevention ordinance.	No

C.4.2 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, natural hazards do not damage vacant areas. As noted earlier, the major impact of hazards is to people and improved property. In some cases, properties can be modified so the hazard does not reach the damage-prone improvements. 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 floodprone 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.

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. A berm can also settle over time, lowering its protection level. A floodwall can crack, weaken, and lose its watertight seal. Therefore, barriers need careful design and maintenance (and insurance on the building, in case of failure).

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. However, experienced building movers can handle any job. In areas subject to flash flooding, deep waters, or other high hazard, relocation is often the only safe approach. 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. Generally, demolition projects are undertaken by a government agency, so the cost is not borne by the property owner, and the land is converted to public open space use, like a park.

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:



- ▶ Pilot reconstruction is only possible after it has been shown that acquisition or elevation are not feasible, based on the program's criteria.
- ▶ Funds are only available to people who owned the property at the time of the event for which funding is authorized.
- ▶ It must be demonstrated that the benefits exceed the costs.
- ▶ The new building must be elevated to the advisory base flood elevation.
- ▶ The new building must not exceed more than 10% of the old building's square footage.
- ▶ The new building must meet all flood and wind protection codes.
- ▶ There must be a deed restriction that states the owner will buy and keep a flood insurance policy.
- ▶ The maximum federal grant is 75% of the cost, up to \$150,000. FEMA is developing a detailed list of eligible costs to ensure that disaster funds are not used to upgrade homes.

Local Implementation

The Town of Cutler Bay does not currently receive credit for Activity 520 – Acquisition and Relocation or Activity 530 – Flood Protection.

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. The CRS credits barriers and elevating existing buildings under Activity 530. Elevating a building above the flood level will also reduce the flood insurance premiums on that individual building. Because barriers are less secure than elevation, not as many points are provided. Higher scores are possible, but they are based on the number of buildings removed compared to the number remaining in the floodplain.

Retrofitting

An alternative to keeping the hazard away from a building is to modify or retrofit the site or building to minimize or prevent damage. There are a variety of techniques to do this, as described below.

Dry Floodproofing

Dry floodproofing means making all areas below the flood protection level watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings, such as doors, windows and vents, are closed, either permanently, with removable shields, or with sandbags. Dry floodproofing of new and existing nonresidential buildings in the regulatory floodplain is permitted under state, FEMA and local regulations. Dry floodproofing of existing residential buildings in the floodplain is also permitted as long as the building is not substantially damaged or being substantially improved. Owners of buildings located outside the regulatory floodplain can always use dry floodproofing techniques.

Dry floodproofing is only effective for shallow flooding, such as repetitive drainage problems. It does not protect from the deep flooding along lakes and larger rivers caused by hurricanes or other storms.

Wet Floodproofing

The alternative to dry floodproofing is wet floodproofing: water is let in and everything that could be damaged by a flood is removed or elevated above the flood level. Structural components below the flood level are replaced with materials that are not subject to water damage. For example, concrete block walls are used instead of wooden studs and gypsum wallboard. The furnace, water heater and laundry facilities are permanently relocated to a higher floor. Where the flooding is not deep, these appliances can be raised on blocks or platforms.

Local Implementation

The Town of Cutler Bay does not currently receive credit for Activity 530 – Flood Protection.



CRS Credit

The credit for Activity 530 is based on the combination of flood protection techniques used and the level of flood protection provided. Points are calculated for each protected building. Bonus points are provided for the protection of repetitive loss buildings and critical facilities.

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, as 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.

Under Section 406(d) of the Stafford Act:

"If an eligible insurable facility damaged by flooding is located in a [mapped floodplain] ... and the facility is not covered (or is underinsured) by flood insurance on the date of such flooding, FEMA is required to reduce Federal disaster assistance by the maximum amount of insurance proceeds that would have been received had the buildings and contents been fully covered under a National Flood Insurance Program (NFIP) standard flood insurance policy. [Generally, the maximum amount of proceeds for a non-residential property is \$500,000.]

Per FEMA Response and Recovery Directorate Policy No. 9580.3, August 23, 2000: "[Communities] Need to:

- ▶ Identify all insurable facilities, and the type and amount of coverage (including deductibles and policy limits) for each. The anticipated insurance proceeds will be deducted from the total eligible damages to the facilities.
- ▶ Identify all facilities that have previously received Federal disaster assistance for which insurance was required. Determine if insurance has been maintained. A failure to maintain the required insurance for the hazard that caused the disaster will render ineligible for Public Assistance funding...
- ▶ [Communities] must obtain and maintain insurance to cover [their] facility - buildings, equipment, contents and vehicles - for the hazard that caused the damage in order to receive Public Assistance funding. Such coverage must, at a minimum, be in the amount of the eligible project costs. FEMA will not provide assistance for that facility in future disasters if the requirement to purchase insurance is not met."



