Coconut Creek

CLIMATE CHANGE VULNERABILITY ASSESSMENT

Acknowledgements

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EXECUTIVE SUMMARY

Reasons for Resiliency

Like many other communities in the world, Coconut Creek has been experiencing the increasing impacts of more frequent and severe climatic threats such as stronger hurricanes, more severe rainfall events, extreme heatwaves, and more. As such, it is imperative that the City invest in climate resilience by identifying potential risks to future climatic events while proactively investing in infrastructure improvements to minimize disruption to imperative assets and services.

Threats & Assets

The document identifies and analyzes the City's critical assets and their exposure to climatic threats. The assets analyzed fall into four categories defined by state statutes and include the following:

- ***Transportation assets and evacuation routes***
- ***Critical infrastructure***
- ***Critical community and emergency facilities***
- ***Natural, cultural, and historical resources***

Protecting these assets are essential for the community to function and support a high quality of life. Therefore, the assessment examines how these assets are affected by different hazards including storm surge, sea level rise, rainfall-induced flooding, groundwater inundation, and extreme heat.

Key Findings

The assessment identified the following key findings and vulnerabilities to the people and assets of Coconut Creek.

Effects of storm surge are minimal but still may affect the City.
There is currently no threat of storm surge to Coconut Creek as a factor alone. However, significant storm surge events may lead to climate driven population displacement from more affected areas of the state relocating to Coconut Creek, leading to a strain on the City's resources if not prepared. The City is also along several evacuation routes.

Sea level rise can lead to an influx of locally displaced residents.
Sea level rise does not directly impact the City, but there may be indirect effects in the form of population migration from coastal residents pushed out of low-lying areas due to the rising cost of insurance premiums or inability to adapt assets. This threat could result in a shift in population migration patterns in the future.

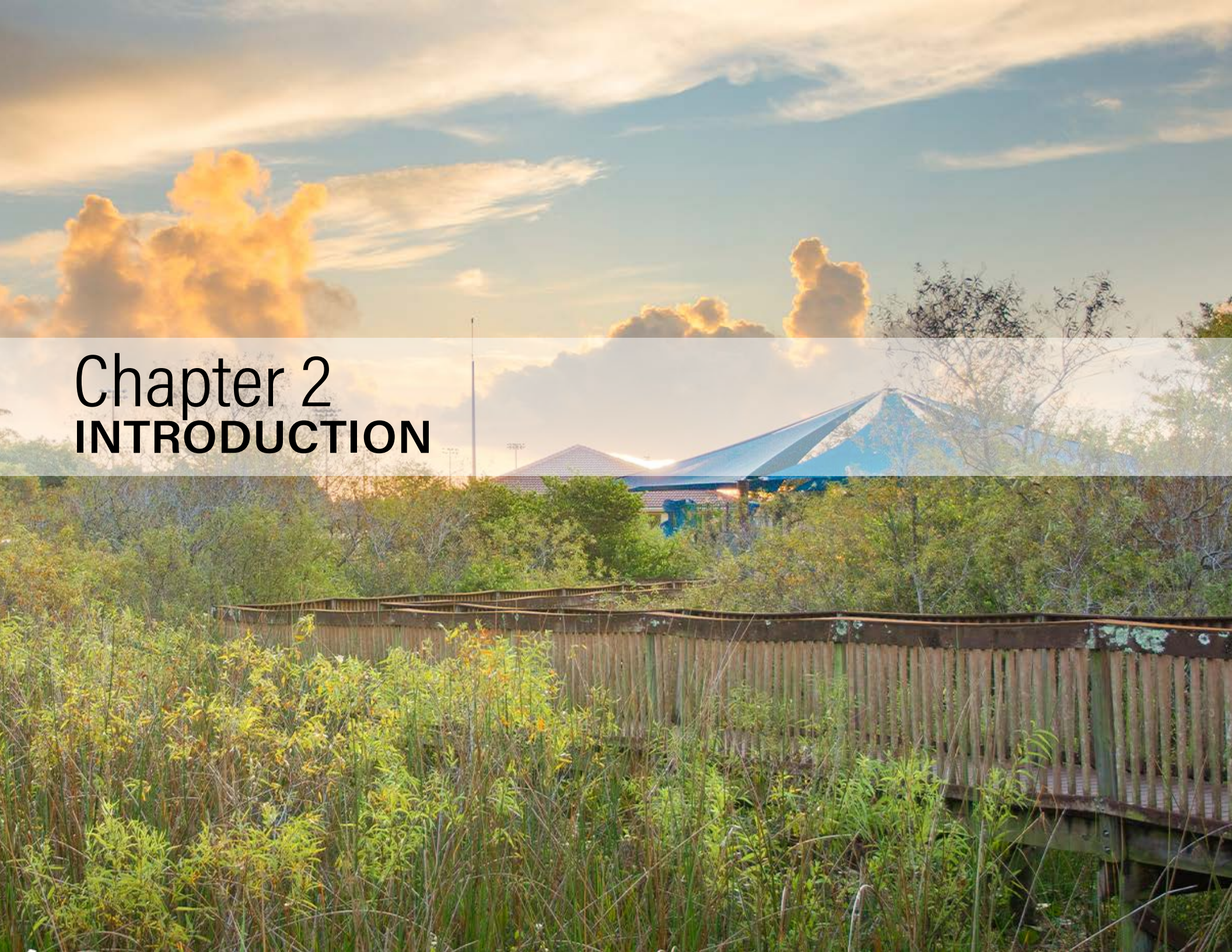
Several facilities and infrastructure are vulnerable to flooding.
A quarter of roadways in the City are vulnerable to rainfall induced flooding. Several community and emergency facilities are at moderate to high risk of flooding including five grocery stores, one community center, seven schools and colleges (including one identified as an evacuation shelter), one essential facility, three healthcare facilities, and all mobile home parks. A total of 22 parks are vulnerable to flooding.

Large areas of the City are vulnerable to extreme heat.
A large swath of the City between Sample Road and the Sawgrass Expressway as well as a large portion located the northeast of Atlantic Boulevard and Lyons Road are highly exposed to extreme heat events.

Focus Area Topics

The document identified three focus areas and recommends adaptive strategies and potential projects to adapt the City's critical assets and reduce disruption caused by climatic events. The three focus areas are as follows:

- Focus Area 1: Resiliency of the Built Environment
- Focus Area 2: Socially Vulnerable Populations and Community Resilience
- Focus Area 3: Transportation Assets and Performance



Chapter 2
INTRODUCTION

Overview

The world is experiencing unprecedented disruption associated with human-induced, negative changes in climate. The social, environmental, and economic costs of disruption are pervasive, affecting virtually every location, whether it be due to excessive rainfall and flooding, rising seas, or drought and wildfires. The City of Coconut Creek (City) is widely recognized for its progressiveness with strong commitments to environmental preservation and the desire for sustainable, green construction. Even with these efforts, the City could still be susceptible to the effects of climate change that impact the South Florida region, including increased temperatures, flooding, and changes in precipitation patterns. A Climate Vulnerability Assessment (CVA) has been performed to help the City better understand how these impacts may affect its future.

A CVA is an evaluation of an area's potential exposure, impacts, and risks due to climate change. The focus of this CVA is sea level rise, storm surge, compound flooding, rising groundwater, and extreme heat. In addition, it assesses how these changes can affect City assets such as infrastructure, natural resources, and the economy. The CVA identifies City assets that may be vulnerable to climate change and prioritizes projects or programs that may prevent or mitigate impacts to those vulnerable assets.

A vulnerability assessment helps a community determine which physical, social, and cultural assets are likely to be impacted by future flooding, rain events, and heat.

Project Scope and Timeline

The CVA follows a scope of work and schedule that contains key components for identifying climate-vulnerable areas within Coconut Creek.

- Kickoff
- Public Outreach
- Acquire Background Data
- Draft Vulnerability Assessment
- Final Vulnerability assessment

Figure 2.1: *Project Timeline*

Framework

This study follows the Florida Department of Environmental Protection (FDEP) Resilient Florida Program framework for conducting vulnerability assessments. The project team conducted a kickoff meeting with City staff to establish project processes and goals and to identify Steering Committee participants. The project team, Steering Committee, and public, through engagement, led the direction of the study within the parameters of the state statutes and the FDEP framework. The foundation of the study is the background data obtained from various sources. The study's first phase entailed sourcing all FDEP mandatory datasets and compiling them in the proper format. The Steering Committee identified additional datasets for climate threats and critical assets. The Steering Committee was provided opportunity to review all datasets for accuracy before moving forward.

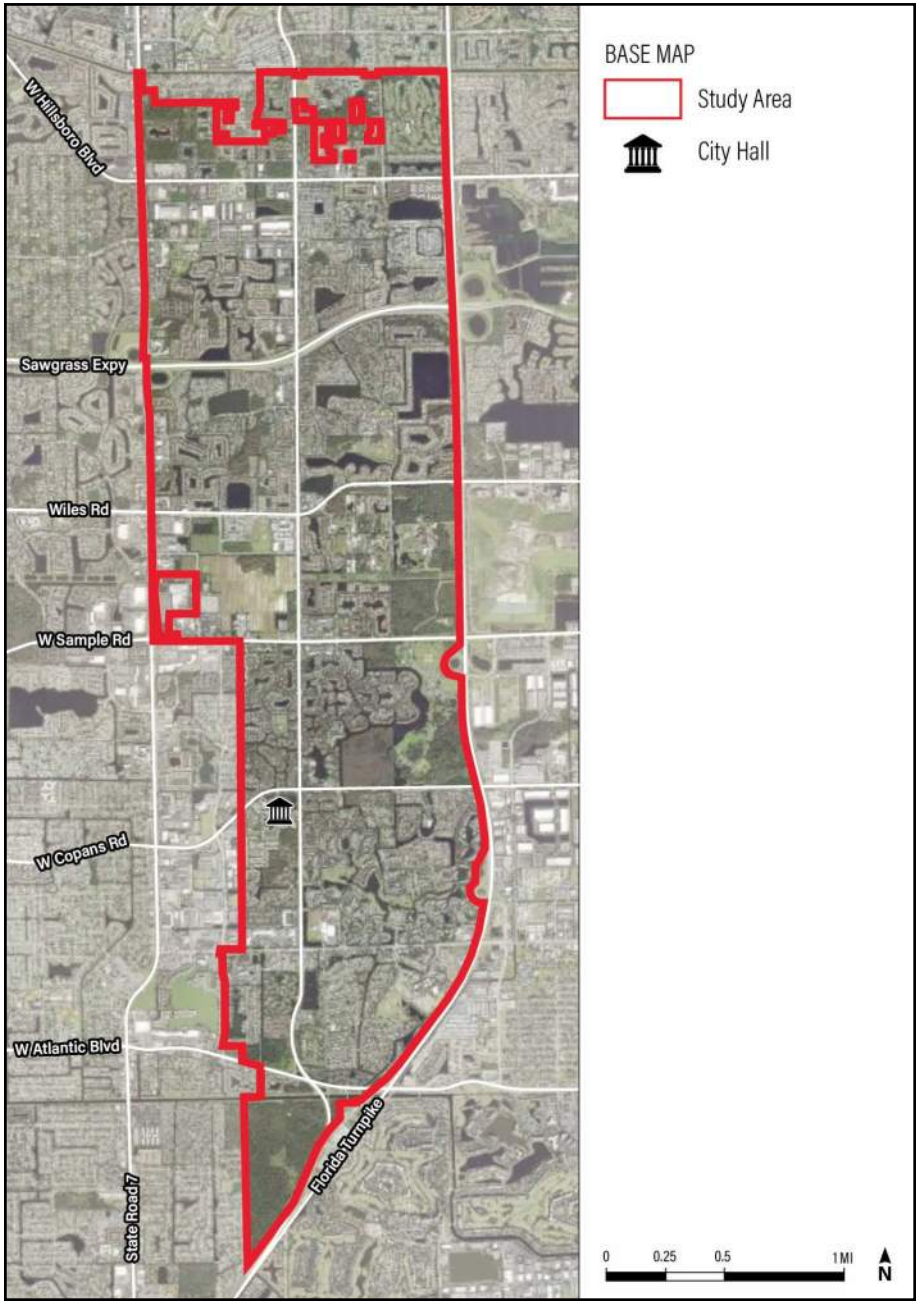
The data collected was used to conduct Citywide exposure and sensitivity analyses. The exposure analysis consists of overlaying the studied threats onto the physical boundaries of the City to identify where impacts may occur and to determine to what extent various classes of facilities are sensitive to climate change threats. The project team and Steering Committee reviewed the results of these analyses to assign focus areas of the study; those locations or assets that warrant special attention during this study and future planning processes. The final step of the study was to identify priority areas that need immediate investment in capital improvement projects to mitigate climate impacts.

Study Area

The study area is the boundary of Coconut Creek, a City located in Broward County, Florida. The City is in the southeastern part of the state, approximately 10 miles inland from the Atlantic Ocean. The City is bordered to the west by the cities of Margate, Coral Springs, and Parkland and to the east by Pompano Beach and Deerfield Beach. Florida's Turnpike runs just east of Coconut Creek and the Sawgrass Expressway bisects the northern portion of the City. The City contains several small unincorporated enclaves on its northern end which are not part of the City's jurisdiction. As such, they have not been included in the spatial analyses of the study.

Coconut Creek's *Salsa in September* event.
Source: City of Coconut Creek

Figure 2.2: *Coconut Creek Boundary Map*
(Source: BCGIS, 2023)



Guiding Documents

This study relies on developed, tested methodologies, and analytical approaches tailored to Florida's unique environmental conditions and regulatory structure. The principal framework and guidance for the study is derived from the following documents.

City of Coconut Creek's Grant Work Plan Agreement (No. 23PLN75)

This document establishes the principal framework and guidance for the Vulnerability Assessment. Because the study is funded partially through an FDEP grant, it follows the requirements of a pre-established work plan. The work plan is consistent with Section 380.093, Florida Statutes, which establishes the Resilient Florida grant program and outlines requirements for awardees.

Resilient Florida Program.

Supporting documents from this program to expand on the statutory clauses and guide the resilience planning process for Florida communities. These documents include:

- **Standardized Vulnerability Assessment** - Scope of Work Guidance – This was developed by FDEP. as a resource specifically for preparing Resilient Florida-compliant vulnerability assessments. It is divided into "task" sections which parallel the requirements in the work plan.
- **The Adaptation Planning Guidebook** - A joint publication of the Florida Coastal Management Program, FDEP, and the National Oceanic and Atmospheric Administration (NOAA). The guidebook, which predates the Resilient Florida grant program, provides steps to conduct a vulnerability assessment, best practices, and case studies.

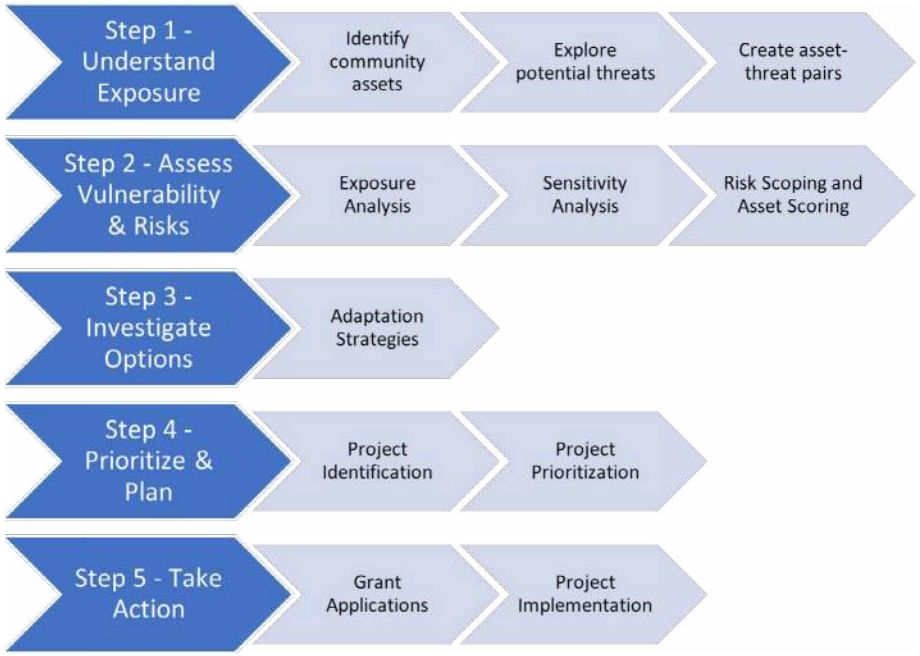
Together, these documents contributed to and informed the study process developed for Coconut Creek's specific needs and goals.

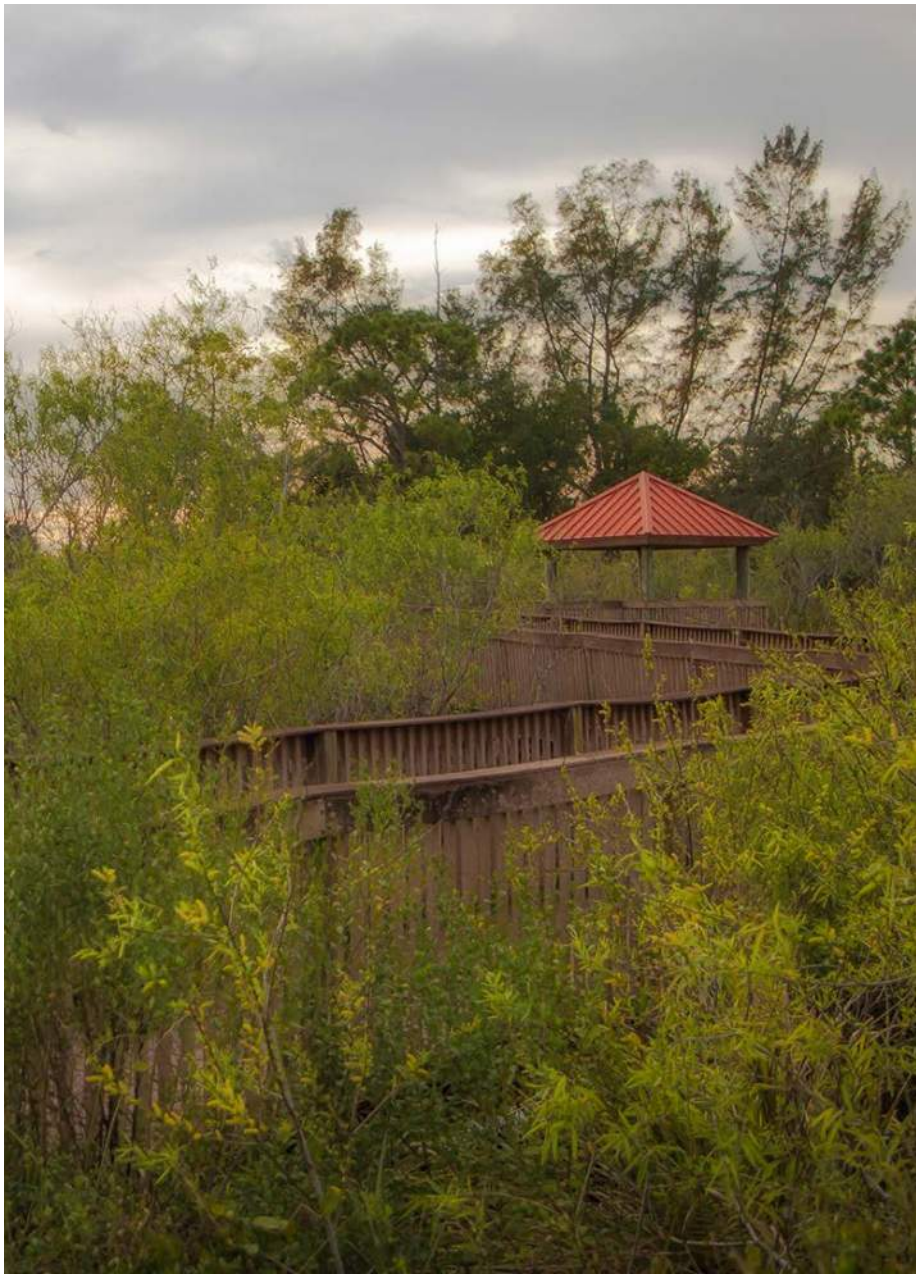
Chapter 3
METHODOLOGY

Overview

This climate change vulnerability assessment meets the criteria under the State of Florida's Resilient Florida program per Section 389.093, Florida Statutes. The methodology follows the process developed and published in the U.S. Climate Resilience Toolkit Steps to Resilience, outlined in Figure 3.1. The following sections describe each step in greater detail and explain how they were applied to the City of Coconut Creek.

Figure 3.1: *U.S. Climate Resilience Toolkit Steps to Resilience*
(Source: U.S. Climate Resilience Toolkit)





Sabal Pines Park
Source: City of Coconut Creek

Step 1: Understand Exposure

Step one of the "Steps to Resilience" involves exploring community assets and threats.

Identify Community Assets

In the context of this study, assets are people, places, and services that are identified as important to protect. They are typically essential to the functionality of the community and support a higher quality of life. This study identified assets from three sources: the Florida statutory requirements of the Resilient Florida program, the City's Department of Sustainable Development, and Steering Committee feedback. Each of these entities identified assets based on their unique perspectives and experiences.

The assets fall into four categories defined by the State Statutes as shown below and expanded upon in Appendix B.

Transportation assets and evacuation routes

Critical infrastructure

Critical community and emergency facilities

Natural, cultural, and historical resources

Explore Potential Threats

This study examines five threats, also referred to as hazards, to Coconut Creek including:

- storm surge
- sea level rise
- rainfall-induced flooding
- groundwater inundation
- extreme heat

The first three threats are required to be studied by the Resilient Florida program. Groundwater inundation and extreme heat were added at the request of the City as they felt that these threats were of particular concern given Coconut Creek's inland location.

Create Asset-Threat Pairs

Once the study team finalized the lists of community assets and threats, they were examined in relation to each other to determine which assets would be potentially vulnerable to each threat, thus warranting a more detailed study. Much of this process was determined by the Resilient Florida program, which stipulated that all required asset classes must be paired with the required threats of sea-level rise, storm surge, and flooding. The Steering Committee established which assets would be vulnerable to the threats of rising groundwater and extreme heat. The asset-threat pairing is thoroughly discussed in Chapter 6.

Step 2: Assess Vulnerability and Risks

Step two is to conduct the vulnerability assessment process, which has three principal steps: exposure analysis, sensitivity analysis, and scoping and scoring.

Figure 3.2: *Vulnerability assessment process*

EXPOSURE ANALYSIS

Identify what areas of the City are at risk.

SENSITIVITY ANALYSIS

Identify level of importance of specific critical asset.

VULNERABILITY RISK SCOPING & ASSET SCORING

Identify how vulnerable the critical asset is.

Coconut Creek's *Juneteenth* event
Source: City of Coconut Creek

Exposure Analysis

The purpose of the exposure analysis is to identify the geographic areas of the study area (in this case, the City limits of Coconut Creek) that will be directly exposed to the identified threats. This is achieved by projecting future conditions for each threat using models. For this study, all model projections were sourced from existing data which was vetted to ensure compliance with the Resilient Florida scenarios and time horizons. The time horizons we utilized are for years 2040 and 2070. We refer to these years as the "planning horizons" and these are as stipulated in the Resilient Florida program. The exposure analysis stops short of examining the effects of the threats on assets, as it solely focuses on the level at which each asset is exposed to the threats.