In other words, the law expects public agencies to be fully insured as a condition of receiving federal disaster assistance.

Local Implementation

Flood insurance information for the Town is provided in Section 4.4.4 as well as the Program for Public Information found in Appendix A.

CRS Credit

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. The CRS also reduces the premiums for those people who do buy NFIP coverage. The Town of Cutler Bay currently receives credit for Activity 330 – Outreach Projects.

The table below summarizes property protection measures considered by the FMPC and provides the rationale for whether or not the FMPC recommended pursuing each alternative.

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Recommended?
5.	Work with local, state and federal partners to target repetitive loss properties for acquisition or elevation to eliminate potential for future flooding.	The Town has a number of repetitive loss buildings including some which are located in X - Zones.	Yes
6.	Promote public outreach encouraging retrofitting techniques where residents can help themselves to potentially eliminate damage from low level flooding to their structure.	There are simple things residents and business can do to reduce damage from the floods. Applying a moisture barrier with adhesive along the bottom few feet of a residence along with barriers for openings in doors can help eliminate flood damage to slab on grade homes.	Yes
-	Pursue relocation of at-risk structures including repetitive loss properties.	Much of Cutler Bay is built out, making it difficult to support relocation to lower risk areas within the Town. Additionally, slab on grade foundations present a difficulty and increased cost for relocations and/or elevations.	No

C.4.3 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 snow melt 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. Seven areas are reviewed:

- ▶ Wetland protection
- ▶ Erosion and sedimentation control
- ▶ River restoration
- ▶ Best management practices
- ▶ Dumping regulations
- ▶ Urban forestry
- ▶ 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.

Local Implementation

According to the Town's Comprehensive Growth Management Plan, the Town contains significant coastal wetlands adjacent to Biscayne National Park. These wetlands are an important component of South Florida's ecosystem, and will be conserved and, where appropriate, restored. Approximately 1,430 acres of these wetlands are in public ownership, and all are designated for Conservation purposes.

The Comprehensive Everglades Restoration Plan (CERP) is a plan to restore and preserve the Everglades, enhance water supplies, and maintain flood protection. The U.S. Army Corps of Engineers has partnered with the South Florida Water Management District and numerous other local, state, tribal and federal partners to reach a common goal based on a "vision" for the future quality of the natural and human systems in South Florida. The Biscayne Bay Coastal Wetlands phase of CERP is located along the undeveloped lands that make up the south and eastern areas of the Town of Cutler Bay. The project benefits will include restoring Biscayne Bay which includes Biscayne National Park.

Objective C-6 in the Town's Comprehensive Growth Management Plan is to ensure that identified wetlands under county, regional, state or federal jurisdiction are protected from unlawful, intrusive actions that could result in environmental damage or degradation.

CRS Credit

There is credit for preserving open space in its natural condition or restored to a state approximating its natural condition. The credit is based on the percentage of the floodplain that can be documented as wetlands protected from development by ownership or local regulations. The Town of Cutler Bay currently receives credit for Activity 420 – Open Space Preservation.

Erosion and Sedimentation Control

Farmlands and construction sites typically contain large areas of bare exposed soil. Surface water runoff can erode soil from these sites, sending sediment into downstream waterways. Erosion also occurs along stream banks and shorelines as the volume and velocity of flow or wave action destabilize and wash away the soil.



Sediment suspended in the water tends to settle out where flowing water slows down. This can clog storm drains, drain tiles, culverts and ditches and reduce the water transport and storage capacity of river and stream channels, lakes and wetlands. When channels are constricted and flooding cannot deposit sediment in the bottomlands, even more sediment is left in the channels. The result is either clogged streams or increased dredging costs.

Not only are the drainage channels less able to perform their job, but the sediment in the water reduces light, oxygen and water quality, and often carries chemicals, heavy metals and other pollutants. Sediment has been identified by the US EPA as the nation's number one nonpoint source pollutant for aquatic life.

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.

If erosion occurs, other measures are used to capture sediment before it leaves the site. Silt fences, sediment traps and vegetated filter strips are commonly used to control sediment transport. Runoff from the site can be slowed down by terraces, contour strip farming, no-till farm practices, hay or straw bales, constructed wetlands, and impoundments (e.g., sediment basins and farm ponds). Slowing surface water runoff on the way to a drainage channel increases infiltration into the soil and reduces the volume of topsoil eroded from the site.

Erosion and sedimentation control regulations mandate that these types of practices be incorporated into construction plans. The most common approach is to require applicants for permits to submit an erosion and sediment control plan for the construction project. This allows the applicant to determine the best practices for the site.

Local Implementation

Cutler Bay's ordinances do include standards for erosion and sedimentation control and Cutler Bay does currently receive credit for Activity 450 – Stormwater Management.

CRS Credit

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 result could in sedimentation and water pollution.

Stream 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

Local Implementation

The following restoration-based objectives and policies can be found in the Town's Comprehensive Growth Management Plan. Each objective has supporting policies upon which Town regulations can be based:

Coastal Management

- ▶ Protect, conserve and enhance coastal wetlands and living marine resources within the coastal area of the Town of Cutler Bay.
- ▶ The Town will support Miami-Dade County to reduce the number of instances water quality standards are exceeded for coastal and estuarine waters.
- ▶ The Town shall minimize the disturbance of natural shorelines that provide stabilization and protect landward areas from storm impacts.
- ▶ Areas that are used for nesting, feeding or congregation by endangered and threatened species shall be protected from alteration and human activities that would further imperil those species.

Conservation

- ▶ The Town will conserve and protect the remaining natural systems of Cutler Bay in recognition of the inherent values of these areas left in their natural state.
- ▶ The Town will set management standards in the Land Development Regulations for environmentally sensitive natural systems. The standards will cover water resources, wetlands, and native habitats of flora and fauna.
- ▶ The Town will protect and conserve remaining coastal wetlands, living marine resources and wildlife habitats as evident within the coastal areas of Cutler Bay through policies outlined in the Coastal Management Element of the Comprehensive Growth Management Plan.
- ▶ The Town will ensure that wildlife and plant species listed as endangered, threatened, or of special concern that inhabit the environments in Cutler Bay are protected and enhanced where possible.
- ▶ The Town will require the preservation of native trees during development or redevelopment wherever possible and if any native trees must be removed, the same type of native trees shall be planted to replace the removed tree. More than one replacement tree shall be planted for every single tree that is removed.

CRS Credit

The Town of Cutler Bay currently receives credit for Activity 420 – Open Space Preservation. The CRS provides credit for preserving open space in its natural condition or restored to a state approximating its natural condition. There are also credits for channel setbacks, buffers and protecting shorelines.

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.

Local Implementation

In accordance with Cutler Bay's adopted Land Development Regulations, BMPs are defined as any activities, prohibitions, practices, procedures, programs, or other measures designed to prevent or reduce the discharge of pollutants directly or indirectly into waters of the United States. This shall include but are not limited to those measures specified in the stormwater best management practice handbooks for municipal, industrial/commercial, and construction activity and those measures identified by the Town. Furthermore, the water quality standard shall be met when the annual average for each of the listed National Pollutant Discharge Elimination System pollutants does not exceed target criteria within a canal basin as specified in the Land Development Regulations.

CRS Credit

The Town of Cutler Bay currently receives credit for Activity 450 – Stormwater Management. To receive WQ credit, the community's stormwater management regulations must either specify one or more measures or refer to BMPs as published in an official government reference.

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.

Local Implementation

Cutler Bay's ordinances make it unlawful for anyone to deposit waste, grass, weeds, brush or other refuse in any street, ditch or watercourse, or on others' property, or on public property. It is also illegal to dispose of certain wastes in public sewers.

CRS Credit

The Town of Cutler Bay currently receives credit for Activity 540 – Drainage System Maintenance. Credit is provided under the Stream Dumping Regulations (SDR) element if the community has and publicizes regulations prohibiting dumping in streams and ditches.

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. Eligible land includes cropland, rangeland, grassland, pastureland, or forest land that is part of an agricultural operation. Certain lands within historical or archaeological resources are also included.

The hazard mitigation benefits of farmland protection are similar to those of open space preservation:

- ▶ Farmland is preserved for future generation,
- ▶ Farmland in the floodplain keeps damageable structures out of harm's way
- ▶ Farmland keeps more stormwater on site and lets less stormwater runoff downstream
- ▶ Rural economic stability and development is sustained
- ▶ Ecosystems are maintain, restored or enhanced
- ▶ The rural character and scenic beauty of the area is maintained

Local Implementation

According to the Town's Comprehensive Growth Management Plan, there are 1,401.4 acres (21%) of vacant, undeveloped land in the Town. Of these lands, 907.2 acres (14%) are protected from future development but privately owned; 118.3 (2%) are protected from future development by public ownership; and 375.9 acres (6%) are vacant and subject to development. In addition, there are 36.5 acres of agricultural lands in the Town. County policy is that no new agricultural uses may be permitted within the Urban Development Boundary (UDB), and existing agricultural uses in the UDB are generally transitioning to urban uses.