Working with the Steering Committee, we established a scoring system based on the anticipated flood elevation in relation to the asset elevation to come up with an exposure score and assist with prioritization and ranking. For each planning horizon, we looked at the Intermediate-Low and Intermediate-High scenario. As there was little difference between the different model scenarios, we focused on the 2070 Intermediate-High sea level rise projection model as a worst-case scenario. We did this for each individual asset identified in the exposure analysis. This is based on a temporary flooding situation; permanent flooding was found not to have an impact on the City.

Figure 3.3: *Exposure score criteria*

Score	Criteria
No exposure (0)	Flood elevation is 6 inches or more below the asset elevation.
Low (1)	Flood elevation is 0.01 inches to 5.99 inches below the asset elevation
Moderate (2)	Flood elevation is up to 6 inches higher than the asset elevation.
High (3)	Flood elevation is greater than 6.01 inches higher than the asset elevation.

Sensitivity Analysis

The sensitivity analysis begins where the exposure analysis ends. After determining the extent of the exposure of each threat to the study area, the critical assets were then reviewed based on their overall sensitivity. The sensitivity analysis identifies the level of importance of specific critical infrastructure. The sensitivity scores are derived from the Steering Committee.

Once we determined that an asset was exposed to a threat, we worked with the Steering Committee to determine how sensitive the asset was to the threat. Below are the scoring criteria used to establish sensitivity:

Figure 3.4: *Sensitivity score criteria*

WILL THE ASSET BE IMPACTED OR DAMAGED IF IT FLOODS?	
Score	**Criteria**
1	No, the asset will not be affected
2	Yes, mildly
3	Yes, damage will be significant but reversible
4	Yes, damage will be significant and irreversible

Vulnerability, Risk Scoping & Asset Scoring

Vulnerability and risk scoping builds on the sensitivity analysis, and includes the full list of metrics used to prioritize assets for adaptation strategies and to define focus areas; it introduces other dimensions to the asset ranking. Vulnerability and risk scoping seeks to identify assets that will be the most impacted, assets that will have the most consequences to the City, and assets that have the most adaptability for mitigation if impacted by threats.

Adaptive Capacity

Adaptive capacity refers to the ability of the asset to adapt to prevent or minimize impacts. We considered factors such as:

- Ability to elevate the asset
- Ability to relocate the asset
- Ability to retrofit/upgrade the asset

With the help of the Steering Committee, we developed scoring criteria to assist with future ranking and prioritization. We evaluated the impact on those assets should they be exposed to flooding using the following criteria:

Figure 3.5: *Adaptive capacity score criteria*

CAN THE ASSET ADAPT TO PREVENT OR MINIMIZE IMPACT?	
Score	**Criteria**
1	Yes, fully and/or at a reasonable cost and effort level
2	Yes, either partially or extremely costly or difficult to achieve
3	No, it is not possible

Consequence

The consequence of an asset being flooded can affect a community in ways that may not be immediately or physically obvious. The Steering Committee considered economic, social, and environmental factors such as:

- Damage to asset disrupts economic operations
- Loss of tourism opportunities
- Disruptions to life-safety systems such as emergency response
- Habitat or biodiversity loss

Again, with the help of the Steering Committee we established the scoring criteria below used to determine the consequence of the asset flooding:

Figure 3.6: *Consequence score criteria*

WILL THE COMMUNITY BE IMPACTED OR DAMAGED IF IT FLOODS?	
Score	**Criteria**
1	Mild consequences
2	Moderate consequences
3	Severe consequences

Tradewinds Park
Source: City of Coconut Creek

Step 3: Investigate Options

Step three consists of reviewing the findings of the previous steps and identifying potential adaptation strategies.

Adaptation Strategy Identification

Adaptation strategies are formulated after critically reviewing the results of step two. The most at-risk assets are identified, alongside data trends and geographic focus areas which could benefit from adaptation projects. The goal of this step is to gather ideas from stakeholders, the Steering Committee, and the public to produce a comprehensive list of strategies. Strategies can take many forms: policies, engineering projects, capacity building, and more.

Step 4: Prioritize and Plan

Step four builds on the previous steps by evaluating costs, benefits, and ability to implement (e.g., practicability) the strategies and solutions identified in step three.

Project Prioritization

The potential projects and strategies identified in step three undergo a scoring and ranking process, helping set priorities. The factors for scoring consist of the ability of the measure to increase resiliency, economic feasibility, and public benefit. Once we tabulated the score from the exposure and sensitivity analysis, vulnerability, and consequences, we utilized those scores to visually represent the highest priority assets.

This scoring process identifies that assets with a higher sensitivity and exposure could be considered a higher priority asset to protect. See Figure 3.7.

Step 5: Take Action

The final step to resilience is implementation. It takes the findings of the report and puts them into practice. The timeline for this step is ongoing, as opportunities to change policies, adapt structures, and build capacity are planned, designed, and funded.

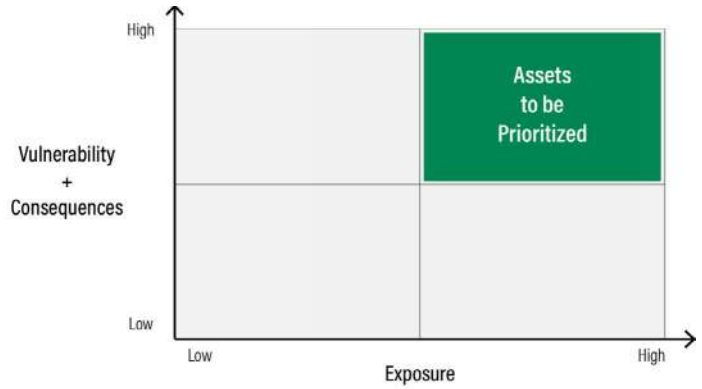
Grant Applications

As the understanding of the impacts of climate change increases with commensurate changes in public policies, funding for projects that seek to address it is also likely to increase. Preparing to apply for potential funding will be important to writing successful grant applications. This study helps the City make a case for such funding.

Project Implementation

Implementation of the identified projects will be an ongoing process. Input on prioritization, funding, and public opinion can all influence the order and rate of project implementation, inclusive of newer climate science findings and stresses or threats outside the scope of this report. Flexibility and adaptability are paramount to ensuring implemented work programs meet the future needs of the City and its residents. Results of projects should be monitored and applied to each subsequent project.

Figure 3.7: *Example prioritization output*



Chapter 4
THREATS

Overview

The assessment of vulnerability and risk for the City of Coconut Creek focuses on the threats of storm surge, sea level rise, rainfall-induced flooding (compound flooding), groundwater inundation, and extreme heat.

This chapter is an overview of the threats and their potential impact. Chapter 7 will go into more detail on how each or if each of these threats specifically impact the City of Coconut Creek.

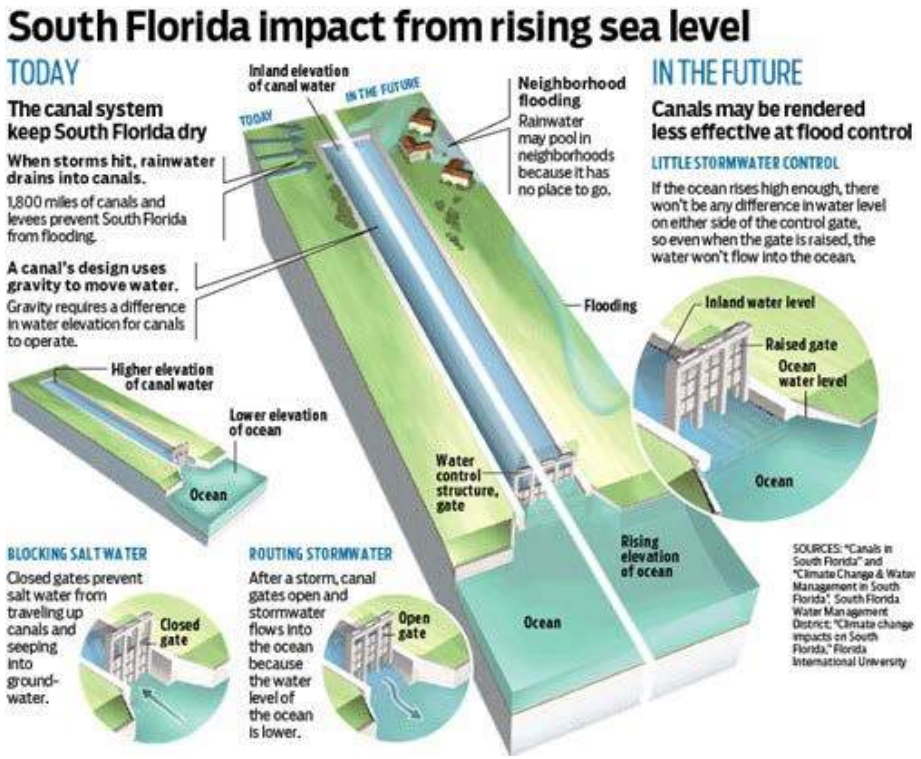
Storm Surge

NOAA defines storm surge as "an abnormal rise of water generated by a storm, over and above the predicted astronomical tides" (National Hurricane Center). It is compounded with the normal astronomical tide as the storm tide, the total height of water during a storm event. The higher water height due to the surge allows it to travel further inland and at higher elevations. Storm surge is often cited as one of the most dangerous and costly threats associated with storm events. Hurricane Katrina in 2005 was the costliest hurricane on U.S. soil, due in part to the extreme storm surge of 25 to 28 feet above normal levels (National Hurricane Center). In 2022, "Hurricane Ian caused at least 156 fatalities. The storm surge had the deadliest impact, claiming 41 lives, with 36 of the 41 surge fatalities occurring near Fort Myers Beach, close to where Ian made landfall" (Wulfeck, Andrew).

Sea-Level Rise

Sea levels have been rising globally over the past century (National Ocean Service). The rise is caused principally by two sources related to our warming climate: thermal expansion of water and melting ice. These factors are increasing global average sea levels and local sea levels to different degrees. South Florida is vulnerable to sea level rise due to its large coastal area and low ground elevations. Sea level rise amplifies the effects of other coastal threats such as storm surge and tidal flooding.

Figure 4.1: *South Florida Impact From Rising Sea Level*
(Source: Sun Sentinel)



Rainfall-Induced Flooding

Because the City is less impacted by storm surge and sea level rise independently, this study's principal focus is on rainfall-induced flooding, also known as compound flooding. It is important to study this threat compared to those threats that are more coastal oriented because of Coconut Creek's inland location. Rainfall-induced flooding is modeled using a combination of multiple, simultaneous threats that are impacted or amplified by climate change. Storm events are the principal threat in which threats such as sea level rise, storm surge, and groundwater inundation can be present simultaneously. The goal of this analysis is to determine how the combination of these events occuring simultaneously can affect an area.

Extreme Heat

Increasing temperatures are the most direct effect of climate change. This study examines heat through two lenses: extreme heat due to the urban heat island effect and heat-sensitive populations who are more sensitive and less able to adapt to extreme heat events. Heat can impact infrastructure, utilities, environmental health, and most importantly, humans. Extreme heat can be dangerous for vulnerable populations such as the young, elderly, and disabled.

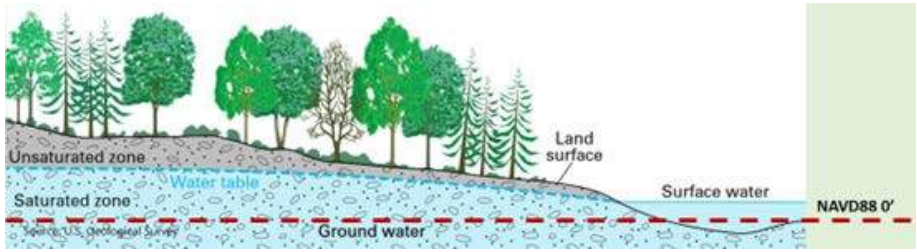
The urban heat island effect refers to the phenomenon where urban areas experience higher temperatures compared to the surrounding areas (United Stated Environmental Protection Agency). This effect is primarily caused by the excessive use of materials like concrete and asphalt, which absorb and re-radiate heat. Additionally, factors such as reduced vegetation, increased energy consumption, and daily human activities contribute to the heat island effect. Intense heat can cause damage to infrastructure such as roads and buildings. Heat stress can also negatively impact ecosystems and biodiversity. The urban heat island effect can raise temperatures in cities, contributing to discomfort, increased energy consumption for cooling, and potential strain on vulnerable populations.

Groundwater Inundation

The groundwater table is the subsurface zone of the Earth which is saturated with water. This level varies due to factors such as soil, climate, and ground elevation. It also fluctuates with the seasons, with the water table being higher during Florida's wet summers. Groundwater inundation, or the groundwater level rising closer to the surface, is projected to occur because of climate change. Sea level rise and increased precipitation are projected to impact South Florida's groundwater table. This could have implications for Coconut Creek's subsurface utilities, building foundations, and septic systems.

Groundwater level is measured to the North American Vertical Datum of 1988 (NAVD88), a national vertical standard. NAVD 88 consists of a leveling network on the North American Continent, ranging from Alaska, through Canada, across the United States, affixed to a single origin point on the continent (National Geodetic Survey).

Figure 4.2: *Future conditions of groundwater inundation*
(Source: Broward County)



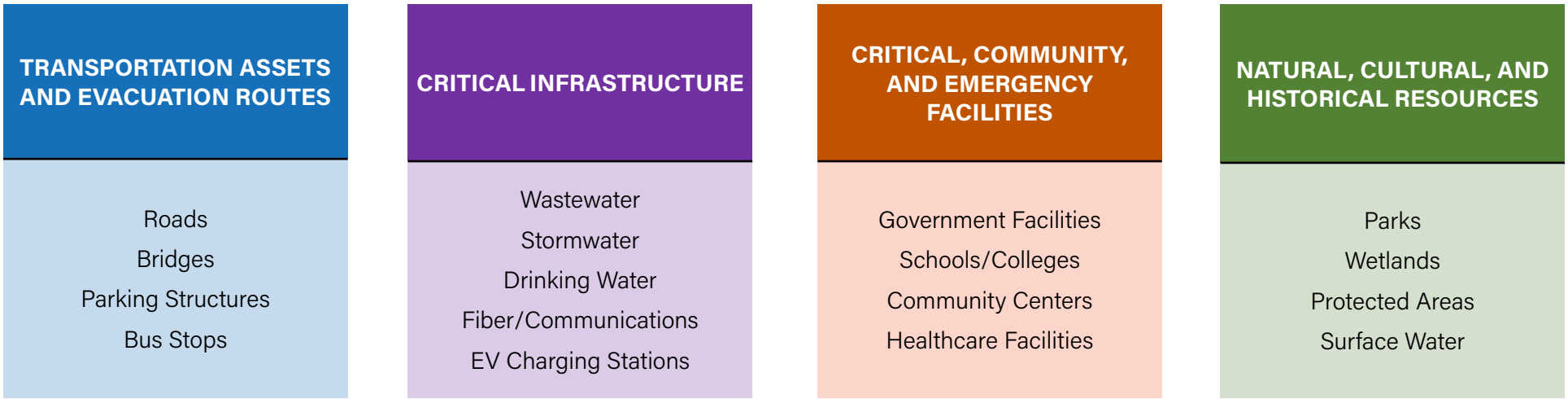
Chapter 5
CRITICAL ASSETS

Overview

This study defines assets as the people, resources, infrastructure, and services that people and communities rely on, value, and expect their leaders to manage and protect. These assets form the foundation of the study, as its purpose is to identify the assets that the City and residents hold in importance and if and how they will be affected by climate change in the future.

Critical/Regionally Significant Assets include transportation assets; critical infrastructure; community and emergency facilities; and natural, cultural, and historical resources. The core list of critical assets is established by the Resilient Florida grant program, which requires certain assets to be studied. This list was added to by the study team, the Steering Committee, and the public to reflect local conditions and priorities. The full list of Critical/Regionally Significant Assets is sorted into the following categories:

Figure 5.1: *Critical/Regionally Significant Asset categories*



Upon sourcing the existing data for each asset type, the location of these assets was presented on maps for the Steering Committee to review. The Steering Committee provided valuable feedback and critique of the data allowing the project team to add and subtract features based on current, local knowledge and recommended additional asset classes for inclusion. Any outdated features were removed, and new or missing data was geocoded from address information. Figure 5.1 provides more information on what is included in each asset type.

Table 5.1: *Asset Type Details*

ASSET TYPE DETAILS	
Asset Type	**Details**
Transportation Assets and Evacuation Routes	
Bridges	Roadway bridges on either city, county, or state roads.
Bus Stops	Broward County Transit bus stop locations. This asset type was included as it is the only public transit option located within the City.
Roads	This includes all private, City, County, and State-owned roads. Evacuation routes are also included in this asset.
Parking Structures	Privately owned, publicly accessible, structured parking. This asset type was included at the direction of the Steering Committee.
Critical Infrastructure	
Communications Infrastructure	Telecommunication towers.
Disaster Debris Management Sites	Solid waste and vegetation debris staging areas and management sites.
Water Infrastructure	Includes water mains, services, hydrants, valves, and meters. This infrastructure is either owned or operated by the City of Margate but within Coconut Creek city limits. Includes potable and reclaim systems.
Wastewater Infrastructure	Includes sanitary sewer mains and laterals. This infrastructure is either city owned or operated by the City of Margate but within Coconut Creek city limits.
Stormwater Infrastructure	Includes storm drain lines, culverts, manholes, inlets, control structures, outfalls, headwall, and yard drains.
Lift Stations	Sanitary sewer lift stations. This infrastructure is either city owned or operated by the City of Margate but within Coconut Creek city limits
Miscellaneous Utilities	Includes the Hilton Tank, water tower, FPL substations, and City Utility and Engineering Department
EV/PV Charging Stations	Publicly available electric vehicle charging stations. This asset type was included at the direction of the Steering Committee.
Critical Community and Emergency Facilities	
Essential Facilities	Fire rescue, police, and emergency operations centers.
Schools and Colleges	Includes public, private, charter, and preparatory schools from preschool to college level.
Community Centers	Includes the City operated community centers and recreation complex.
Grocery Stores	Privately owned grocery stores and markets. This asset type was included at the direction of the Steering Committee.
Healthcare Facilities	Includes long and short-term healthcare facilities, assisted living facilities, nursing homes, group homes, emergency medical facilities, surgery centers, and adult day cares. Private, in-home facilities or businesses are excluded.
Mobile Home Parks	Mobile home communities. This asset type was included at the direction of the Steering Committee.
Natural, Cultural, and Historic Resources	
Parks	Active or passive recreation areas. These may be located on public or private property.
Protected Natural Lands	Designated preserves, natural areas, greenways, or mitigation areas. These may be located on public or private property.
Wetlands	Naturally occurring low lying areas which may be covered by vegetation or water for varying periods during the year.
Surface Water	Naturally occurring lakes and ponds and manmade stormwater retention, canals, and conveyance systems.

Chapter 6
ASSET-THREAT PAIRING

Overview

The Resilient Florida grant program requires evaluating (pairing) all required assets with the sea level rise, storm surge, and rainfall-induced flooding threats. The study team followed this guidance, also selecting to review the additional asset classes identified by the Steering Committee with each of these threats.

To determine which assets should be evaluated with extreme heat and groundwater intrusion threats, the Steering Committee's local knowledge was used. The study team presented Steering Committee members with detailed summaries of those threats and the types of assets and used a survey to collect feedback. The list of assets consists of human-centric assets (bus stops) alongside mechanical and infrastructure assets (communications infrastructure).

Assets that have been evaluated for the threats are indicated in Table 6.1. An "X" identifies that the asset's risk has been assessed against the specific threat.

Coconut Creek *Juneteenth* event
Source: City of Coconut Creek

Table 6.1: *Asset Risk Evaluation By Threat*

ASSET RISK EVALUATION BY THREAT					
Asset Type	**Storm Surge**	**Sea Level Rise**	**Rainfall-Induced Flooding**	**Extreme Heat***	**Groundwater Intrusion***
Transportation Assets and Evacuation Routes					
Bridges	X	X	X		
Bus Stops	X	X	X	X	X
Roads	X	X	X		X
Parking Structures	X	X	X*		X
Critical Infrastructure					
Communications Infrastructure	X	X	X	X	
Disaster Debris Management Sites	X	X	X		X
Water Infrastructure	X	X	X		X
Wastewater Infrastructure	X	X	X		X
Stormwater Infrastructure	X	X	X		X
Lift Stations	X	X	X		
Miscellaneous Utilities	X	X	X		X
EV/PV Charging Stations	X	X	X*		
Critical Community and Emergency Facilities					
Essential Facilities	X	X	X	X	X
Schools and Colleges	X	X	X		
Community Centers	X	X	X	X	
Grocery Stores	X	X	X*		X
Healthcare Facilities	X	X	X	X	X
Mobile Home Parks	X	X	X*	X	X
Natural, Cultural, and Historic Resources					
Parks	X	X	X	X	X
Protected Natural Lands	X	X	X	X	
Wetlands	X	X	X	X	X
Surface Water	X	X	X	X	X

* = Included at the request of the Steering Committee

Chapter 7
VULNERABILITY AND RISK ASSESSMENT

Overview

Now that we have identified the critical assets and the threats, in this chapter we will review where those threats occur in relation to the asset location and if the assets are impacted, or "exposed". If the assets are exposed, then we will evaluate how vulnerable it is if exposed and if the asset can adapt or manage the threat.

As we did with the asset-threat paring in Chapter 6, we will review the critical assets for the following threats:

- **STORM SURGE**
- **SEA LEVEL RISE**
- **RAINFALL-INDUCED FLOODING**
- **GROUNDWATER INUNDATION**
- **EXTREME HEAT**

City Scenes
Source: City of Coconut Creek

Storm Surge & Sea Level Rise

As discussed in Chapter 4, storm surge is the abnormal rise of water, associated with a storm event, above what typically occurs with the tides. While normally we associate this with coastal areas, as we saw with Hurricane Ian, "storm surge reached up to 15 feet at the coast on Fort Myers Beach, and was pushed 15 miles inland. Along rivers and waterways, storm surge was pushed up to 24 miles inland, with a depth up to eight feet" (Pinellas County).

Like storm surge, sea level rise is not always just a coastal concern. "In Florida, sea level rise is already exacerbating saltwater intrusion and impacting groundwater supplies. Sea level rise is impacting gravity-flow drainage infrastructure, which is leading to more frequent and severe high tide (or "nuisance") flooding" (The Florida Climate Center). Due to the complex drainage and canal systems in South Florida, there can be concerns for inland impacts due to sea level rise that adversely impacts/ reduces stormwater discharge and tide via major coastal area discharge structures.

Exposure Analysis

For storm surge we reviewed the National Hurricane Center Storm Surge Risk Maps. This tool uses the National Hurricane Center's Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model to visualize the impact of storm surge for a hurricane event. The tool has maps for Category 1 - 5 storms. For this threat we studied the Category 5 storm map, see Figure 7.1.

For sea level rise we reviewed the NOAA's Sea Level Rise Viewer. This viewer depicts anticipated depth of sea level rise by the years 2040 and 2070. NOAA has six projections or scenarios for each of these planning horizons. They are Low, Intermediate-Low, Intermediate, Intermediate-High, and Extremes. We studied the Intermediate-Low and Intermediate-High scenarios as required by the Resilient Florida program, see Figures 7.2 through 7.5.

Key Findings

No Direct Impacts

There is currently no threat of storm surge or sea level rise to Coconut Creek as factors individualy, therefore no additional sensitivity analysis was conducted for either of these threats.