CRS Credit

The Town of Cutler Bay currently receives credit for Activity 420 – Open Space Preservation. The CRS provides credit for preserving open space in its natural condition or restored to a state approximating its natural condition.

The table below summarizes natural resource protection measures considered by the FMPC and provides the rationale for whether or not the FMPC recommended pursuing each alternative.

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Recommended?
8.	Protect the natural floodplain functions within the Town including the Cutler Wetlands.	The Cutler Wetlands is a natural barrier to storm surge and sea-level rise from the Atlantic Ocean, that protects buildings from flood damage. The Town of Cutler Bay is fortunate to have this large wetland area in the east part of the Town and should protect it from infiltration of development.	Yes



Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Recommended?
12.	Complete the Cutler Bay Wetlands Restoration Project Plan to prevent flood damages and restore mitigation property to a world-class birding sanctuary. Share information about this project with stakeholders and the public.	Flood prone wetland property in the Town serves as an important habitat for birds. Preserving this property for flood mitigation is being paired with an effort to restore its natural and beneficial functions as a bird habitat.	Yes
-	Implement BMPs to increase storage capacity for floodwaters.	The Town is encouraging developers to implement BMPs through its Stormwater Manual.	No

C.4.4 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. At the state level, emergency services programs are coordinated by the Florida Department of Emergency Management (FDEM). Locally, Cutler Bay's emergency services are coordinated by Miami-Dade County Emergency Management.

This section reviews emergency services measures following a chronological order of responding to an emergency. It starts with identifying an impending problem (threat recognition) and continues through post-disaster activities.

Threat Recognition

The first step in responding to a flood is to know when weather conditions are such that an event could occur. With a proper and timely threat recognition system, adequate warnings can be disseminated.

The National Weather Service (NWS) is the prime agency for detecting meteorological threats. Severe weather warnings are transmitted through NOAA's Weather Radio System. Local emergency managers can then provide more site-specific and timely recognition after the Weather Service issues a watch or a warning. A flood threat recognition system predicts the time and height of a flood crest. This can be done by measuring rainfall, soil moisture, and stream flows upstream of the community and calculating the subsequent flood levels.

On smaller rivers and streams, locally established rainfall and river gauges are needed to establish a flood threat recognition system. The NWS may issue a "flash flood watch." This is issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area, but the occurrence is neither certain nor imminent. These events are so localized and so rapid that a "flash flood warning" may not be issued, especially if no remote threat recognition equipment is available. In the absence of a gauging system on small streams, the best threat recognition system is to have local personnel monitor rainfall and stream conditions. While specific flood crests and times will not be predicted, this approach will provide advance notice of potential local or flash flooding.

Local Implementation

The Town monitors flood warnings issued by the County and operates under the County's Comprehensive Emergency Management Plan. The Miami-Dade Emergency Operations Center (EOC) operates at one of three levels of readiness in order to carry out its mission. These levels are patterned to closely match the Florida Division of Emergency Management EOC activation levels to maintain consistent definitions.



CRS Credit

The Town of Cutler Bay currently receives credit for Activity 610 – Flood Warning Program. Credit can be received for using National Hurricane Center warnings and river flood stage predictions for the NWS's gages. The actual score is based on how much of the community's floodplain is affected by these systems.

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:

- ▶ 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. Each warning system has advantages and disadvantages:

- ▶ Radio and television provide a lot of information, but people have to know when to turn them on. They are most appropriate for hazards that develop over more than a day, such as a tropical storm, hurricane, or winter storm.
- ▶ NOAA Weather Radio can provide short messages of any impending weather hazard or emergency and advise people to turn on their televisions for more information, but not everyone has a Weather Radio.
- ▶ Outdoor warning sirens can reach many people quickly as long as they are outdoors. They do not reach people in tightly-insulated buildings or those around loud noise, such as at a factory, during a thunderstorm, or in air conditioned homes. They do not explain what hazard is coming, but people should know to turn on a radio or television when they hear the siren.
- ▶ Automated telephone notification services are also fast, but can be expensive and do not work when phone lines are down. Nor do they work for unlisted numbers, call screening services, or cellular service, unless people sign up for notifications.

Just as important as issuing a warning is telling people what to do in case of an emergency. A warning program should include a public information component.



StormReady

The National Weather Service 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; and
- ▶ 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. It is also credited by the CRS.

Local Implementation

The Town of Cutler Bay is not currently designated as a StormReady community; however, Miami-Dade County is designated as StormReady. Should a storm threaten South Florida, the Miami-Dade County Office of Emergency Management will activate. During activation, the county will give regularly advisories to the media and to local municipalities. The Town of Cutler Bay then updates their website based on the latest advisories. The Town also provides up-to-date information on Town services during that time. The Cutler Bay police department is responsible for enforcing actions required during an emergency.

CRS Credit

The Town of Cutler Bay currently receives credit for Activity 610 – Flood Warning Program. Community Rating System credits are based on the number and types of warning media that can reach the community's flood prone population. Depending on the location, communities can receive credit for the telephone calling system and more credits if there are additional measures, like telephone trees. Being designated as a StormReady community can provide additional credits.

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.

A flood stage forecast map shows areas that will be under water at various flood stages. Different flood levels are shown as color coded areas, so the emergency manager can quickly see what will be affected. Emergency management staff can identify the number of properties flooded, which roads will be under



water, which critical facilities will be affected, and who to warn. With this information, an advance plan can be prepared that shows problem sites and determines what resources will be needed to respond to the predicted flood level.

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.

Local Implementation

The Town of Cutler Bay Police Chief serves as the Emergency Manager. Emergency management services are coordinated with Miami-Dade County Office of Emergency Management.

CRS Credit

The Town of Cutler Bay currently receives credit for Activity 610 – Flood Warning Program.

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., individuals with disabilities, prisoners, hospital patients, schoolchildren)

Those who cannot get out of harm's way need shelter. Typically, the American Red Cross will staff a shelter and ensure that there is adequate food, bedding, and wash facilities. Shelter management is a specialized skill. Managers must deal with problems like scared children, families that want to bring in their pets, and the potential for an overcrowded facility.

Local Implementation

The Miami-Dade County Emergency & Evacuation Assistance Program (E&EAP) provides evacuation support to those residents who may require specialized transportation, whose medical needs prevent them from evacuating on their own or who may require evacuation assistance. Additionally, the program may also be utilized post disaster to provide other assistance to those who are at risk due to a disability, frailty or health issues and who elected to stay at home in the event of a hurricane or other disaster.

Miami-Dade County Office of Emergency Management partners with Dade County Public Schools and the American Red Cross (ARC) to operate Hurricane Evacuation Centers (HEC). These HECs provide refuges of last resort for those individuals who need to evacuate and are unable to make their own evacuation/sheltering arrangements, such as with friends, family, or in hotels outside of the evacuation zones.

The Miami-Dade County storm surge planning zones are based on the newest generation SLOSH model. Areas in Miami-Dade along canals and rivers and further inland have been identified as being at risk for storm surge based on this new data. Using evacuation maps, each zone or portions will be evacuated depending on the hurricane's track and projected storm surge, independent of the hurricane's category. Upon identification of a threat, the County will use local media to relay pertinent information, such as evacuations and shelter openings.



CRS Credit

Because it is primarily concerned with protecting insurable buildings, the CRS does not provide any special credit for evacuation or sheltering of people (minimal credit is given in Activity 510 - Floodplain Management for evacuation policies and procedures). It is assumed that the emergency response plan would include all necessary actions in response to a flood.

Post-Disaster Recovery and Mitigation

After a disaster, communities should undertake activities to protect public health and safety and facilitate recovery. Appropriate measures include:

- ▶ Providing safe drinking water
- ▶ Monitoring for diseases
- ▶ Vaccinating residents for tetanus and other diseases
- ▶ Patrolling evacuated areas to prevent looting
- ▶ 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, which typically 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.

Communities can also regulate reconstruction through pre-disaster planning. Through a Post-Disaster Redevelopment Plan and/or Post-Disaster Redevelopment Ordinance, a community can identify opportunities to integrate mitigation in the rebuilding process. For example, a community might institute a temporary development moratorium or phased reconstruction to ensure redevelopment meets code requirements and incorporates mitigations. Similarly, retrofits or new locations for critical infrastructure may be identified. Land use changes, affordable housing, green rebuilding, and public and environmental health might also be integrated into the recovery process.

Local Implementation

Currently, the Town's post-disaster mitigation procedures are codified through the Floodplain Management Ordinance, which sets higher regulatory standards for buildings in the SFHA, including a one foot freeboard, and sets a cumulative substantial damage and lower substantial damage requirement, among other flood damage protection policies.