Indirect Impact - Climate Driven Population Displacement

More frequent and intense hurricanes can force people to leave their homes temporarily or permanently, particularly in lower elevation areas. This could lead to a strain on the City's resources if they are not prepared to receive displaced or vulnerable populations. Those effects may be particularly significant in times of evacuation orders in adjacent areas as well as the rest of the state. The City is along several evacuation routes and, with limited direct vulnerability to storm surge and sea level rise, may serve as a temporary or permanent shelter location for evacuees.

Indirect Impact - Climate Migration

Coastal regions which are more vulnerable to rising sea levels have already seen displacement of populations from those low-lying areas due to the rising cost of insurance premiums or inability to adapt assets. The City should be prepared to see a change in historic population migration patterns in the future.

Table 7.1: *NOAA Sea Level Rise Projections*

NOAA 2017 SLR PROJECTIONS	
Projection	**SLR Depth in Feet**
Intermediate-Low 2040	0.6 to 0.8
Intermediate-High 2040	1.3 to 1.6
Intermediate-Low 2070	1.1 to 1.14
Intermediate-High 2070	3.2 to 3.5

Figure 7.1: *Storm Surge Map*
(Source: NOAA, 2017)

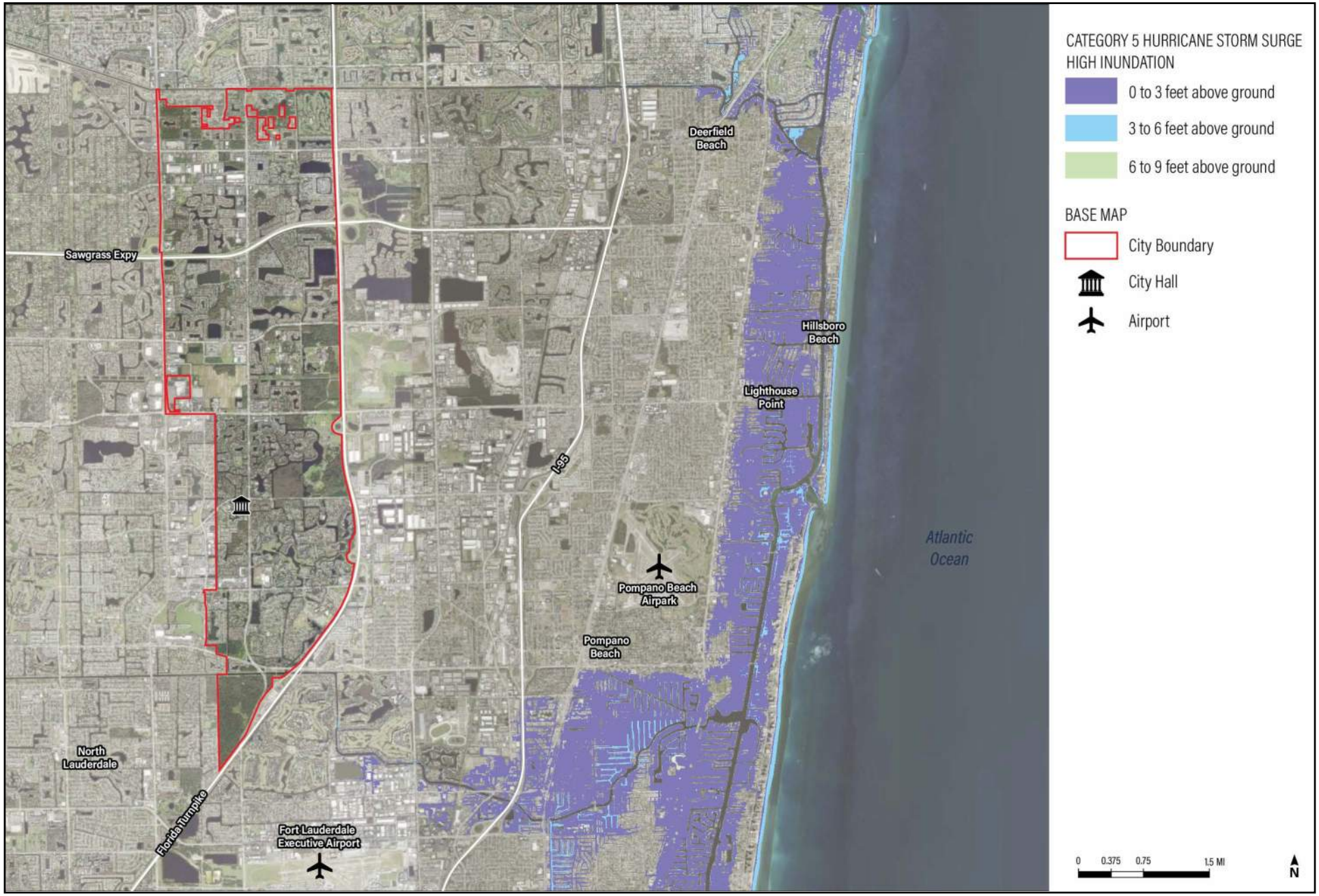


Figure 7.2: *2040, Intermediate Low Sea Level Rise Map*
(Source: NOAA, 2017)

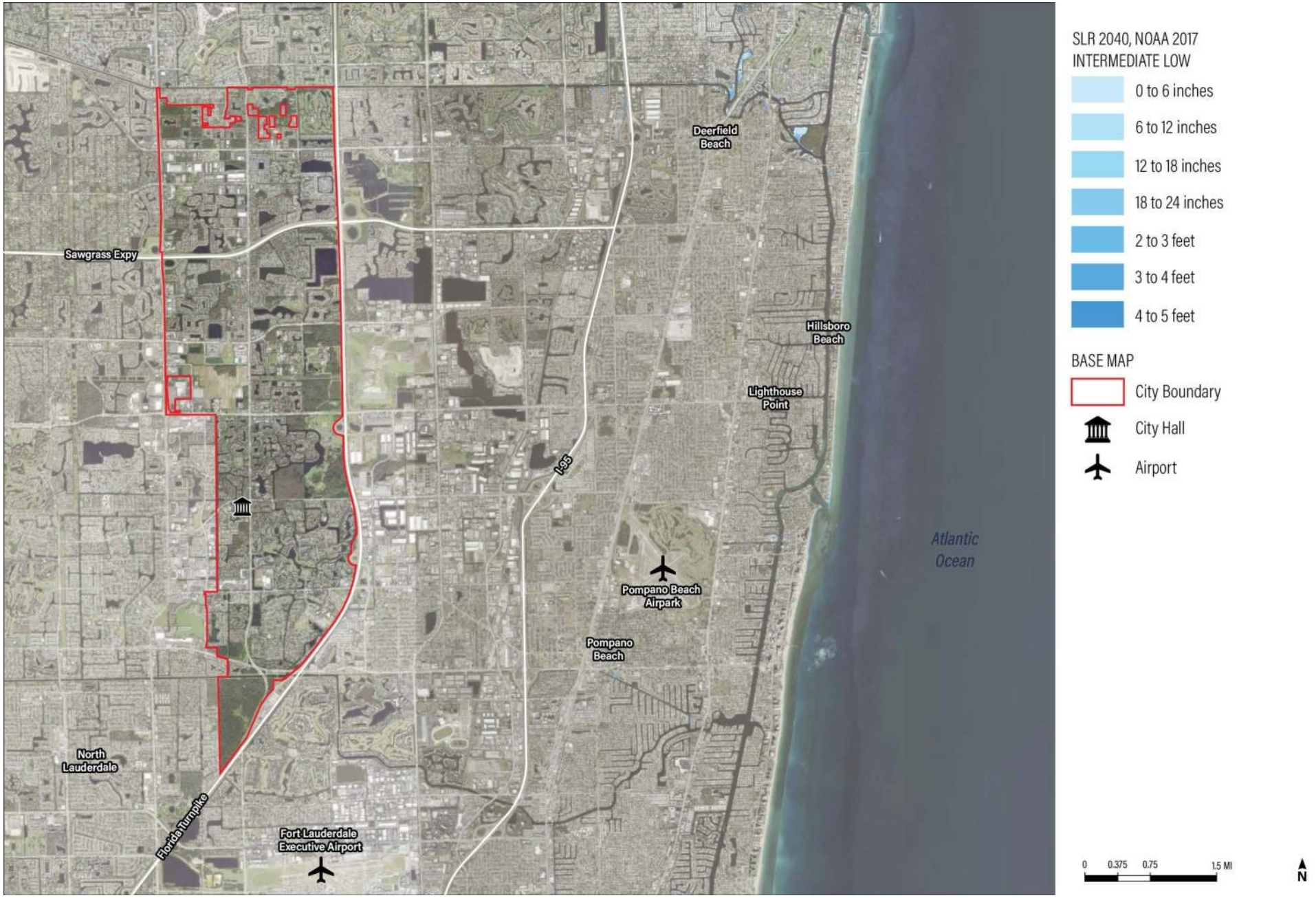


Figure 7.3: *2040, Intermediate High Sea Level Rise Map*
(Source: NOAA, 2017)

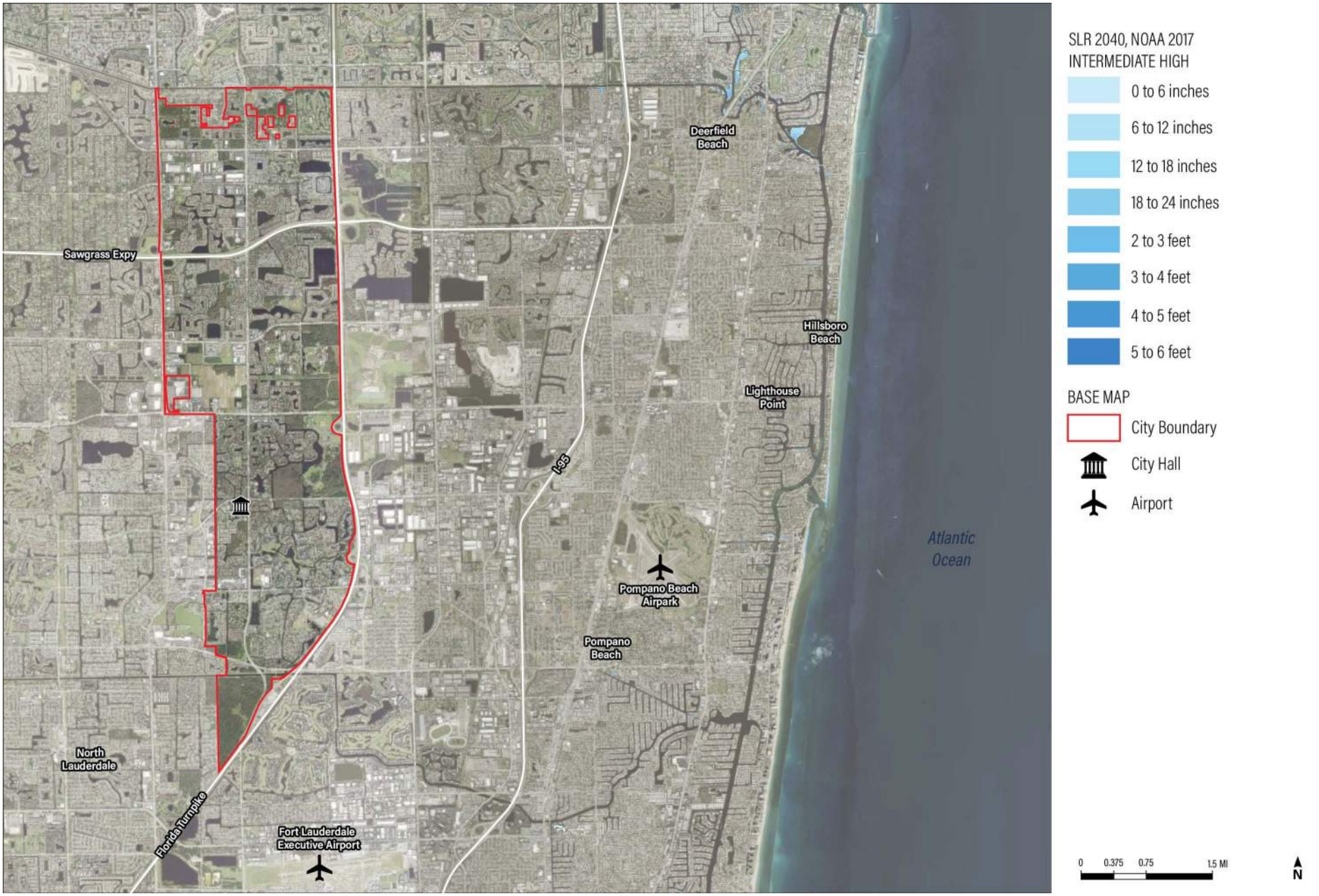


Figure 7.4: *2070, Intermediate Low Sea Level Rise Map*
(Source: NOAA, 2017)

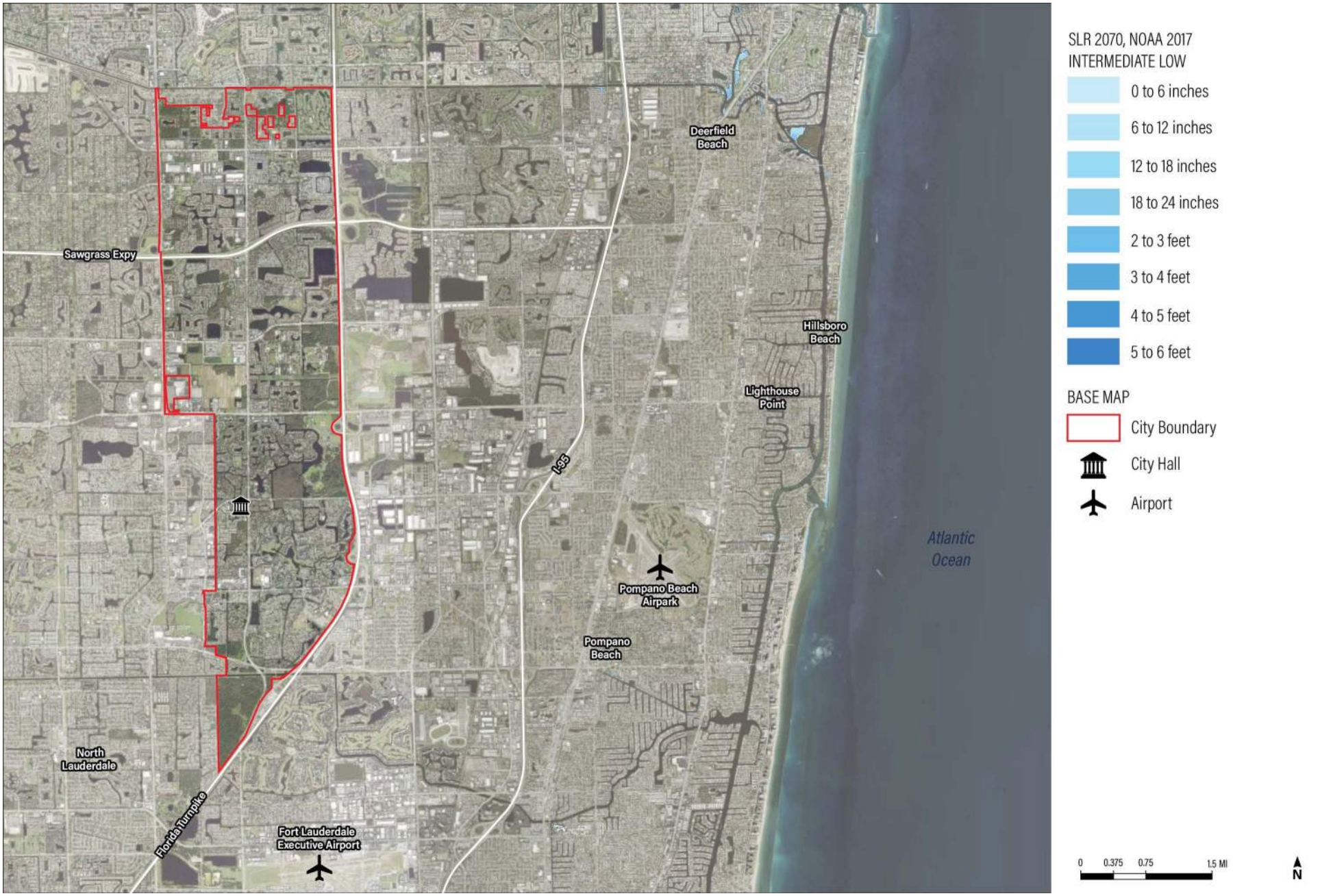
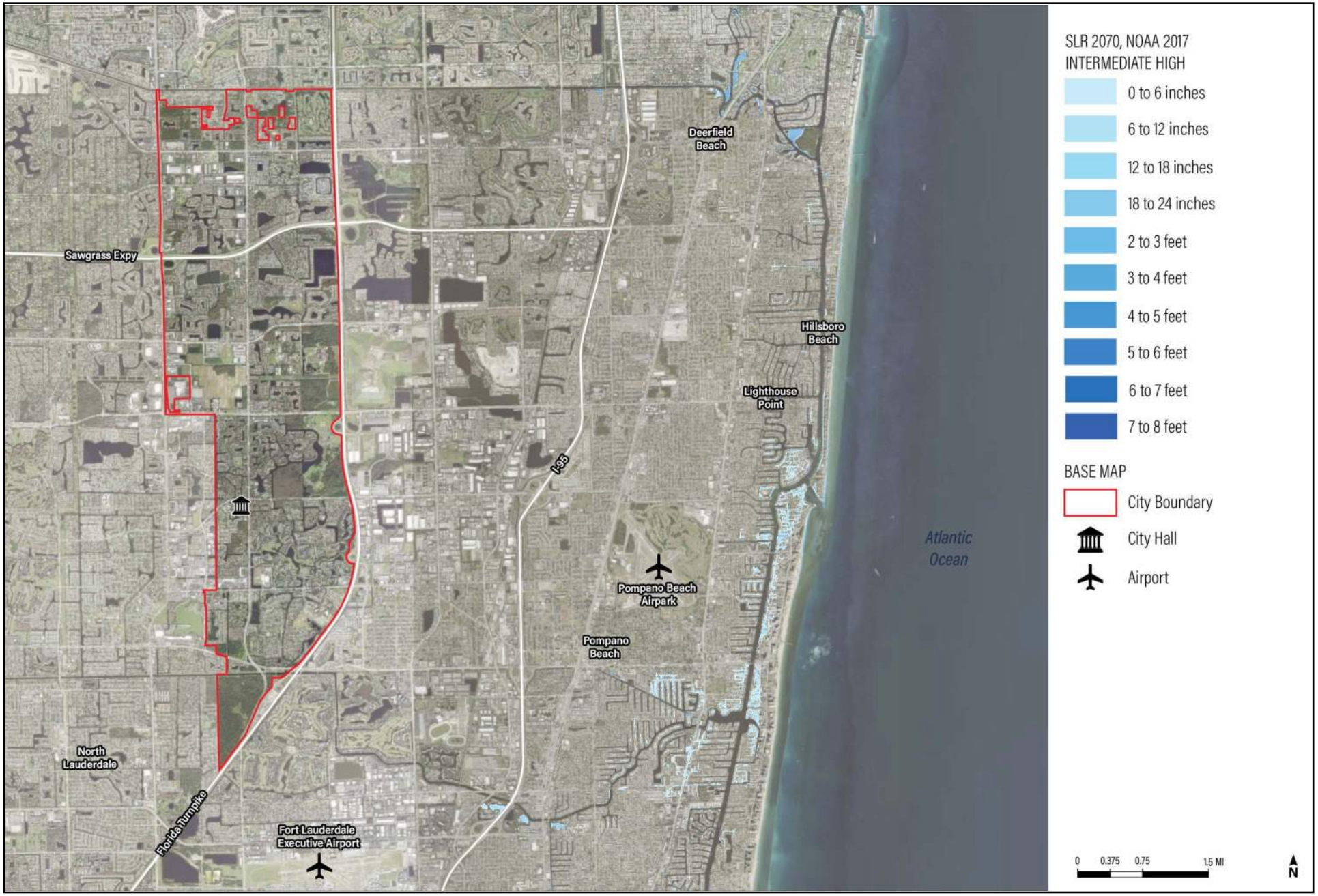


Figure 7.5: *2070, Intermediate High Sea Level Rise Map*
(Source: NOAA, 2017)



Rainfall-Induced Flooding (Compound Flooding)

While looking at events such as sea level rise and storm surge independently from one another is important, what happens when a series of weather events occur simultaneously? For example, when a hurricane makes landfall at high tide, shortly after days of heavy rain when the ground is already saturated? This type of "perfect storm" is what is known as a compound flooding event. This is when multiple potential causes of flooding occur at the same time thereby putting maximum stress or load on the City's systems.

Exposure Analysis

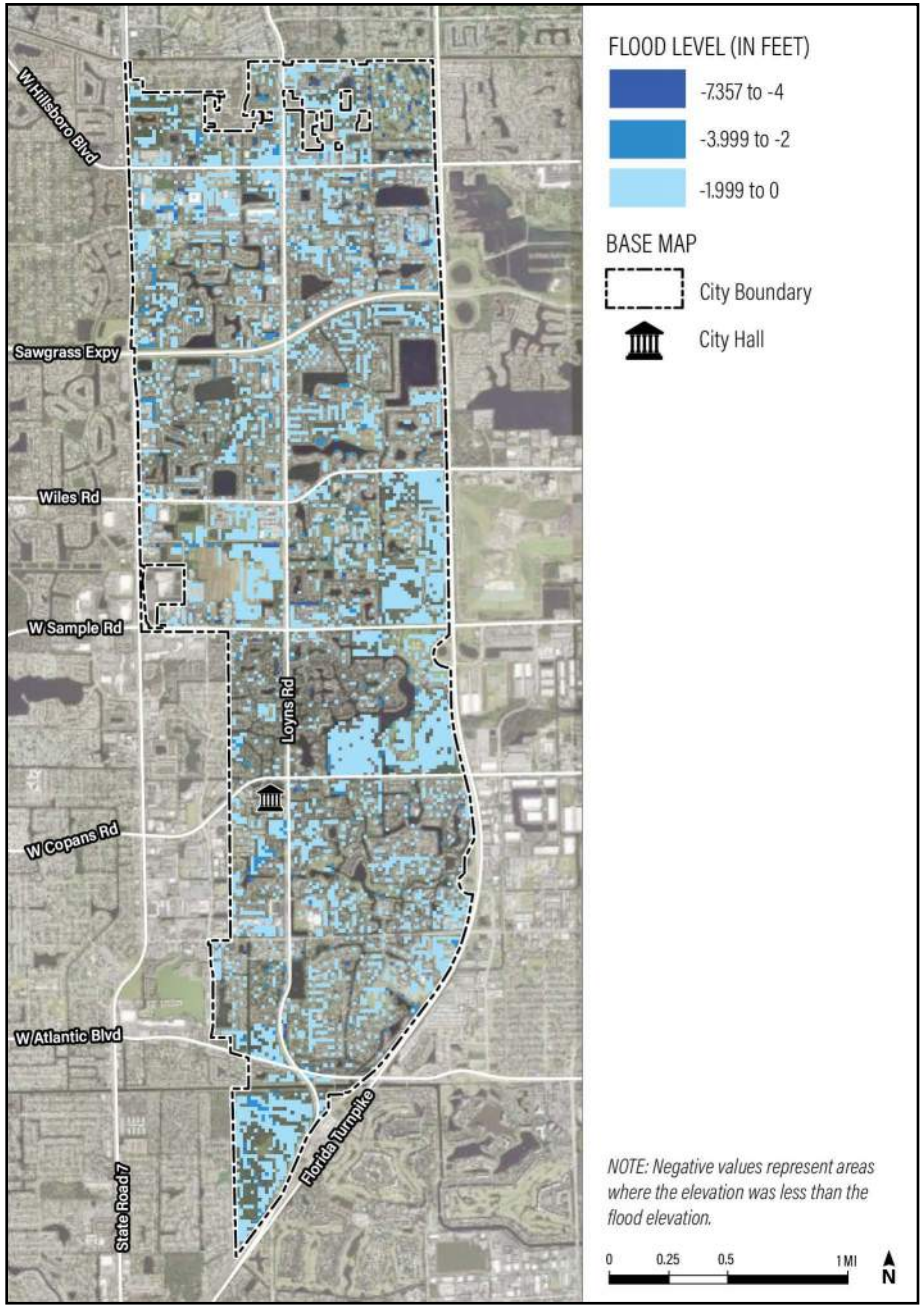
For this threat we utilized the recent work that Broward County is doing to study compound flooding. They have created a model to simulate different possible compound flooding scenarios. For this study we used the four scenarios below as commissioned by Broward County's Resilient Environment Department. We applied the same 2040 and 2070 planning horizons and Intermediate-Low and Intermediate-High scenarios as we did with sea level rise and storm surge.