CRS Credit

The CRS does credit post-disaster mitigation procedures if the policies and procedures are incorporated into a flood mitigation or multi-hazard plan through Activity 510 - Floodplain Management Planning.

The table below summarizes emergency services measures considered by the FMPC and provides the rationale for whether or not the FMPC recommended pursuing each alternative.

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Recommended?
10.	Work with Miami-Dade County Emergency Management on identifying vulnerable populations who may need assistance for evacuations.	Emergency managers may not know where vulnerable populations are located. Having this information in a database/GIS mapping can better equip responders to assist in evacuations	Yes
11.	Work with Miami-Dade County Emergency Management, state and federal governments, to protect vulnerable critical facilities to ensure they can operate properly during flooding conditions.	Critical facilities which operate as either evacuation centers or pump flood waters, or sewage should be protected from flood damage so they perform without interruption.	Yes
-	Complete a Post-Disaster Redevelopment Plan to determine if and how development changes should be enacted to incorporate mitigation in post-disaster redevelopment	There is not currently local or political support to develop a post-disaster redevelopment plan. Policies controlling post-flood redevelopment are included in the flood damage prevention ordinance.	No

C.4.5 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 residents 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. Key considerations when evaluating the use of a levee include:

- ▶ Design and permitting costs
- ▶ Right of way acquisition
- ▶ Removal of fill to compensate for the floodwater storage that will be displaced by the levee
- ▶ Internal drainage of surface flows from the area inside the levee
- ▶ Cost of construction
- ▶ Cost of maintenance
- ▶ Mitigation of adverse impacts to wetlands and other habitats
- ▶ Loss of river access and views
- ▶ Creating a false sense of security, because while levees may reduce flood damage for smaller more frequent rain events, they may also overtop or breach in extreme flood events and subsequently create more flood damage than would have occurred without the levee

Reservoirs and Detention

Reservoirs reduce flooding by temporarily storing flood waters behind dams or in storage or detention basins. Reservoirs lower flood heights by holding back, or detaining, runoff before it can flow downstream. Flood waters are detained until the flood has subsided, and then the water in the reservoir or detention basin is released or pumped out slowly at a rate that the river can accommodate downstream.

Reservoirs can be dry and remain idle until a large rain event occurs. Or they may be designed so that a lake or pond is created. The lake may provide recreational benefits or water supply (which could also help mitigate a drought).

Flood control reservoirs are most commonly built for one of two purposes. Large reservoirs are constructed to protect property from existing flood problems. Smaller reservoirs, or detention basins, are built to protect property from the stormwater runoff impacts of new development.

Diversion

A diversion is a new channel that sends floodwaters to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel. During floods, the floodwaters spill over to the diversion channel or tunnel, which carries the excess water to a receiving lake or river.

Dredging

Dredging is often viewed as a form of conveyance improvement. However, it has the following problems:

- ▶ Given the large volume of water that comes downstream during a flood, removing a foot or two from the bottom of the channel will have little effect on flood heights.



- ▶ Dredging is often cost prohibitive because the dredged material must be disposed of somewhere.
- ▶ Unless in-stream or tributary erosion is corrected upstream, the dredged areas usually fill back in within a few years, and the process and the expense have to be repeated.
- ▶ If the channel has not been disturbed for many years, dredging will destroy the habitat that has developed.

To protect the natural values of the stream, federal law requires a U.S. Army Corps of Engineers permit before dredging can proceed. This can be a lengthy process that requires a lot of advance planning and many safeguards to protect habitats, which adds to the cost of the project.

Local Implementation

The Town of Cutler Bay does not currently receive credit for Activity 530 - Flood Protection.

CRS Credit

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 in order to avoid duplicating the larger premium reduction provided by removing properties from the mapped floodplain.

The CRS credits smaller flood control projects that meet the following criteria:

- ▶ They must provide protection to at least the 25-year flood
- ▶ They must meet certain environmental protection criteria
- ▶ They must meet federal, state and local regulations, such as the Corps of Engineers' 404 permit and State dam safety rules
- ▶ They must meet certain maintenance requirements

These criteria ensure that credited projects are well-planned and permitted. Any of the measures reviewed in this section would be recognized under Activity 530 - Flood Protection. Credit points are based on the type of project, how many buildings are protected, and the level of flood protection provided.

The table below summarizes structural project measures considered by the FMPC and provides the rationale for whether or not the FMPC recommended pursuing each alternative.

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Recommended?
2.	Improve drainage capacity in the Saga Bay sub basin through upgraded stormwater piping in order to discharge the volume of runoff necessary to meet desired performance criteria for modeled storm events, as determined through hydrologic and hydraulic calculations.	Observed flooding across roadway and localized ponding in roadway in multiple locations within the sub-basins. Multiple complaints have been received.	Yes
-	Implement drainage improvements to increase system capacity throughout the Town.	The Town is currently updating its Capital Improvements Plan to identify new projects which will be recommended for implementation at a later date once project parameters and funding estimates are defined.	No



C.4.6 Public Information

Outreach Projects

Outreach projects are the first step in the process of orienting property owners to the hazards they face and to the concept of property protection. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties.

Awareness of the hazard is not enough; people need to be told what they can do about the hazard. Thus, projects should include information on safety, health and property protection measures. Research has shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions.

Community newsletters/direct mailings: The most effective types of outreach projects are mailed or distributed to everyone in the community. In the case of floods, they can be sent only to floodplain property owners.

News media: Local newspapers can be strong allies in efforts to inform the public. Local radio stations and cable TV channels can also help. These media offer interview formats and cable TV may be willing to broadcast videos on the hazards.

Other approaches: Examples of other outreach projects include:

- ▶ Presentations at meetings of neighborhood, civic or business groups
- ▶ Displays in public buildings or shopping malls
- ▶ Signs in parks, along trails and on waterfronts that explain the natural features (such as the river) and their relation to the hazards (such as floods)
- ▶ Brochures available in municipal buildings and libraries
- ▶ Special meetings, workshops and seminars

Local Implementation

A community brochure is mailed to all properties in the community on an annual basis. An outreach brochure is mailed annually to all properties in the SFHA. The community also provides flood information at the Town Hall and distributes both a County and Town Hurricane Guide and prints flood information in the phone book. Cutler Bay maintains a Town website that provides flood protection information. Flood education materials are also provided in the Miami-Dade County library. More details on the Town's outreach program is provided in the Program for Public Information (PPI) in Appendix A.

CRS Credit

The Town of Cutler Bay currently receives credit under Activity 330 – Outreach Projects as well as Activity 350 – Flood Protection Information.

Real Estate Disclosure

Many times after a flood or other natural disaster, people say they would have taken steps to protect themselves if they had known they had purchased a property exposed to a hazard. There are some federal and state requirements about such disclosures:

- ▶ Federal law: Federally regulated lending institutions must advise applicants for a mortgage or other loan that is to be secured by an insurable building whether the property is in a floodplain as shown on the Flood Insurance Rate Map. If so, flood insurance is required for buildings located within the floodplain if the mortgage or loan is federally insured.
- ▶ State law: State laws set standards for real estate sales and licensing of agents and brokers.



Local Implementation

Cutler Bay requires local real estate agents to disclose flood hazards to prospective buyers.

CRS Credit

Cutler Bay currently receives credits under Activity 340 – Hazard Disclosure.

Libraries and Websites

The two previous activities tell people that they are exposed to a hazard. The next step is to provide information to those who want to know more. The community library and local websites are obvious places for residents to seek information on hazards, hazard protection, and protecting natural resources.

Books and pamphlets on hazard mitigation can be given to libraries, and many of these can be obtained for free from state and federal agencies. Libraries also have their own public information campaigns with displays, lectures and other projects, which can augment the activities of the local government. Today, websites are commonly used as research tools. They provide fast access to a wealth of public and private sites for information. Through links to other websites, there is almost no limit to the amount of up to date information that can be accessed on the Internet.

In addition to online floodplain maps, websites can link to information for homeowners on how to retrofit for floods or a website about floods for children.

Local Implementation

Cutler Bay provides flood materials through the Miami-Dade County library. The Town also provides flood protection information on their website.

CRS Credit

The Town of Cutler Bay currently receives credit under Activity 350 – Flood Protection Information. The CRS provides credits for having a variety of flood references in the local public library and for providing similar material on municipal websites.

Technical Assistance

Hazard Information

Residents and business owners that are aware of the potential hazards can take steps to avoid problems or reduce their exposure to flooding. Communities can easily provide map information from FEMA's Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies. They may also assist residents in submitting requests for map amendments and revisions when they are needed to show that a building is located outside the mapped floodplain.

Some communities supplement what is shown on the FIRM with information on additional hazards, flooding outside mapped areas and zoning. When the map information is provided, community staff can explain insurance, property protection measures and mitigation options that are available to property owners. They should also remind inquirers that being outside the mapped floodplain is no guarantee that a property will never flood.