Table 7.2: *Compound flooding scenarios*

Scenario Code	Event Probability	Event Duration	SLR Projection	Planning Horizon	Storm Surge
VA-21	100-yr	72-hour	2017 NOAA Intermediate Low	2040	Storm Surge (Cat 5)
VA-24	100-yr	72-hour	2017 NOAA Intermediate High	2040	Storm Surge (Cat 5)
VA-27	100-yr	72-hour	2017 NOAA Intermediate Low	2070	Storm Surge (Cat 5)
VA-30	100-yr	72-hour	2017 NOAA Intermediate High	2070	Storm Surge (Cat 5)

Exposure refers to the level at which assets or resources are prone to threats. For this we look at the data collected on the elevation or height of the asset and then compare that to the anticipated flooding levels as projected by the Broward County models. Figure 7.6 identifies the areas of the City that are at risk for flooding under the 2070 Intermediate High scenario. Table 7.3 then identifies how many assets are potentially exposed to flooding under that scenario.

Figure 7.6: *2070 Intermediate-High Rainfall-Induced Flooding Map*
(Source: Broward County Reslient Environment Department, 2024)



The following assets were reviewed for exposure to compound flooding assets:

Table 7.3: *Percentage of assets exposed to compound flooding.*

Percentage of Assets Exposed (Exposure ≥ 1)	Asset
0%	Bridges
19%	Bus Stops
0%	Parking Structures
24%	Roads
33%	Communications Infrastructure
66%	Disaster Debris Management Sites
35%	Lift Stations
100%	Miscellaneous Utilities
Insufficient Data	EV/PV Charging Stations
14%	Essential Facilities
50%	Schools and Colleges
33%	Community Centers
42%	Grocery Stores
27%	Healthcare Facilities
100%	Mobile Home Parks
82%	Parks
66%	Protected National Lands

Sensitivity Analysis

If an asset was determined to have exposure to flooding, we then studied how sensitive that asset was to the flooding. This is discussed in more detail on the following pages in the Key Findings.

Table 7.4: *Percentage of assets' sensitivity to compound flooding*

Asset	No exposure	Low	Moderate	High
Bridges	100%	0%	0%	0%
Bus Stops	81%	2%	2%	15%
Parking Structures	100%	0%	0%	0%
Roads	73%	4%	8%	15%
Communications Infrastructure	66%	0%	0%	33%
Disaster Debris Management Sites	33%	0%	0%	66%
Lift Stations	68.5%	10.5%	10.5%	10.5%
Miscellaneous Utilities	0%	0%	50%	50%
EV/PV Charging Stations	Insufficient Data. See "Key Findings" for more information.			
Essential Facilities	86%	0%	0%	14%
Schools and Colleges	0%	37%	45%	18%
Community Centers	67%	0%	33%	0%
Grocery Stores	0%	37.5%	25%	37.5%
Healthcare Facilities	72%	0%	28%	0%
Mobile Home Parks	0%	0%	0%	100%
Parks	18%	3%	25%	54%
Protected National Lands	34%	11%	11%	44%

*Some assets had insufficient data and could not be analyzed for exposure.

Key Findings

The four compound flooding scenarios have relatively few differences between them. This could be due to minor direct effects from sea level rise and storm surge on the City.

Transportation Assets

Exposed roadway was determined to have a moderate to high vulnerability and consequences. Figure 7.7 shows roadway exposure to compound flooding in the City.

Sawgrass Expressway, Florida Turnpike, State Road 7, and Sample Road are identified as evacuation routes by Broward County (Broward County). The effects of compound flooding on evacuation routes are limited or unverifiable due to a lack of roadway data.

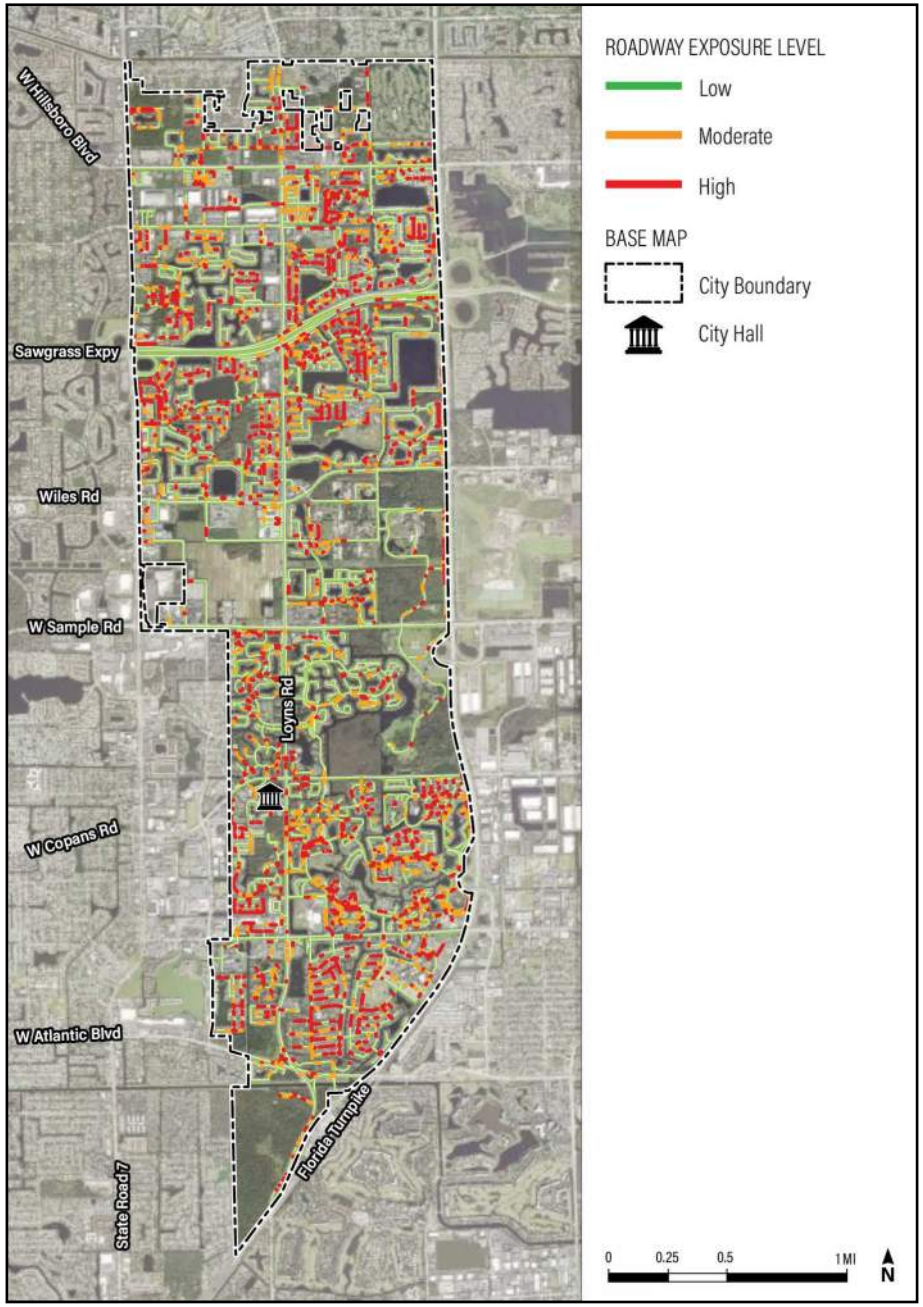
The following is a list of key findings for moderately to highly exposed road by jurisdiction:

- 54.67 miles of city-owned road (23%)
- 1.89 miles of county-owned road (0.8%)
- 0.65 miles of state-owned road (0.3%)

The following is a list of key findings for moderately to highly exposed road by category:

- 7.88 miles of arterial roads (3%)
- 0.30 miles of collector roads (0.1%)
- 49.03 miles of local roads (21%)

Figure 7.7: *Roadway Compound Flooding Exposure Map*
(Source: BCGIS, 2023)

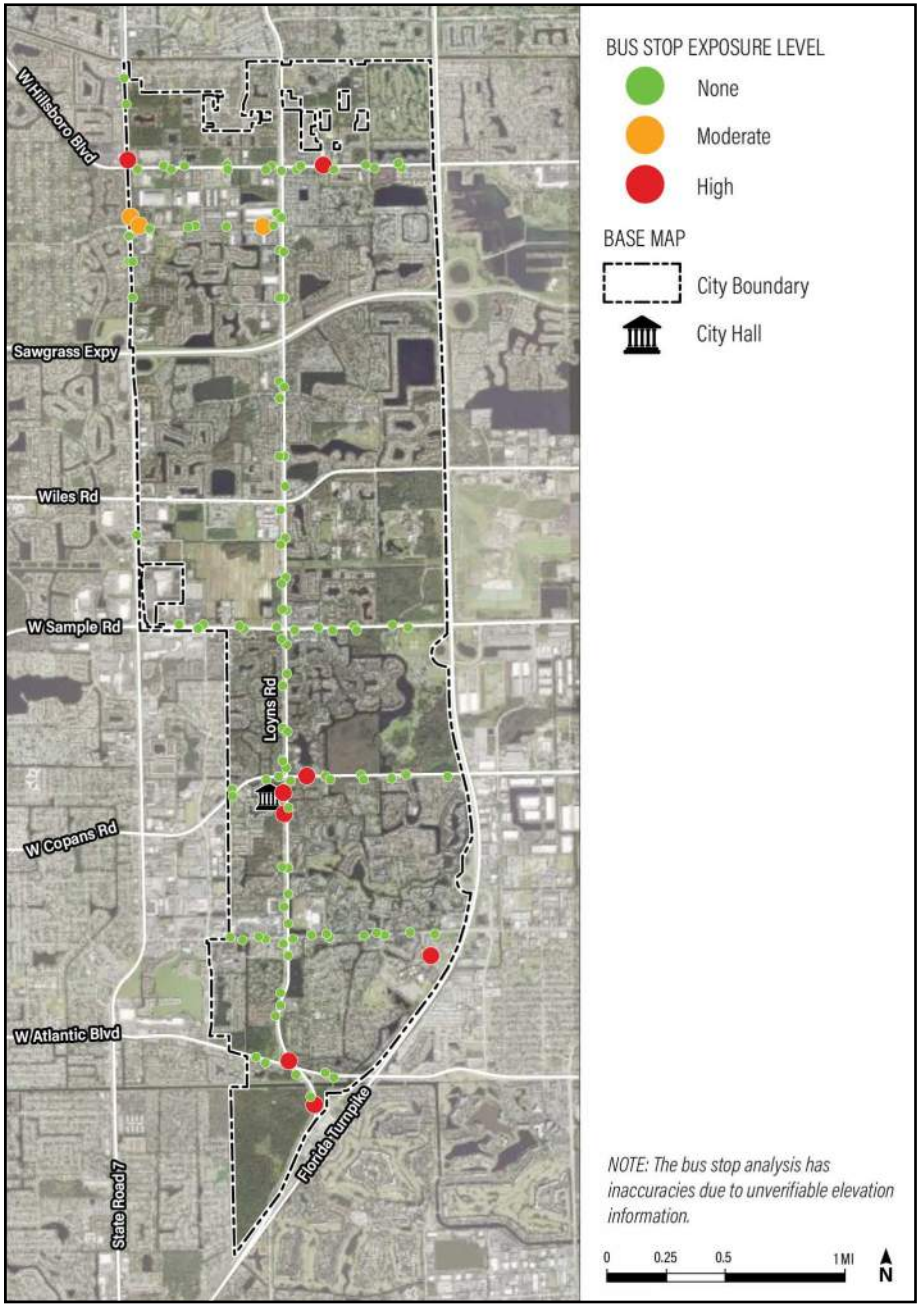


Bus stops were determined to have moderate vulnerability and consequences if exposed, and so, the exposed assets fall outside of the prioritization area. It should be noted that this bus stop analysis may have inaccuracies due to unverifiable asset elevation data.

A total of 11 bus stops (9%) have moderate to high exposure to compound flooding. Figure 7.8 shows bus stop locations and exposure levels to compound flooding.

There are no bridges or parking structures exposed to compound flooding.

Figure 7.8: *Bus Stop Compound Flooding Exposure Map*
(Source: BCGIS, 2023)



Critical Infrastructure

Exposed lift stations were determined to have high vulnerability and consequence, exposed communication towers have a moderate to high vulnerability and consequence, disaster debris sites have a high vulnerability and consequence, and miscellaneous utilities have a moderate to high vulnerability and consequence. All of these assets can be considered high priority assets to protect.

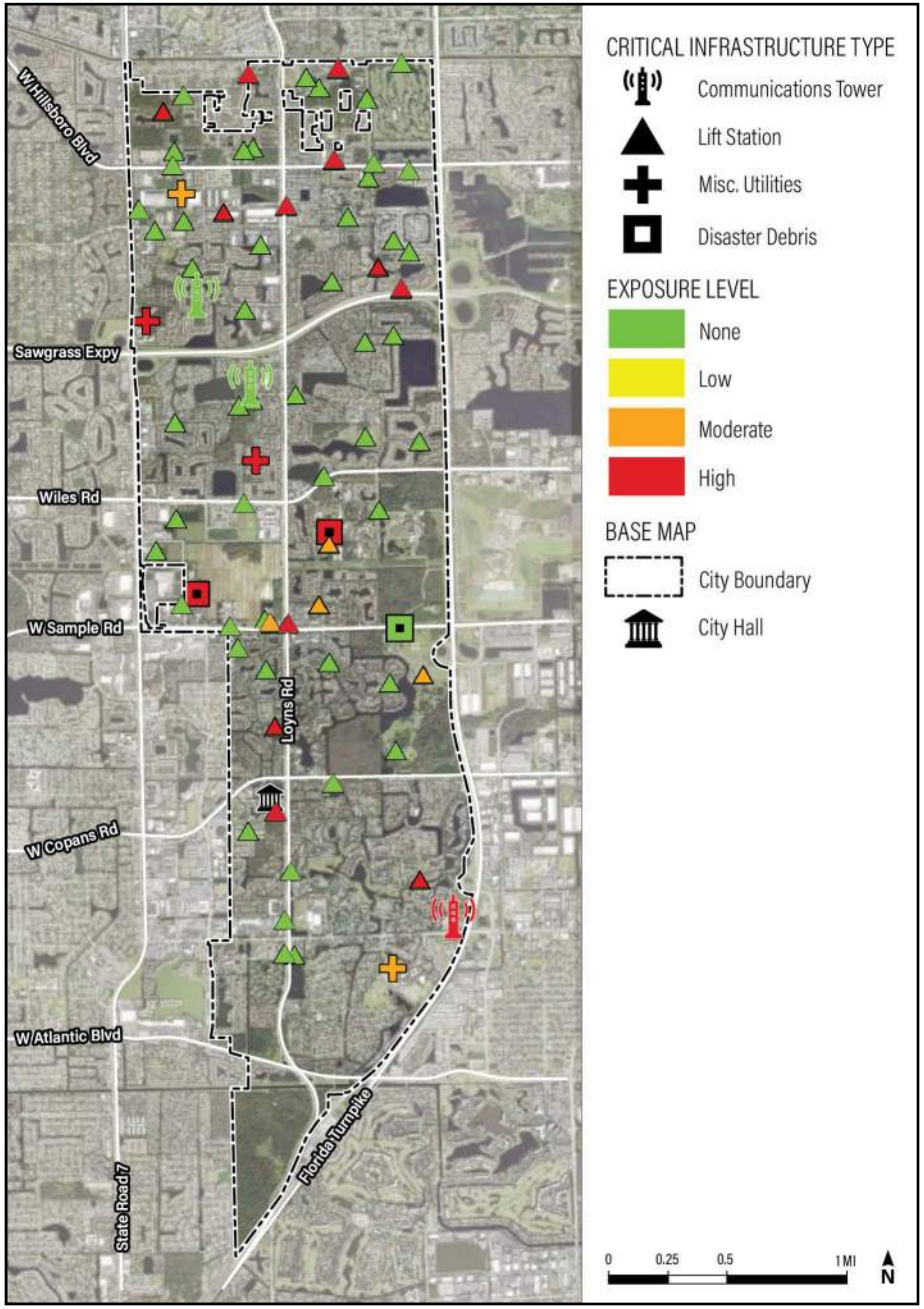
The following is a list of key findings for moderately to highly exposed critical infrastructure assets:

- nine lift stations (13.8%),
- one communication tower (33%),
- two disaster debris managements sites (67%), and
- all miscellaneous utilities.

EV/PV charging stations lacked elevation data and could not be analyzed against compound flooding.

For the specific assets affected, see Figure 7.9.

Figure 7.9: *Critical Infrastructure Compound Flooding Exposure Map*
(Sources vary; See Appendix B for GIS layers)



Community & Emergency Facilities

All exposed assets in the Community & Emergency Facilities asset class were determined to have high vulnerability and consequences, and can be considered high priority assets to protect.

The following is a list of key findings for moderately to highly exposed community and emergency facility assets:

- five grocery stores (26%),
- one community center (33%),
- seven schools and colleges (32%),
- one essential facility (20%),
- three healthcare facilities (30%), and
- all mobile home parks.

Of the schools and colleges with significant exposure to compound flooding, Tradewinds Park Elementary School has been identified as an evacuation shelter.

For the specific assets affected, see Figures 7.10 through 7.16.

Figure 7.10: *Community & Emergency Facilities Compound Flooding Exposure Map*
(Sources vary; See Appendix B for GIS layers)

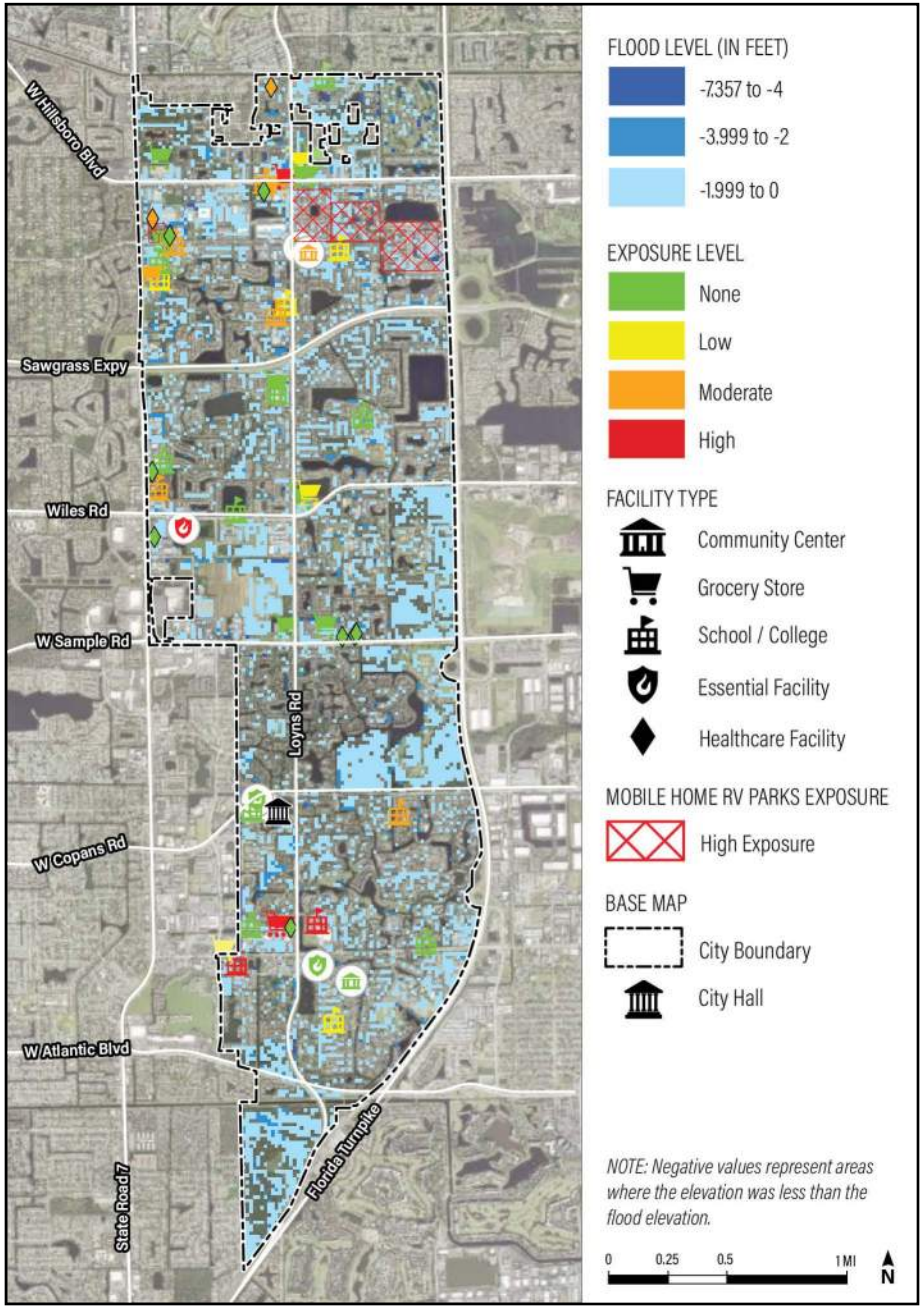


Figure 7.11: *Grocery Stores Compound Flooding Exposure Map*
(Source: City of Coconut Creek, 2024)

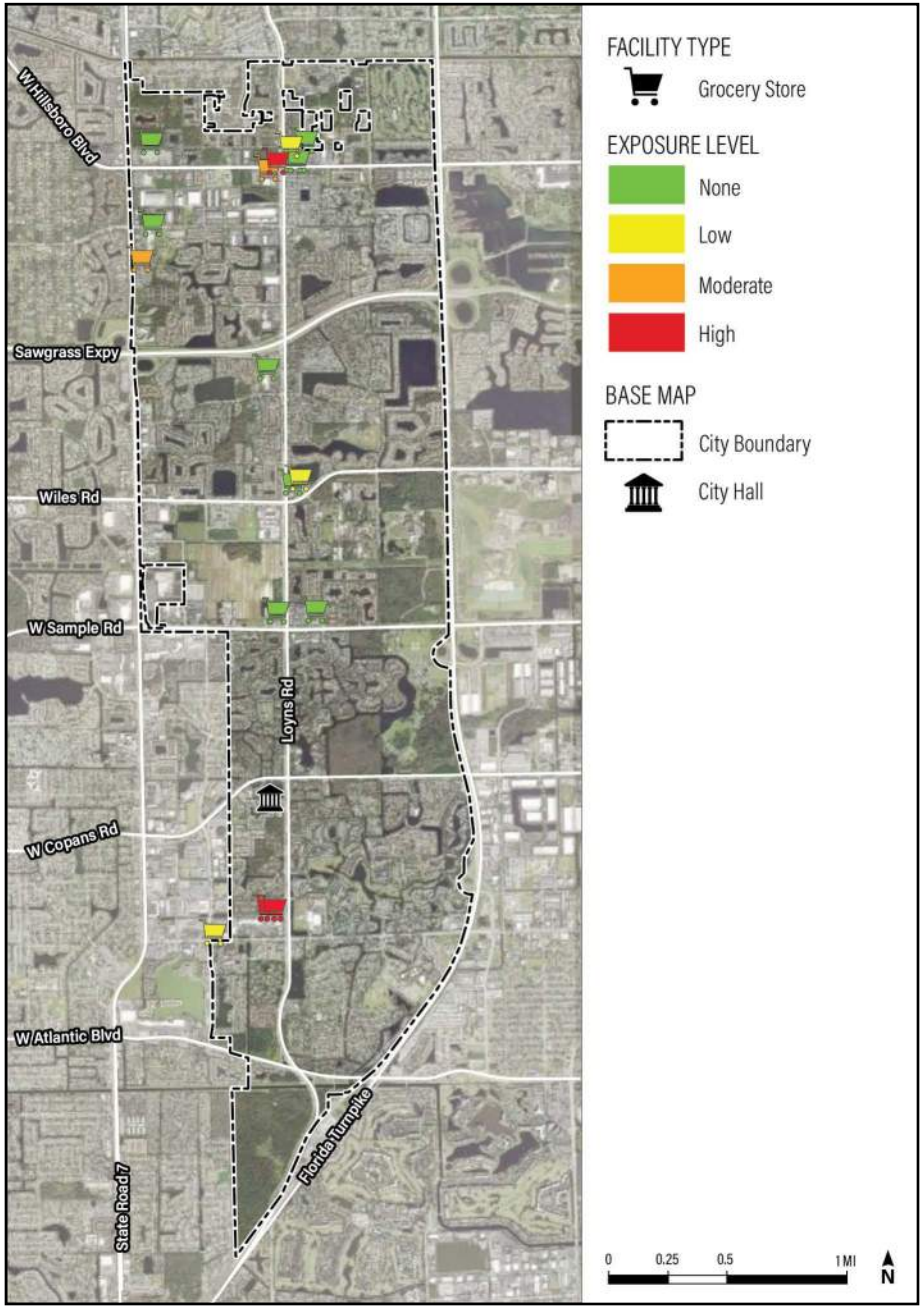


Figure 7.12: *Community Centers Compound Flooding Exposure Map*
(Source: SERT, 2023)

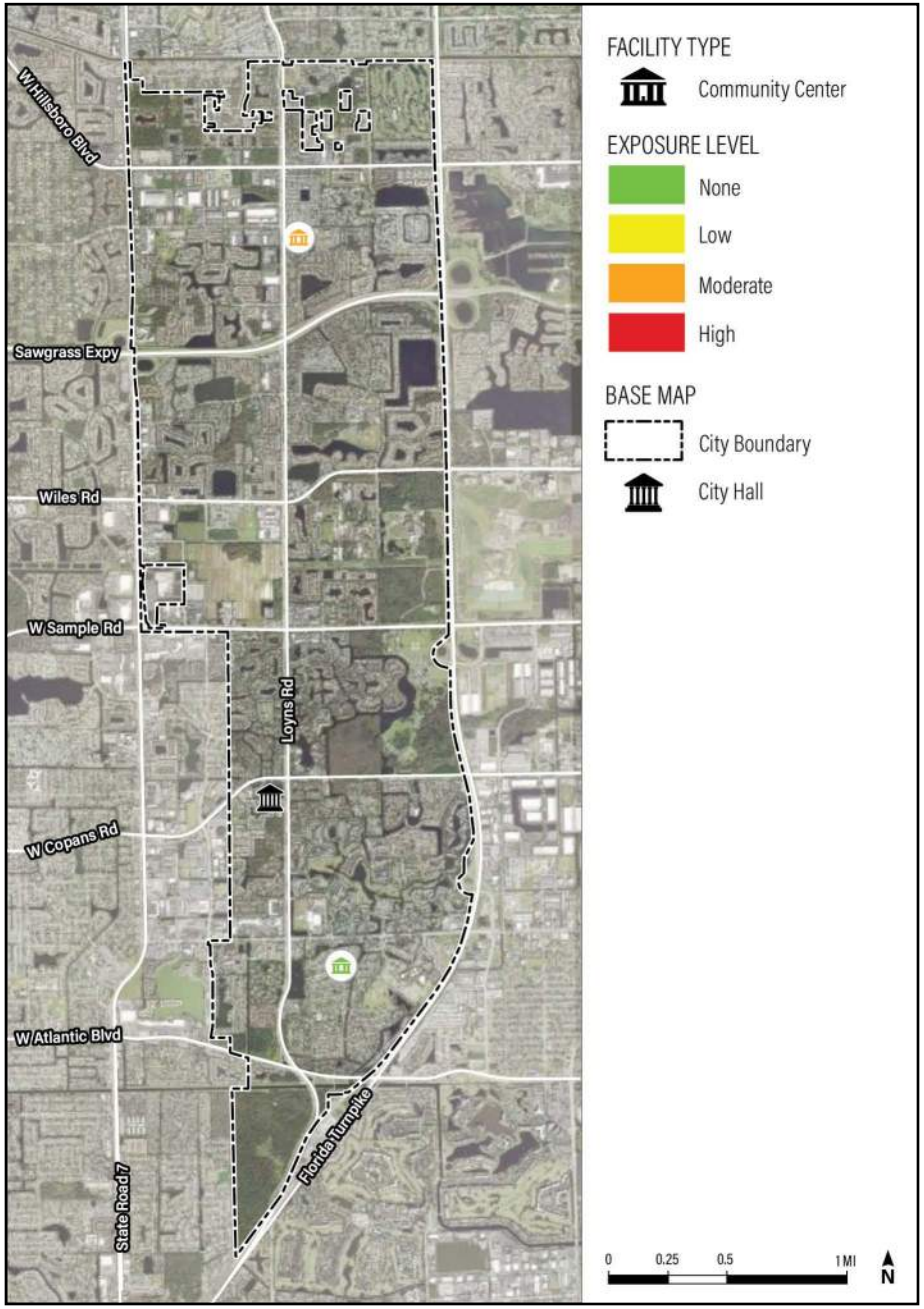


Figure 7.13: *Schools and Colleges Compound Flooding Exposure Map*
(Source: BCGIS, BCEMD, FPL, 2022)

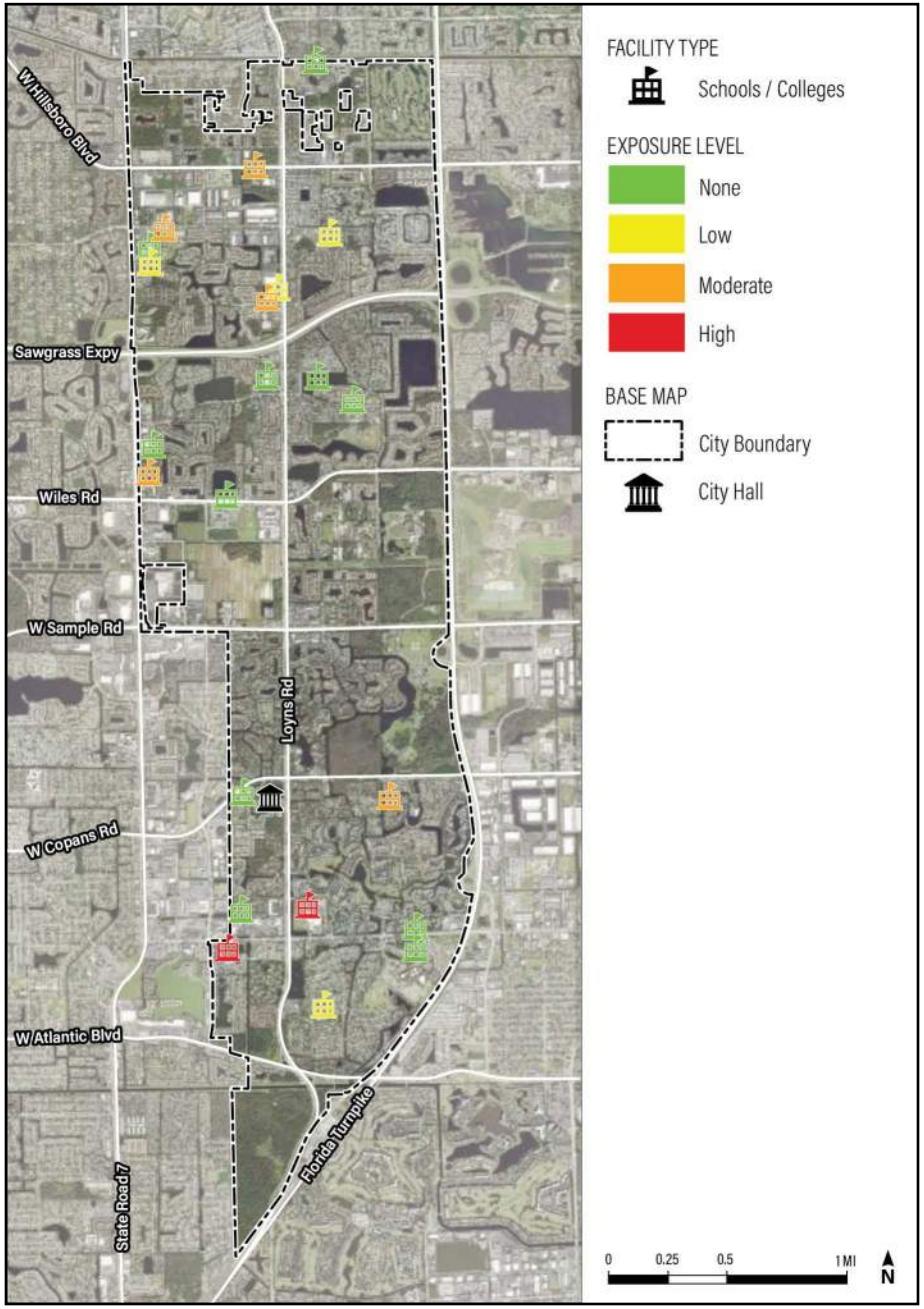


Figure 7.14: *Essential Facilities Compound Flooding Exposure Map*
(Source: BSO, 2022)

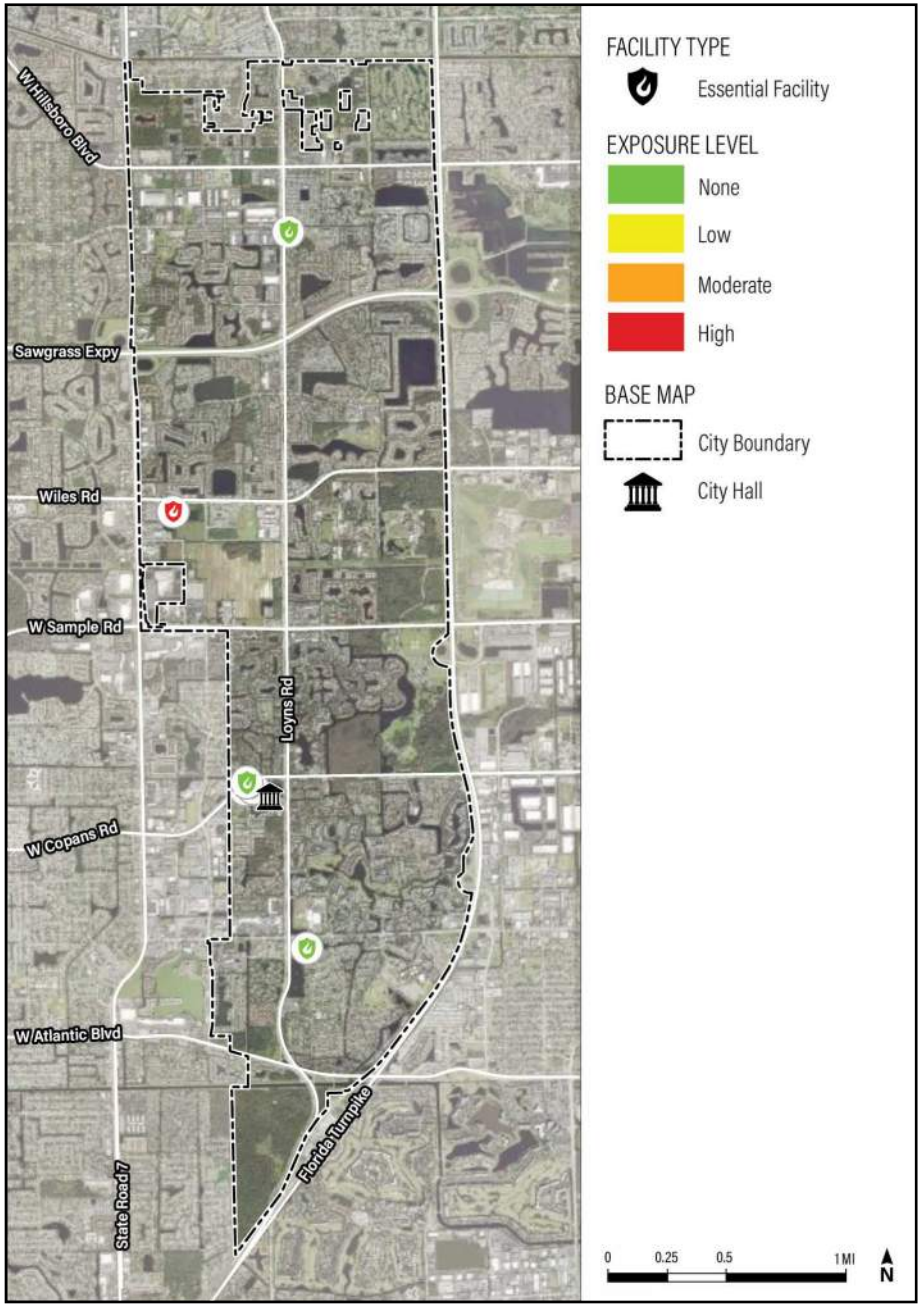


Figure 7.15: *Healthcare Facilities Compound Flooding Exposure Map*
(Source: SERT, 2023)

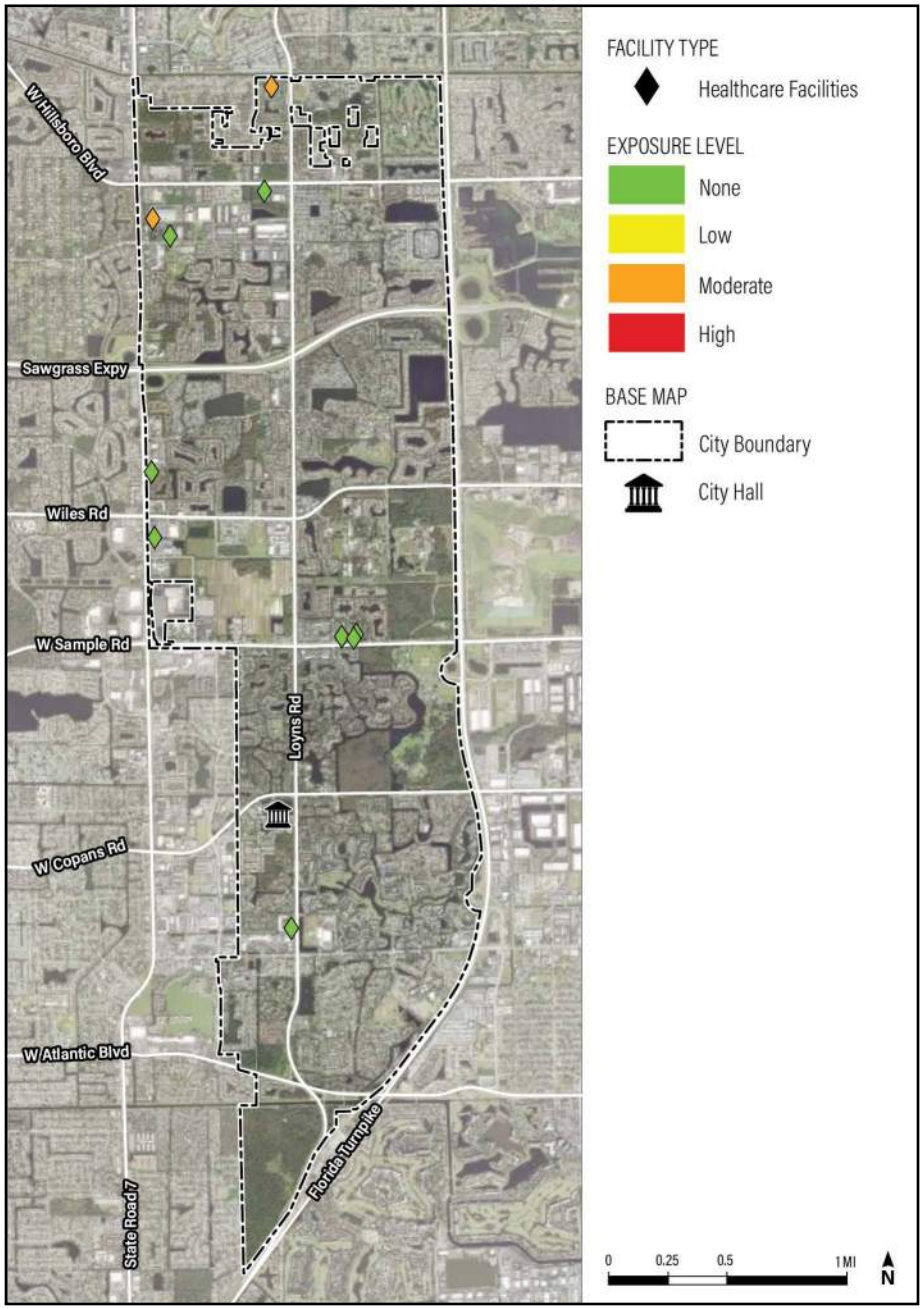
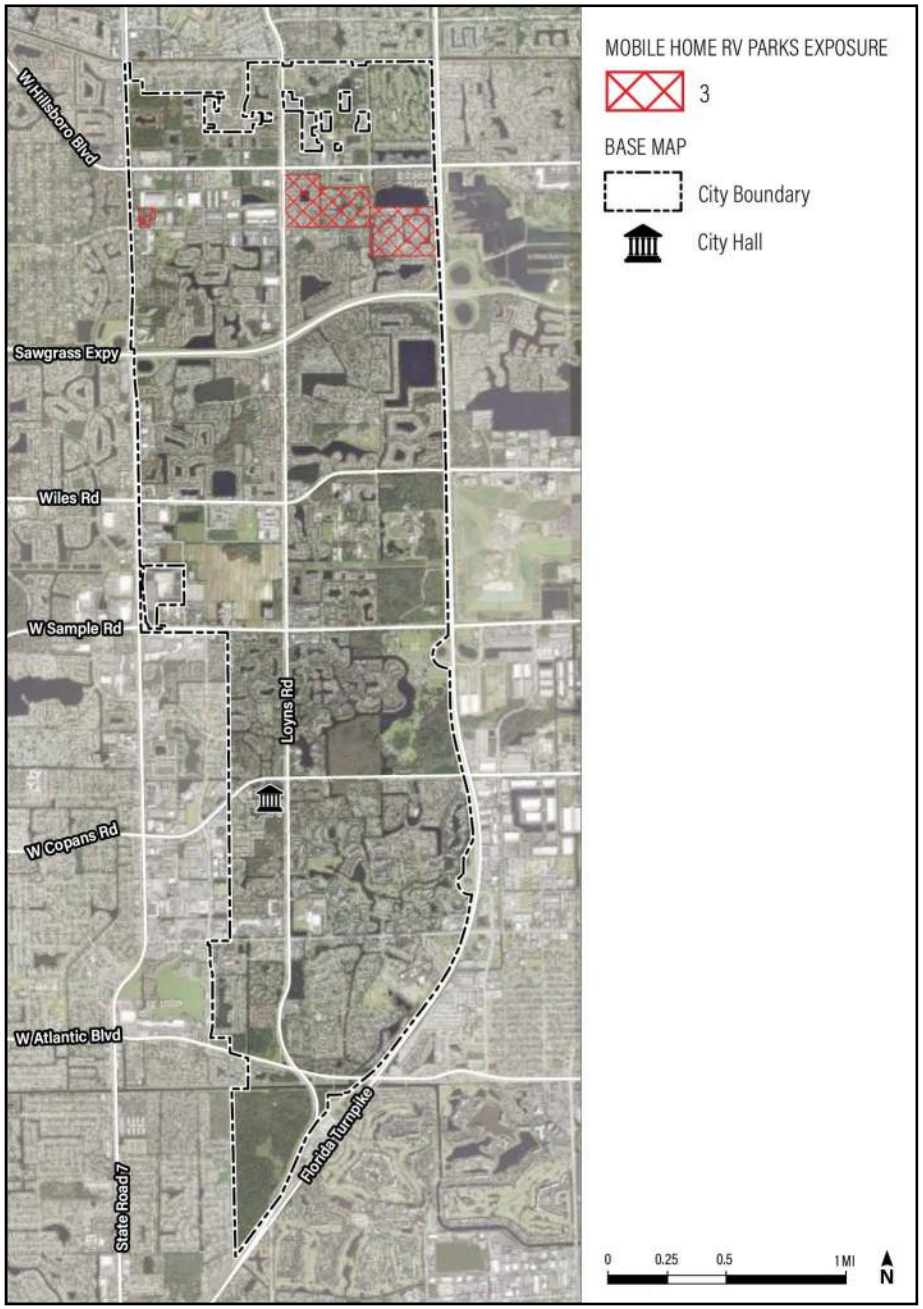


Figure 7.16: *Mobile Home Parks Compound Flooding Exposure Map*
(Source: BCGIS, EOC, 2022)



Natural, Cultural, & Historic Resources

A total of 22 parks (79%) have moderate to high exposure to compound flooding. Of these 22 parks, 15 are highly exposed and seven are moderately exposed. Exposed parks were determined to have moderate to high vulnerability and consequence, and can be considered high priority assets to protect.

A total of 10 protected natural lands (91%) have moderate to high exposure to compound flooding. Protected natural lands were determined to have low to moderate vulnerability and consequence, and were not identified as critical assets to prioritize.