Property Protection Assistance

While general information provided by outreach projects or the library is beneficial, most property owners do not feel ready to retrofit their buildings without more specific guidance. Local building department staffs are experts in construction. They can provide free advice, not necessarily to design a protection measure, but to steer the owner onto the right track. Building or public works department staffs can provide the following types of assistance:

- ▶ Visit properties and offer protection suggestions



- ▶ Recommend or identify qualified or licensed contractors
- ▶ Inspect homes for anchoring of roofing and the home to the foundation
- ▶ Explain when building permits are needed for home improvements.

Local Implementation

FEMA floodplain maps are available on Cutler Bay's website, and the Town responds to requests on whether a property is located in a Special Flood Hazard Area. Property protection measures are also included on the Town's website. Cutler Bay also responds to drainage complaints and provides technical advice and assistance to interested property owners and annually publicizes the service.

CRS Credit

Cutler Bay currently receives credit under Activity 360 – Flood Protection Assistance.

Public Information Program

A public information program (PPI) is a document that receives CRS credit. It is a review of local conditions, local public information needs, and a recommended plan of activities. A PPI consists of the following parts, which are incorporated into this plan:

- ▶ The local flood hazard
- ▶ The property protection measures appropriate for the flood hazard
- ▶ Flood safety measures appropriate for the local situation
- ▶ The public information activities currently being implemented within the community, including those being carried out by non-government agencies
- ▶ Goals for the community's public information program
- ▶ The outreach projects that will be done each year to reach the goals
- ▶ The process that will be followed to monitor and evaluate the projects

Local Implementation

A PPI for Cutler Bay has been included as Appendix A of this Plan.

CRS Credit

The CRS provides credit for a PPI under Activity 330 – Outreach Projects.

The table below summarizes public information and outreach measures considered by the FMPC and provides the rationale for whether or not the FMPC recommended pursuing each alternative.

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Recommended?
4.	Promote an Enviro Scape model to elementary school students to help them understand sources of flooding and prevention of water pollution.	Town is committed to public outreach programs dedicated to informing the public about flood risk and pollution prevention	Yes
7.	Promote the purchase of flood insurance to residents and businesses to increase policy base and ensure protection from flood losses.	A majority of the Town is located in a 100-year floodplain. The more buildings that have flood insurance the fewer properties that will have to cover flood damage repairs out of pocket.	Yes
9.	Increase awareness of the flood hazard through development of a PPI.	Improving upon the overall messaging, dissemination methods, and who the Town is targeting with those messages will improve the overall effectiveness of the outreach program and may result in a better informed public.	Yes

C.5 MITIGATION ALTERNATIVE SELECTION CRITERIA

The following criteria were used to select and prioritize proposed mitigation measures:

STAPLEE

- ▶ **Socially Acceptable:** Is the action acceptable to the community? Does it have a greater impact on a certain segment of the population? Are the benefits fair?
- ▶ **Technically Feasible:** Is the action technically feasible? Is it a long-term solution to the problem? Does it capitalize on existing planning mechanisms for implementation?
- ▶ **Administrative Resources:** Are there adequate staffing, funding and other capabilities to implement the project? Is there adequate additional capability to ensure ongoing maintenance?
- ▶ **Politically Supported:** Will there be adequate political and public support for the project? Does the project have a local champion to support implementation?
- ▶ **Legally Allowable:** Does the community have the legal authority to implement the action?
- ▶ **Economically Sound:** Can the action be funded locally? Will the action need to be funded by an outside entity, and has that funding been secured? How much will the project cost? Can the benefits be quantified, and do they outweigh the costs?
- ▶ **Environmentally Sound:** Does the action comply with environmental regulations? Does the action meet the community's environmental goals? Does the action impact land, water, endangered species, or other natural assets?

Action Efficacy

- ▶ Will the action result in lives saved?
- ▶ Will the action reduce property damages?
- ▶ Will the action reduce the need for response actions?
- ▶ Will the benefits exceed the cost?

Sustainable Disaster Recovery Principles

- ▶ Quality of life
- ▶ Social equity
- ▶ Hazard mitigation
- ▶ Economic development
- ▶ Environmental protection/enhancement
- ▶ Community participation

Smart Growth Principles

- ▶ Infill versus sprawl
- ▶ Efficient use of land resources
- ▶ Full use of urban resources
- ▶ Mixed uses of land
- ▶ Transportation options
- ▶ Detailed, human-scale design