Lakewood Park
Source: City of Coconut Creek

Figure 7.17: *Parks Compound Flooding Exposure Map*
(Source: BCGIS, 2023)

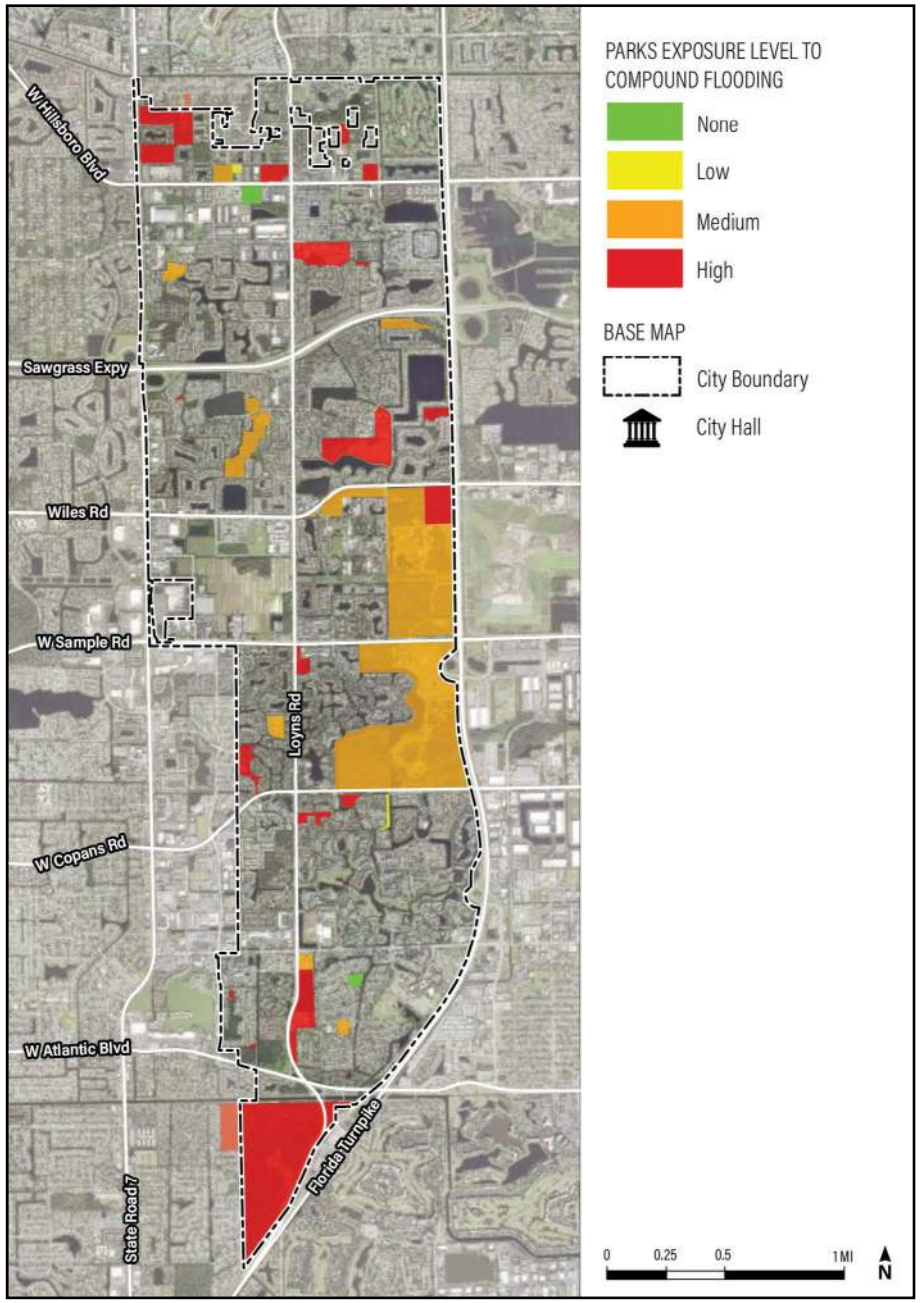
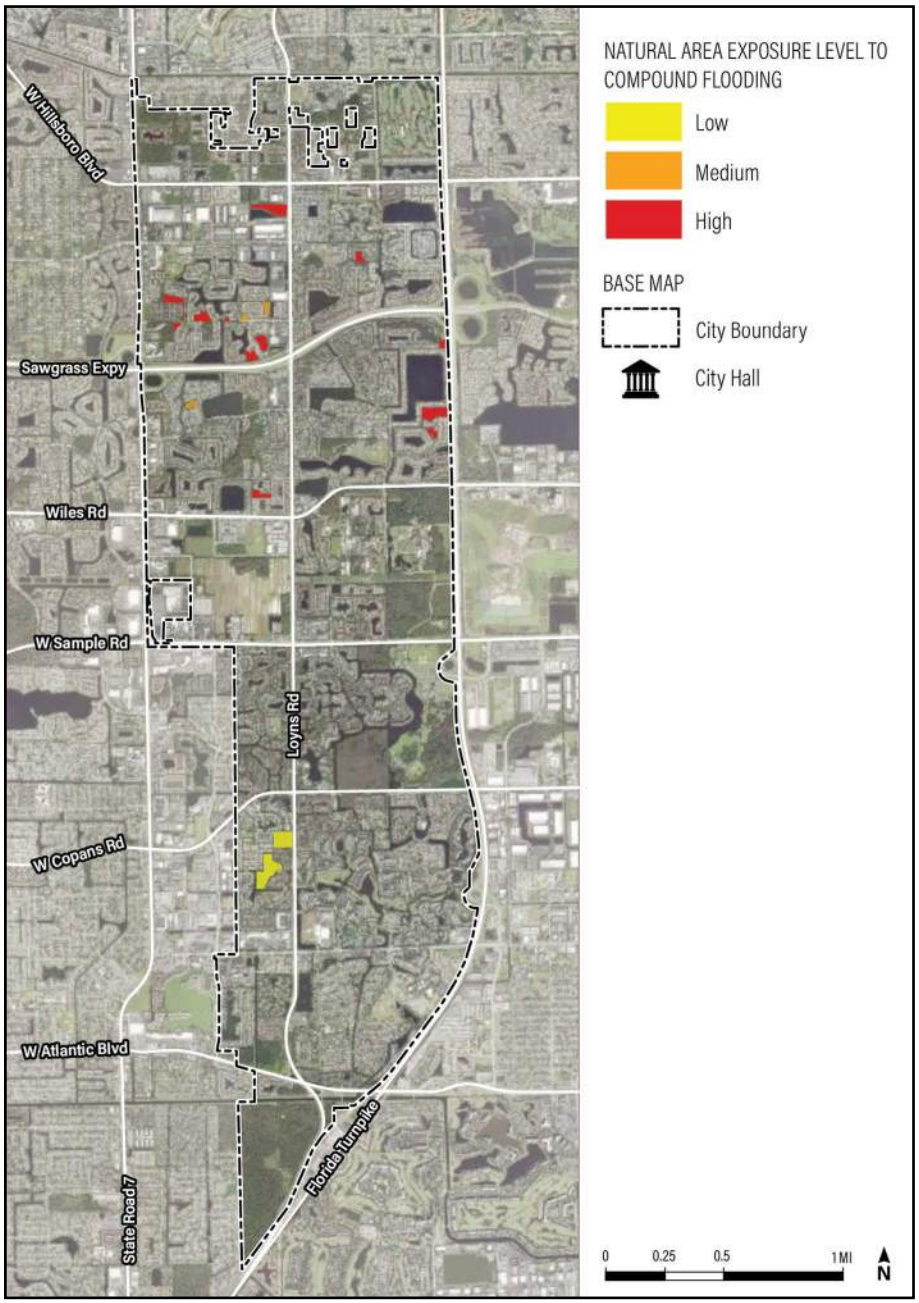


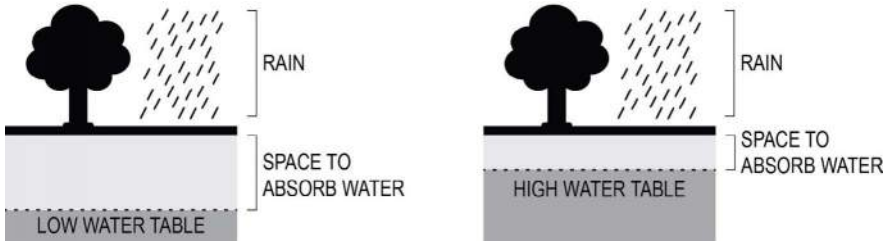
Figure 7.18: *Protected Natural Lands Compound Flooding Exposure Map*
(Source: Natasha Herne Natural Resources Planning and Management Division Land Stewardship Program, 2022)



Groundwater Inundation

Coconut Creek is in an area with the highest groundwater table elevations of Broward County. This means the City may be more susceptible to groundwater infiltration impacts if the ground elevation of the land isn't high enough to compensate for the rise in groundwater below the surface. This can have significant impacts on below ground infrastructure like drainage systems, road sub-base, and buried utilities which are not designed to be permanently inundated with water.

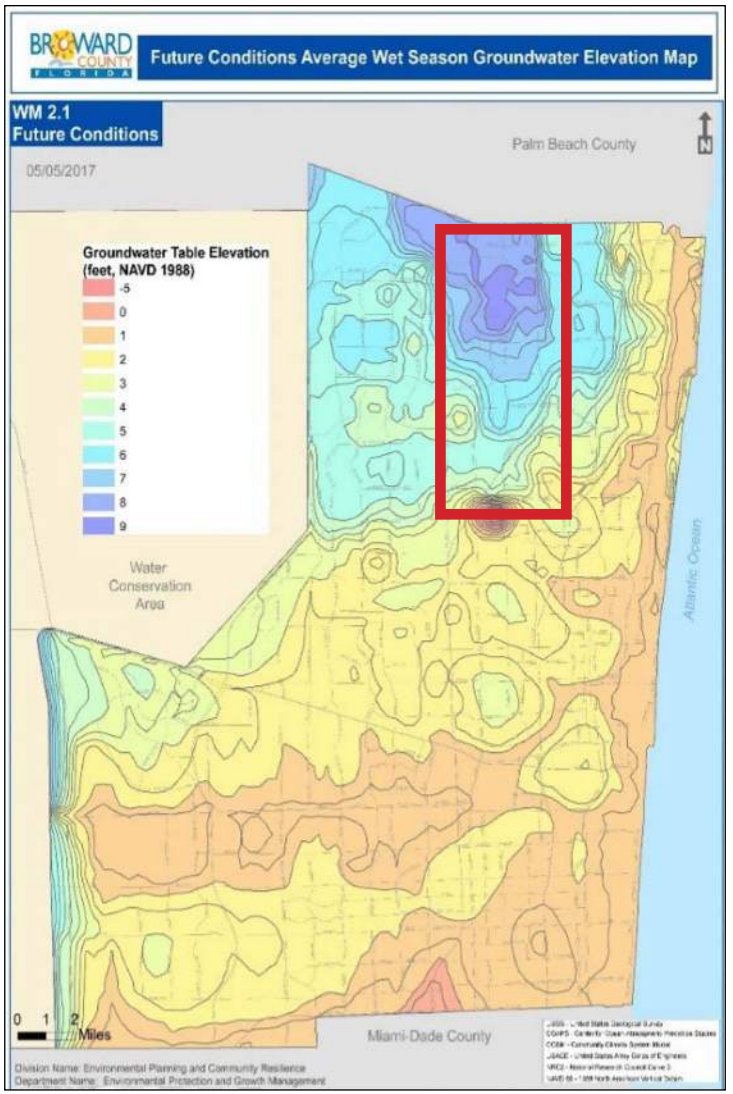
Figure 7.19: *Groundwater table elevation graphic*
(Source: WGI)



Exposure Analysis

To evaluate this threat, we used the future conditions for groundwater elevation map from Broward County. This future projection reflects conditions in 2060 to 2069 and accounts for 2.5 feet of sea level rise.

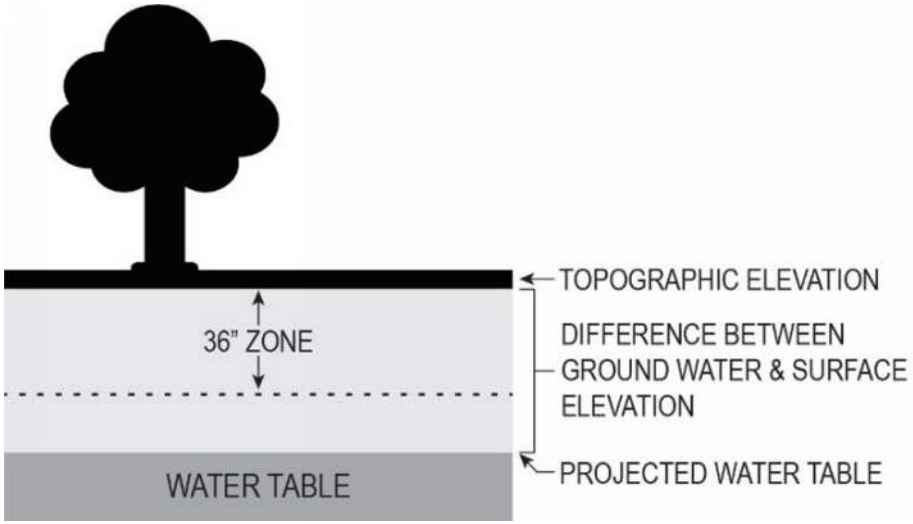
Figure 7.20: *Future Average Groundwater Elevation Map*
(Source: Broward County, 2017)



Sensitivity Analysis

Using the available topographic or elevation information, we compared the difference between the groundwater elevation and the surface elevation. Based on Steering Committee feedback, we focused on those areas that had a 36" or less of difference in elevation. This 36" zone is primarily where subsurface infrastructure is located.

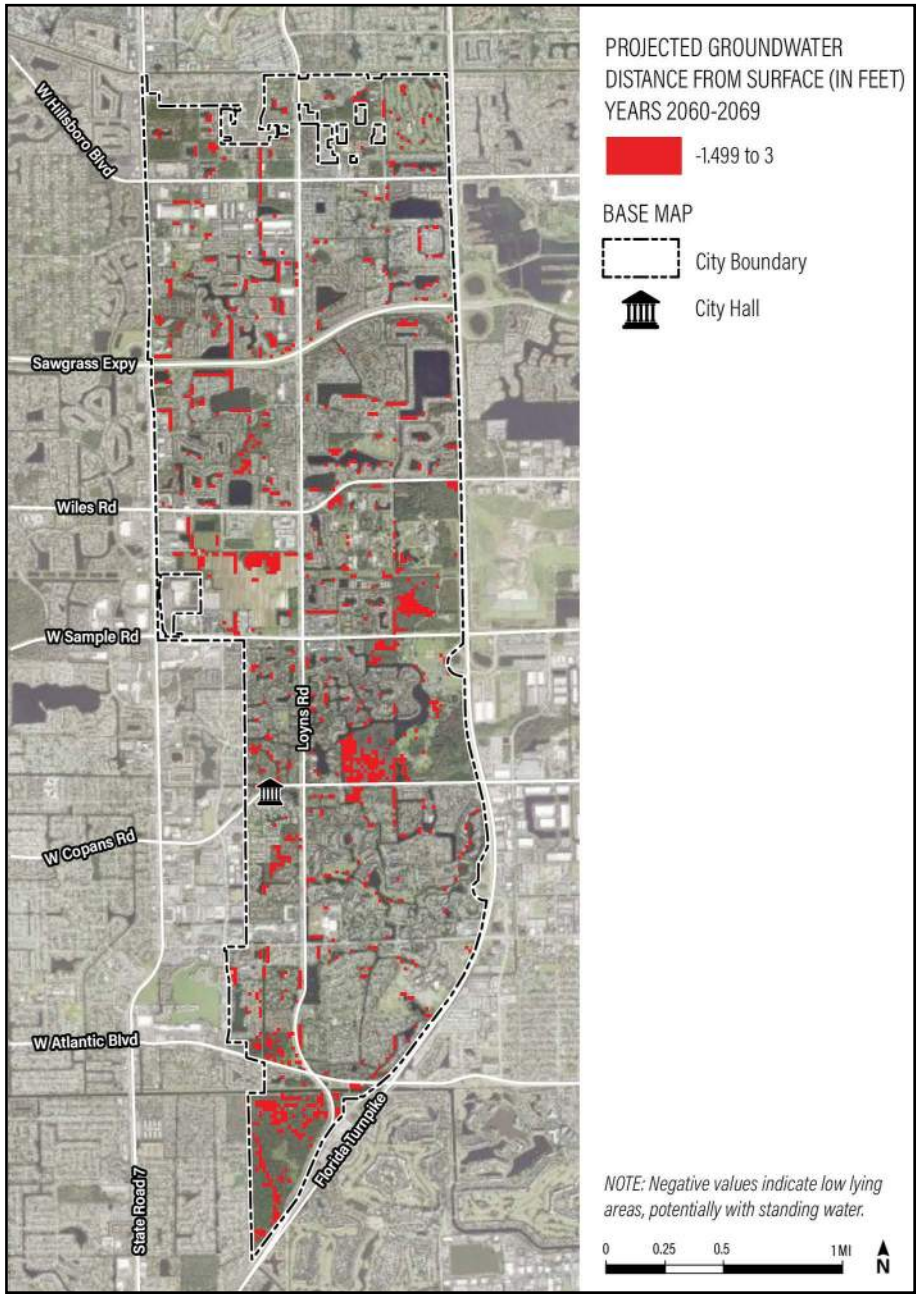
Figure 7.21: *Depth of groundwater table zone used in study*
(Source: WGI)



Key Findings

We found that areas of the city where the groundwater is anticipated to be within 36" of the surface elevation almost exactly aligns with existing surface water areas such as retention ponds, canals, and detention areas. There were no areas of significance outside of these surface water locations.

Figure 7.22: *2060-2069 Projected Groundwater Elevation Map*
(Source: BCGIS, 2023)



Extreme Heat

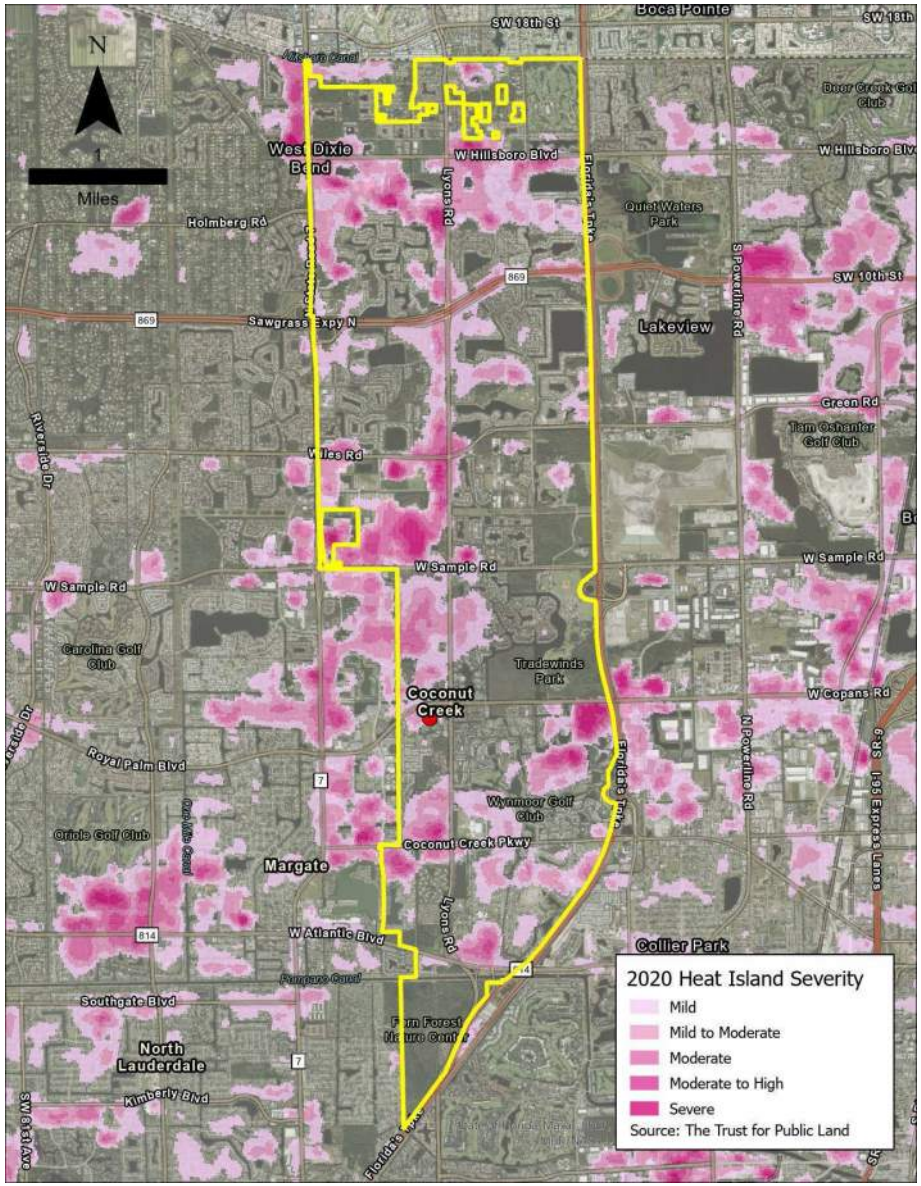
Coconut Creek experiences extreme heat hazard exposure due to local climate patterns. Heat hazard exposure refers to the amount of exposure and potential risks that are presented to individuals and communities due to high temperatures. As an urban area, Coconut Creek is subject to the urban heat island effect. There are portions of land with a higher concentration of asphalt and buildings, making those areas more prone to heat hazards. Conversely, areas with more vegetation covering the area are less likely to be affected.

Exposure Analysis

The project team assessed exposure in two forms: overall, city-wide temperatures which do not vary spatially over the study area; and local, relative extreme heat measured by urban heat islands. Because temperature increases are projected city-wide without spatial variability, these values were not used to assign exposure levels.

To measure the severity of exposure to heat, map data from the Trust for Public Land was used to show where certain areas of Coconut Creek are hotter than the average temperature for others. Severity is based on a scale developed by the Trust for Public Land that ranges from 1 to 5, with 1 representing a relatively mild heat area or slightly above average for the City and 5 being severe or significantly above average.

Figure 7.23: *Coconut Creek Heat Island Map*
(Source: The Trust for Public Land, 2020)



Extreme Heat Vulnerability

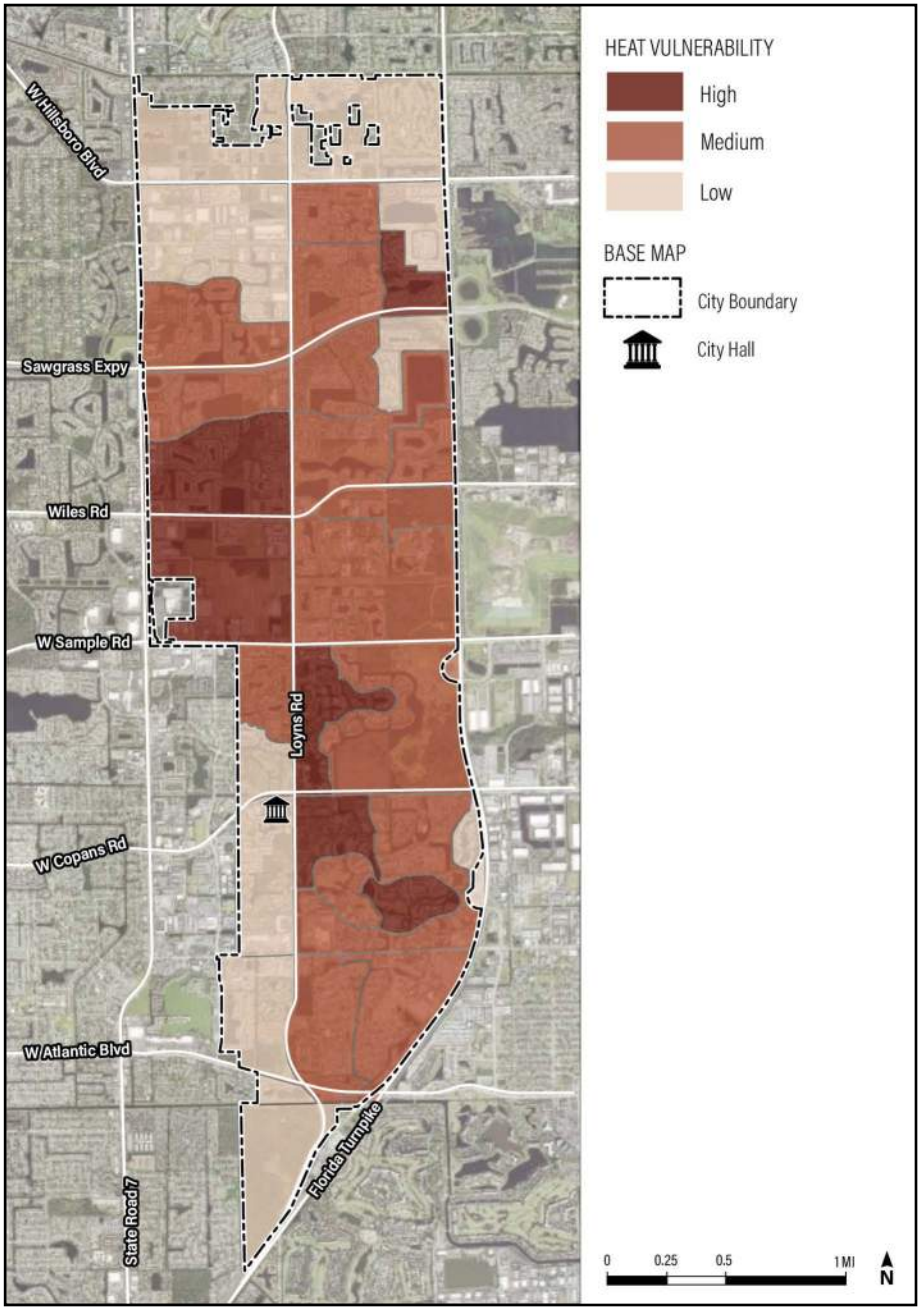
Heat vulnerability refers to an individual's susceptibility to the effects of high temperatures and heat exposure. As communities within Coconut Creek navigate potential challenges presented by rising temperatures, it becomes important to recognize varying degrees of heat sensitivity amongst residents. Within this assessment, heat sensitivity is measured by observing the population of those aged younger than 18 or older than 65. Risk factors for dying during a heat wave include being very old or very young (Stone, B., Hess, J. J., & Frumkin, H). Impervious percent coverage and tree canopy coverage are used as well.

Table 7.5 shows the relative vulnerability of the assets the Steering Committee determined should be paired with extreme heat vulnerability.

Table 7.5: *Percentage of asset exposure to heat vulnerability*

Asset	Percentage of Asset & Relative Vulnerability		
	Low	Moderate	High
Bus Stops	43%	39%	18%
Communications Infrastructure	0%	67%	33%
Essential Facilities	50%	33%	17%
Government Facilities	25%	50%	25%
Healthcare Facilities	39%	44%	17%
Mobile Home Parks	25%	50%	25%
Parks	38%	46%	16%
Protected Natural Lands	41%	45%	14%

Figure 7.24: *Extreme Heat Vulnerability Map*
(Source: U.S. Census, 2020)



Sensitivity Analysis

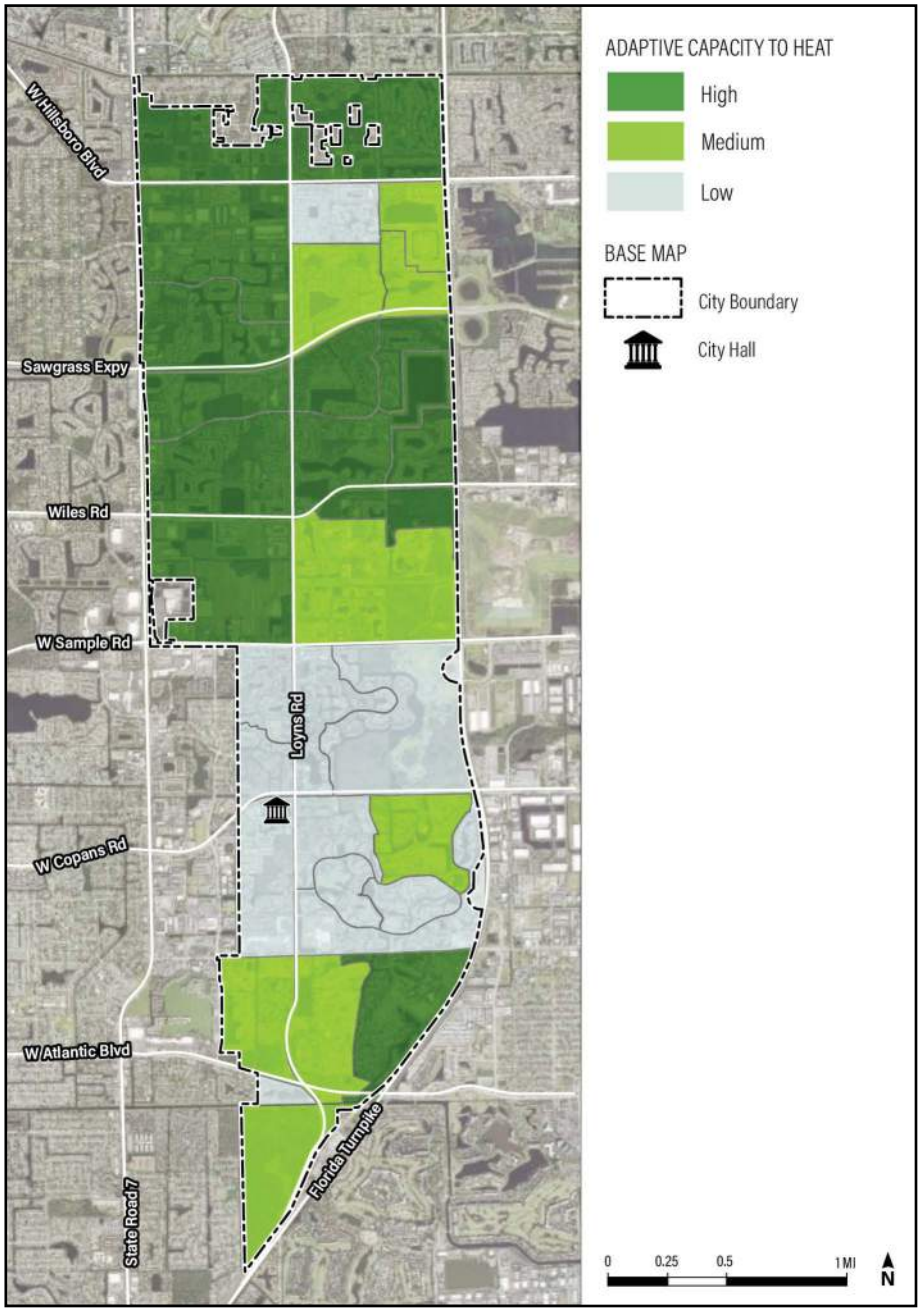
The heat island map symbolizes the darkest areas as the highest relative temperatures. These darker areas within the City are shown to be areas with low canopy cover and high impervious areas. Hotspots include Lyons Technology Center, the Centura Parc community (high impervious area), and the future location of MainStreet (low tree canopy). Additionally, the Lyons Road corridor shows above-average temperatures along most of its length through Coconut Creek. It should be noted that the MainStreet area, while a hot spot currently due to limited tree cover, should see a dramatic reversal once the site is developed and tree canopy planted.

The sensitivity analysis seeks to identify specific assets that are more vulnerable to extreme heat, where heat islands show higher temperatures compared to the City's average, and where residents could be more vulnerable to the effects of heat. The diverse spectrum of asset types means that the implications of high sensitivity will vary, e.g., adaptation of bus stops versus assisted living facilities.

Adaptive Capacity

Adaptive capacity is the ability of communities to cope or adjust to hazardous changes within the environment. Many factors can contribute to the adaptive capacity for heat including availability and quality of air conditioning, heat action plans, and emergency response systems. Adaptive capacity for this assessment is assessed by using median household income and canopy percent coverage. Median household income is used because the amount of income for each household can affect the way that households can protect themselves from heat threats using various preventive measures. Tree canopy coverage is used because the amount of tree coverage can also protect against direct heat.

Figure 7.25: *Adaptive Capacity to Heat Map*
(Source: U.S. Census, 2020)



Key Findings

Coconut Creek will continue to see rising temperatures associated with climate change.

By comparing the heat vulnerability map with the adaptive capacity map, parts of the City that are more susceptible to effects from heat can be identified. Areas with moderate to high heat vulnerability and high adaptive capacity are shown in orange in Figure 7.27, while areas with moderate to high heat vulnerability but low adaptive capacity are shown in Figure 7.26.

Using this data, assets that are located in areas of moderate to high vulnerability and low adaptive capacity were identified.

Transportation Assets

29 of 122 bus stops (24%) are in areas of low adaptive capacity and moderate to high heat vulnerability.

Critical Infrastructure

0 of 3 critical infrastructure assets (0%) are in areas of low adaptive capacity and moderate to high vulnerability.

Community & Emergency Facilities

7 of 56 of community and EMS facilities (13%) are in areas of low adaptive capacity and moderate to high vulnerability.

Natural, Cultural, & Historic Resources

7 of 46 natural, cultural, and historic resources (15%) are in areas of low adaptive capacity and moderate to high vulnerability.

Surface water and wetland asset results were not included due to overlapping features into areas of low heat vulnerability and/or high adaptive capacity.

Figure 7.26: *Census blocks with moderate to high heat vulnerability and low adaptive capacity*
(Source: U.S. Census, 2020

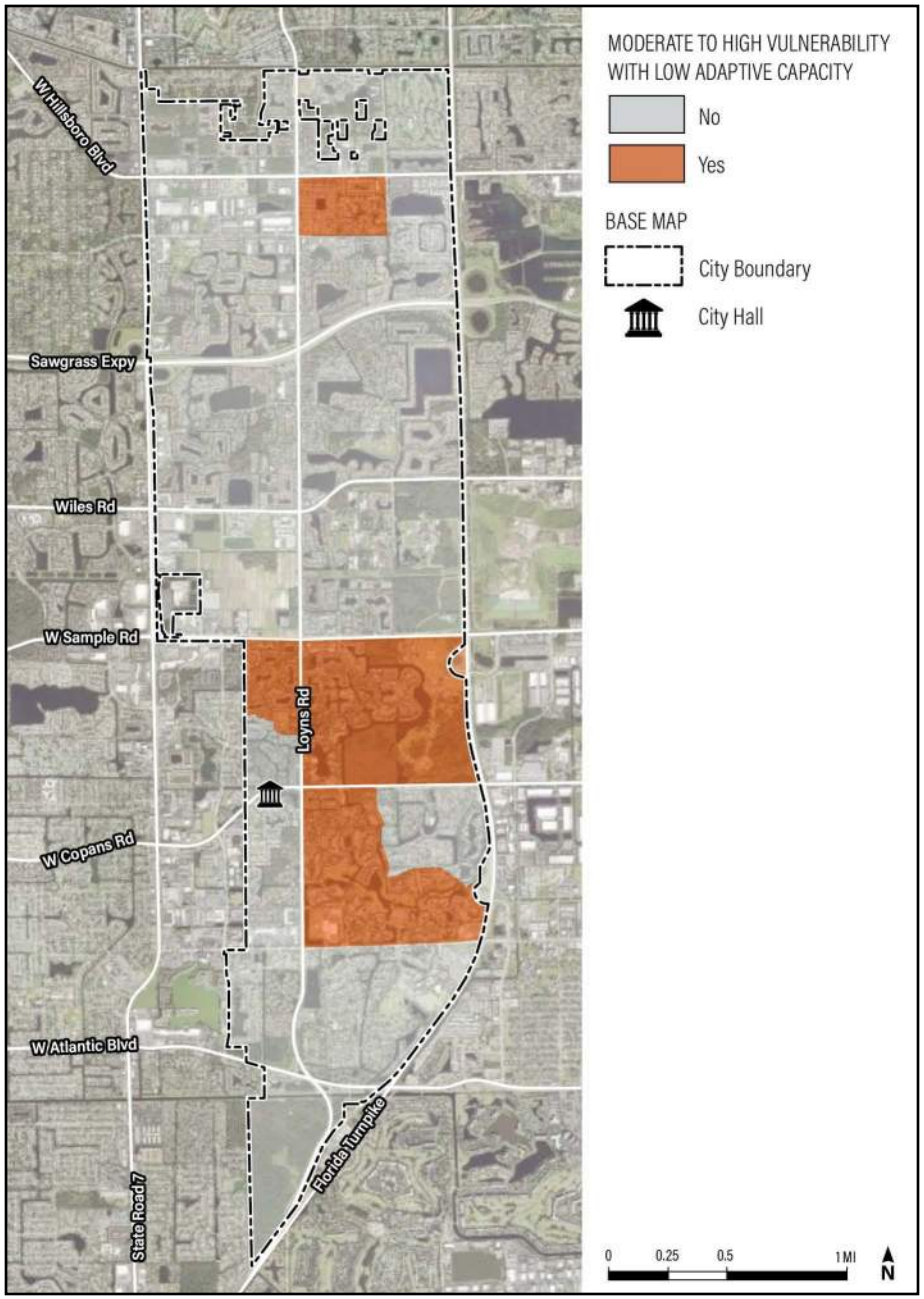


Figure 7.27: *Census blocks with moderate to high vulnerability and moderate to high adaptive capacity*
(Source: U.S. Census, 2020)

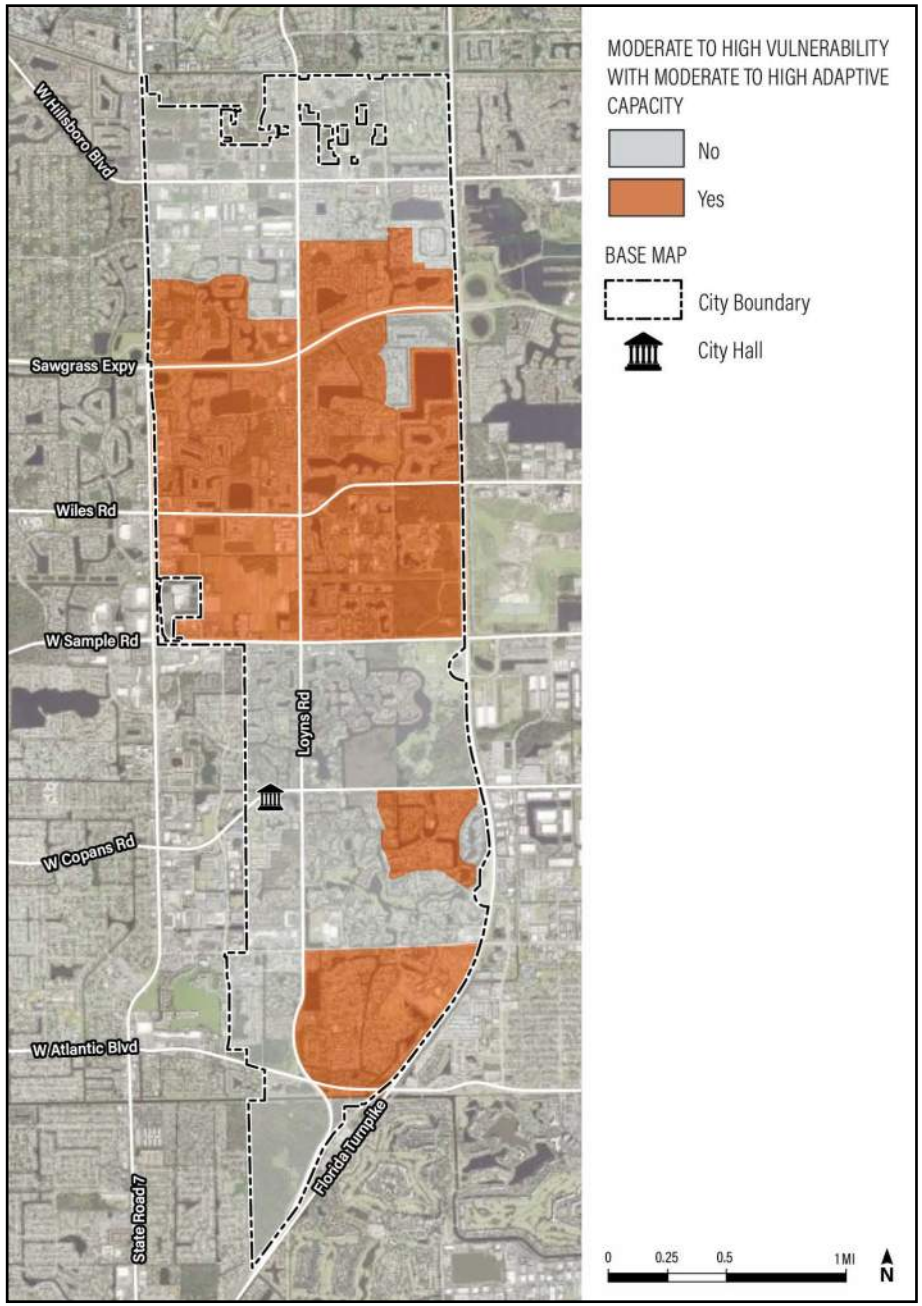
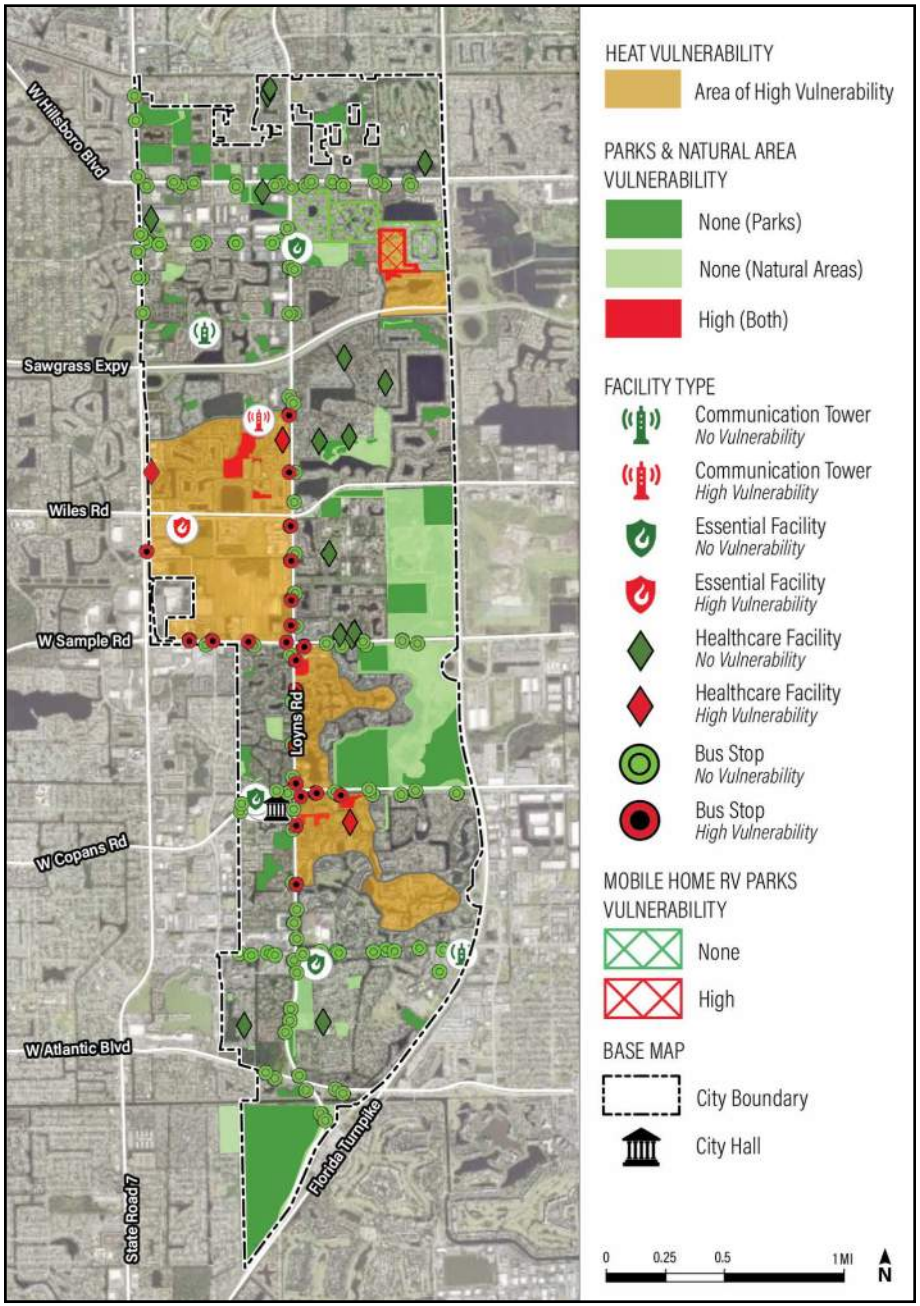


Figure 7.28: *Asset exposure to areas with high heat vulnerability.*
(Sources vary; See Appendix C for GIS layers)



Chapter 8
FOCUS AREAS

Overview

The results from this step help identify tangible projects that the City could pursue to build resilience and adaptability. Focus areas broadly identify priorities. Focus areas can be based on:

- Geographic locations – specific neighborhoods or areas of the city
- Types of assets – physical buildings; important road corridors
- Population or demographics – highest population; vulnerable populations; employment centers

For Coconut Creek, focus areas were established to assist the City in guiding their short-term and long-term decision making. To optimize the effectiveness of these focus areas for the City, localized priorities have been defined, drawing from public input and an overarching vulnerability analysis. As part of the City's established Ambassador Program, residents were surveyed to determine their top priority assets for safeguarding and fortifying resilience against compound flooding and extreme heat. The key outcomes of this survey are as follows:

Rainfall/Compound Flooding Priorities

- Roads
- Healthcare Facilities
- Lift Stations

Extreme Heat Priorities

- Communication Infrastructure
- Healthcare/Assisted Living Facilities
- Bus Stops
- Protected Natural Lands

Based on the resident's priority set of assets, three focus areas were established as follows:

1. Resiliency of the Built Environment
2. Socially Vulnerable Populations and Community Resilience
3. Transportation Infrastructure

These focus areas are directly representative of the input received from residents on priority assets and the key findings of the Vulnerability Analysis.

Focus Area 1: Resiliency of the Built Environment

In both the Extreme Heat Analysis and the Rainfall/Compound Flooding Analysis, the City of Coconut Creek's built environment experiences varying levels of exposure, sensitivity, and overall impact. For purposes of this section, the built environment is defined as the locations in which people live, work, and engage in various activities. Enhancing resilience in the City of Coconut Creek's built environment promises widespread, cascading benefits. This not only assists in protecting the City against natural disasters but can also improve recovery time after disruptions. Ultimately, building resilience safeguards local infrastructure, offering security for current and future residents in Coconut Creek. Moving forward, the City of Coconut Creek must establish strategies and procedures to increase the City's built environment's resilience to major climate events, such as extreme heat and compound flooding/rainfall.

Focus Area 2: Socially Vulnerable Populations and Community Resilience

As with many Cities across the state, the City of Coconut Creek has residents that are more vulnerable to extreme events like flooding and heat. This is due to varying measures, such as income, race, and age that predispose these residents as more vulnerable. As a result, the second focus area of this assessment centers on the socially vulnerable populations within Coconut Creek. Community resilience, referring to the ability of the residents of Coconut Creek to be able to withstand and recover from climate related events, is an extremely important metric for the socially vulnerable within the City. As such, the City of Coconut Creek must work on increasing community resilience to safeguard the socially vulnerable populations within the City.

Focus Area 3: Transportation Assets and Performance

The third focus area derived from community input and the vulnerability analysis is transportation assets. These assets are vitally important to the City, as they impact the City's ability to move both resources and people during extreme events. As a result, the third focus area for potential adaptation strategies is centered on increasing the resilience of the City's transportation infrastructure. Ultimately, these strategies will strengthen the City's transportation system ability to recover and withstand climate related shocks.

Coconut Creek's *ArtsFest 2021*
Source: City of Coconut Creek

Chapter 9
ADAPTATION STRATEGIES AND PROJECTS

Types of Adaptation Strategies

Given the identified focus areas, the following outlines adaptation strategies the City can utilize to address the priorities.

The following is a list of types of adaptation strategies that the City can use to address the priorities identified in this assessment:

- Infrastructure – green infrastructure; asset hardening
- Land Use, Building Codes & Standards –climate action plan; green building standards
- Planning, Policy, & Management – revise city code; operations; internal practices
- Capacity Building – partnerships with other public, private, non-profit organizations
- Public Outreach – public engagement; communication; education
- Funding and Financing – grants, loans; homeowner improvement programs

During the Ambassador Program meeting, the residents were polled on adaptation strategies they would like to see prioritized. The top three results are as follows:

- Infrastructure
- Land Use, Building Codes, & Standards
- Funding & Finance

Potential Adaptation Strategies

Each focus area has multiple potential adaptation strategies This section lists what these strategies are, and explains them in greater detail.

FOCUS AREA 1: RESILIENCY OF THE BUILT ENVIRONMENT	1. Resiliency Audit of Land Development Code 2. Climate Stressor Impact Fee
FOCUS AREA 2: SOCIALLY VULNERABLE POPULATIONS AND COMMUNITY RESILIENCE	1. Build Community Resilience through Weatherization Resources 2. Program to evaluate and monitor Community Resilience of Vulnerable Populations
FOCUS AREA 3: TRANSPORTATION ASSETS AND PERFORMANCE	1. Establish Long-term Monitoring Program of Asset Quality 2. Designate Alternative Travel Routes for Flood Events 3. Implement a Local Roads Advisory Program

Focus Area 1: Resiliency of the Built Environment

1. Resiliency Audit of Land Development Code

The City's Land Development Code guides and governs new development within the City. While the City is predominantly developed, new development and redevelopment of existing sites will occur. As such, conducting regular *Resiliency Audits of the City's Land Development Code* will ensure that the City's standards are continually reviewed and improved as best practices evolve and standards change. Resiliency Code Audits can follow similar review schedules as Comprehensive Plan updates, as these will provide adequate time in between audits for improvements to occur.

2. Climate Stressor Impact Fee

Similar to conducting regular resilience audits of the Land Development Code, the City could explore the potential benefits of adopting a *Climate Stressor Impact Fee*. Climate Stressor Impact Fees (CSIFs) establish a fee threshold for new development that requires developers to pay fees to the City as a result of the potential climate stressor impacts. Climate stressor impacts can be determined by the amount of new impervious surface area, associated climate risk for specific development location (flood risk, heat, and other extreme events), impact to natural water drainage, etc. The fees collected through this program can be utilized by the City as a Climate Action Bank for potential projects and improvements. Alternatively, this may include credits for developers if they design or retrofit a resilience component into their projects.

Focus Area 2: Socially Vulnerable Populations and Community Resilience

1. Build Community Resilience through Weatherization Resources

Weatherization refers to the hardening, improvement, and replacement of materials and appliances in order to increase resilience and energy efficiency. In turn, weatherization can provide an avenue for the City of Coconut Creek to take the economic pressure off socially vulnerable populations that have homes made with inefficient materials and resources. By reducing the economic pressure on these populations through weatherization, the City is increasing these populations' ability to withstand and absorb external shocks caused by extreme climate events.

Further, weatherization is a direct method for the City to address urban heat island effects caused by inefficient homes, as energy inefficient homes will produce higher surrounding temperatures than an energy efficient home (U.S. Environmental Protection Agency, 2008). The state currently runs a Weatherization Assistance Program (WAP) through Florida Commerce. The program provides economic assistance to vulnerable populations for increasing the energy efficiency of their home. For more information and assistance, the City of Coconut Creek can reach out to their in-county local Weatherization Office.

2. Program to evaluate and monitor Community Resilience of Vulnerable Populations

Iterative and scheduled monitoring of community resilience will assist Coconut Creek's ability to plan for, react to, and withstand extreme events. This is recommended to be codified through land use standards as a required community monitoring component. The program will require the City to adopt standards and metrics to track as part of the program.

Focus Area 3: Transportation Assets and Performance

1. Establish Long-term Monitoring Program of Asset Quality

In order to efficiently plan for improvements to transportation assets within the City, the City must actively monitor long-term asset physical conditions. In turn, this will allow the City to prioritize specific assets based on their quality. While assets such as roads and bridges are generally monitored to begin with, it is worthwhile to establish a standalone monitoring program for all the transportation assets in the City. This extends to bus stops and parking structures that need to be monitored for quality over time.

2. Designate Alternative Travel Routes for Flood Events

Based on the results of this Vulnerability Assessment, the City's transportation system and road network will be impacted at various levels during flood events. While the City does have dedicated Evacuation Routes to move people out of the City quickly during extreme events, the City does not have a dedicated Alternative Travel Route program established for use during rainy day flood events. Alternative Travel Routes will ensure that City residents will be able to travel in the event that normal routes are impacted.

3. Implement a Local Roads Advisory Program

A Local Roads Advisory Program functions as an information platform that the City can utilize to inform and provide on-demand transportation messaging to City residents. This messaging can occur before or during extreme climate events so that the City can actively advise residents the status of specific transportation assets, like roads and bus stops. In turn, this will better prepare both the City and residents for these disruptive events.

Potential Projects

Using the prioritized adaptation strategies as a guide, the project team then developed a list of potential, actionable projects for the City to consider implementing in order to accomplish the priorities established in this study. Each project is grouped by focus, then by potential strategy. A full list of projects can be found in Appendix D.

Chapter 10
OUTREACH AND ENGAGEMENT

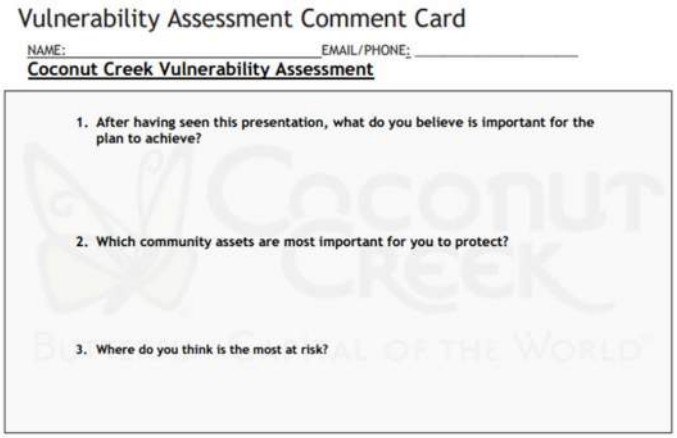
Public Outreach Methods

Public outreach is an important part of the vulnerability assessment process as it allows members of the community an opportunity to be aware and engaged in the overall process of vulnerability assessment. It also provides valuable information which might not be immediately apparent from data alone. For this assessment, feedback was received from both the community and the Steering Committee.

The Steering Committee was comprised of representatives from every City department and was utilized in decision making processes guiding the strategic direction of the project. Resident outreach was conducted using the City's pre-existing Ambassador Program, set up to empower residents with the knowledge and tools to be effective community "ambassadors" regarding City issues.

Outreach event times and locations were advertised through City social media websites as well as City public agendas.

Figure 10.1: *Comment card for Ambassador Meeting 1*


Vulnerability Assessment Comment Card

NAME: _____ EMAIL/PHONE: _____

Coconut Creek Vulnerability Assessment

1. After having seen this presentation, what do you believe is important for the plan to achieve?

2. Which community assets are most important for you to protect?

3. Where do you think is the most at risk?

Ambassador Meeting 1 - Kickoff

A kickoff meeting was held on January 12, 2023, to inform the public of the overall project scope, schedule, and upcoming deliverables for the vulnerability assessment. The meeting was held in conjunction with the City's Ambassador Program which allows residents and City staff to collaborate on the strategies outlined in Coconut Creek's Vision 2030 plan. During the Ambassador kickoff event, a presentation was given by the Broward County Assistant Chief Resilience Officer, Gregory Mount, and Director of Planning at WGI, Angela Biagi. The presentation detailed data regarding sea level rise, temperature projections, assets to be examined, and the vulnerability assessment timeline. The presentation was followed by an open floor for questions from Ambassador Program members.

During the meeting, boards on display depicted critical facilities as well as sea level rise inundation within the boundaries of Coconut Creek. Participants used these maps to identify critical locations they wished to be included in the study in addition to those listed in the presentation. City staff members and the study team were on hand to answer any questions or concerns Ambassadors may have had regarding the vulnerability assessment. The ambassador meeting also provided participants the opportunity to share input in the form of a comment card, see Figure 10.1, which was collected by the study team. Comments were collected both at the meeting and via email through the city's sustainability department.

Ambassador Meeting 2 - Determining Focus Areas

A second Ambassador Program meeting was held on October 12, 2023, to provide a progress update on the assessment and to receive the community's feedback on which assets they want to prioritize. The presentation was led by WGI Director of Planning, Angela Biagi. and WGI Planner, Tyler Tornese, covering the assets and threats that were researched and the findings from that research. The presentation also covered which assets Ambassadors would be voting on to become focus areas.

Following an introduction by City Manager Karen Brooks, WGI began the presentation with an overview of the vulnerability assessment. An explanation was provided of what a vulnerability assessment is, a bit of the history behind it, examples of vulnerability and climate change stressors, direct impacts, and how conducting a vulnerability assessment can benefit the community. After a brief review of the assessment timeline, WGI introduced the threats and assets that were studied, as well as the findings from each of the studies. The findings included graphs and maps that clearly identify how different assets would be affected by different threats. The presentation ended with the next steps and an overview of potential focus areas that ambassadors could choose.

Figure 10.2: *Heat priorities dot-voting board*

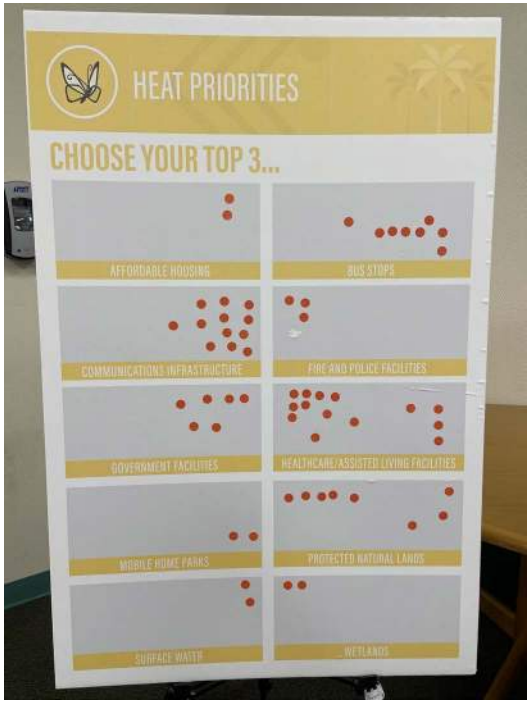


Figure 10.3: *Rainfall/Flooding priorities dot-voting boards*

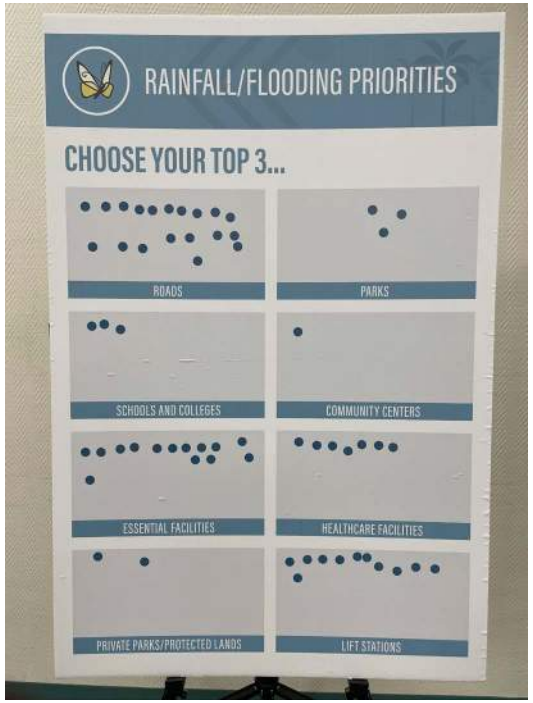
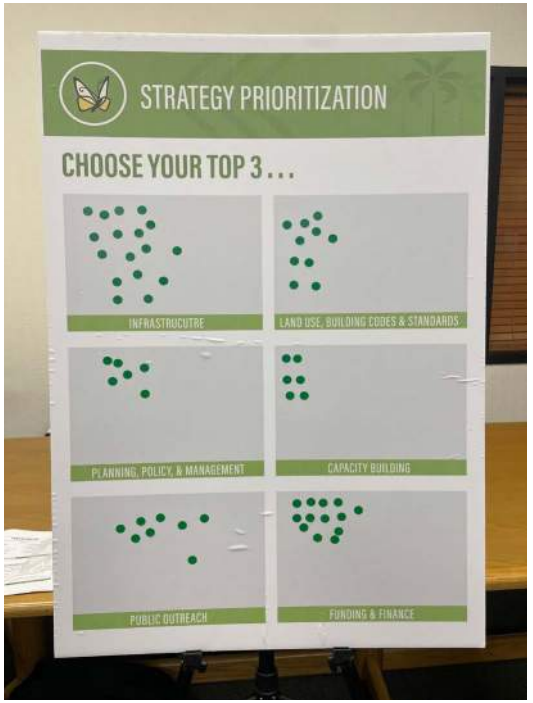


Figure 10.4: *Strategy prioritization dot-voting board*



After the presentation, ambassadors voted on asset and strategy priorities. Voting took place using dot stickers on boards at three stations – Heat, Rainfall/Flooding, and Strategies. Each Ambassador was given dot stickers that they placed next to the top three assets they wished to prioritize. WGI and City staff were positioned at each station to assist Ambassadors with any questions or concerns. Additionally, dsiplays with flood elevation and heat exposure data were set up next to the voting boards to help voters. The top three areas were chosen at each station as follows:

Table 10.1: *Top ranked assets for heat, compound flooding, and strategies*

HEAT PRIORITIES			RAINFALL/FLOODING PRIORITIES		
Rank	**Asset**	**Votes**	**Rank**	**Asset**	**Votes**
1	Healthcare/Assisted Living Facilities	14	1	Roads	19
2	Communications Infrastructure	12	2	Essential Facilities	14
3	Bus Stops	8	3	Lift Stations	11

STRATEGY PRIORITIZATION		
Rank	**Asset**	**Votes**
1	Infrastructure	17
2	Funding and Finance	13
3	Land Use, Building Codes & Standards	10

Steering Committee Meeting 1 – Kick off

The first Steering Committee meeting was held on February 27, 2023, in the Coconut Creek Commission Chambers. The project team gave a presentation on the topic and goals of the vulnerability assessment project. The presentation was followed by an open discussion on critical assets within the community and any other concerns. Steering Committee members provided direction on additional assets to review, beyond the FDEP mandatory assets, including grocery stores, parks, cell towers, and parking structures.

Steering Committee Meeting 2 – Identification of Assets

The second Steering Committee meeting was held on May 9, 2023, in the Coconut Creek Commission Chambers. During this meeting, the project team presented updates on data collection and community assets. Following the presentation, the team conducted a group exercise to obtain feedback on which assets should be studied for extreme heat vulnerability and to determine asset threat pairing. The extreme heat vulnerability worksheets assessed which metrics contributed to determining heat-vulnerable populations. The results were as follows:

Table 10.2: *Heat vulnerability metrics*

HEAT VULNERABILITY	
Votes	**Heat Metrics**
16	Older Population
16	Disability
15	Tree Canopy Coverage
14	Impervious Surface Coverage
11	Poverty Rate
11	Percent of Children Under 18

Table 10.3: *Adaptive capacity metrics*

ADAPTIVE CAPACITY	
Votes	**Heat Metrics**
12	Disability
11	Poverty Rate
10	Older Population
9	Percent of Children Under 18
7	Minority Race or Ethnicity
7	Home Ownership vs. Rental

Steering Committee Meeting 3 – Risk Scoping

The study team held the third Steering Committee meeting on July 12, 2023 in the Coconut Creek Public Works building. The main topics covered during this meeting included presenting the preliminary results of the heat vulnerability analysis to the committee members, providing updates on work completed to date, and the risk scoping survey. The study team presented the asset-threat pairings for extreme heat and groundwater intrusion for which opinions were solicited at the previous meeting; see Tables 10.5 and 10.6 for the results.

Following the review of the results, a presentation of extreme heat was given. The team asked for any feedback from Steering Committee members on the maps showing extreme heat vulnerability and adaptive capacity or groundwater intrusion. The Steering Committee members gave the study team an indication that the results of the asset/threat pairing were accurate to their responses.

The first map reviewed by the Steering Committee showed urban heat island exposure. Hotspots identified on the map included Lyons Road, industrial areas, denser residential neighborhoods, shopping centers, and large parking lots.

A member of the Steering Committee mentioned that the future development, Main Street, is currently labeled as having a low adaptive capacity due to minimal canopy. They stated that this area could later see more tree canopy due to future development at the location and that this would be something to keep in mind for future metrics.

Table 10.5: *Groundwater intrusion asset-threat pairing*

GROUNDWATER INTRUSION	
Votes	**Asset Class**
17	Lift Stations
16	Sewer Infrastructure
16	Electric/Fiber Infrastructure
15	Water Infrastructure
15	Drainage Infrastructure
14	Government Facilities
13	Mobile Home Parks
13	Roads
13	Fire and Police Facilities
13	City and County Parks
11	Parking Structures

Table 10.4: *Extreme heat asset-threat pairing*

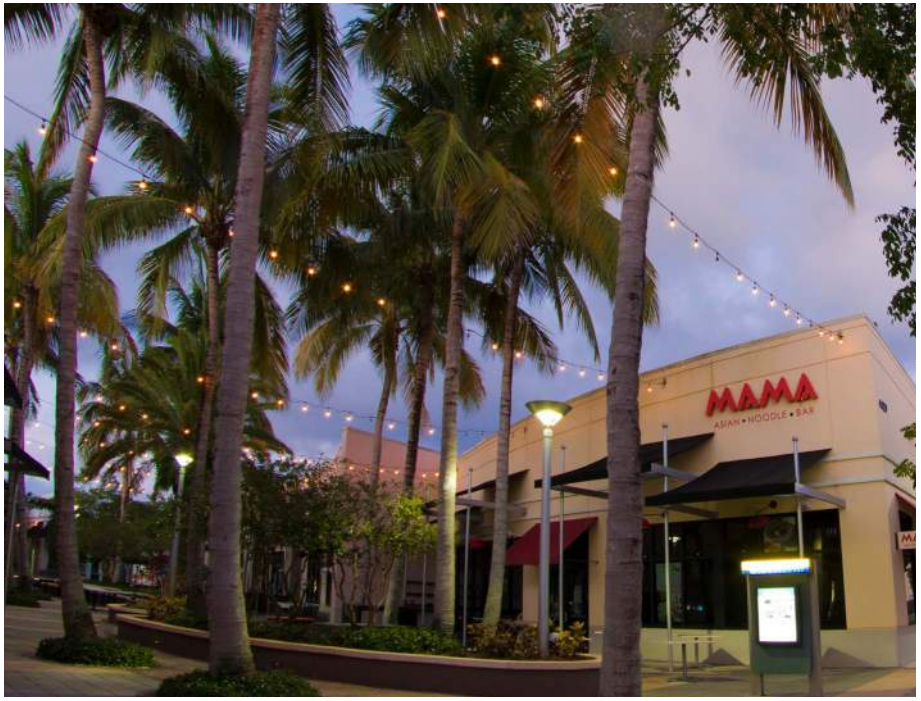
EXTREME HEAT	
Votes	**Asset Class**
16	Healthcare and Assisted Living Facilities
15	Bus Stops
14	Fire and Police Facilities
14	Government Facilities
13	Mobile Home Parks
13	City and County Parks
12	Communications Infrastructure (Cell Towers)
12	Wetlands
11	Affordable Housing
11	Surface Water
10	Protected Natural Lands

The next section reviewed with the Steering Committee was the heat vulnerability map. The committee was asked if they noticed any discrepancies between what they noticed on the map and their experience as members of the community. The heat vulnerability maps measure where populations are susceptible to the negative effects of extreme heat, combined with areas exposed to heat. The heat adaptive capacity map measures where populations have a higher ability to adjust or cope with extreme heat. A comment was made stating that the heat vulnerability and heat adaptive capacity maps could see more detail on which areas are more vulnerable by using community boundaries rather than census block group boundaries.

Following the review of the maps, the study team presented the extreme heat sensitivity analysis and offered Steering Committee members an opportunity to observe the priority levels of the different assets on a more granular level, listing each asset location. Because the dataset for this information was more comprehensive, the dataset was made available to committee members via SharePoint. A groundwater review for exposure analysis findings was presented to the Steering Committee members as well. At the end of this meeting, the study team introduced an online survey to gather input on risk scoping. Steering Committee members were given a primer on what risk scoping is and how they could evaluate risk and consequences for the different asset classes.

Steering Committee Meeting 4 – Identification of Projects

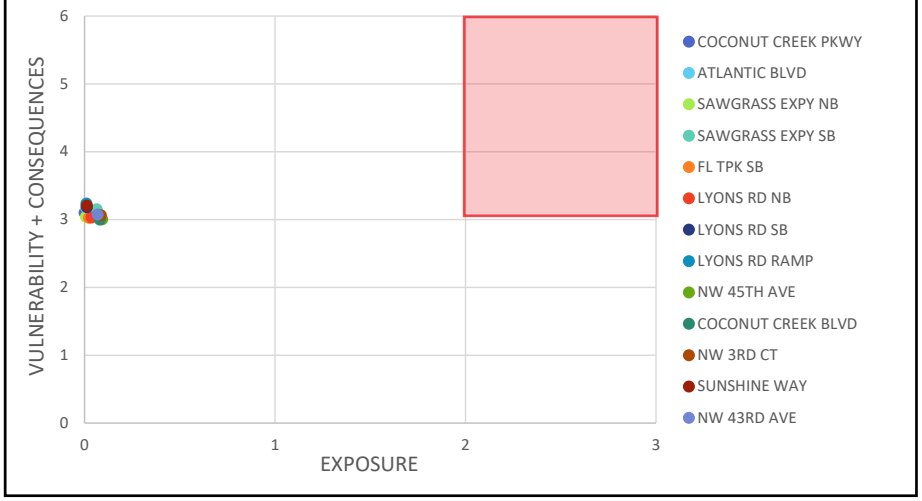
The fourth Steering Committee meeting was held virtually via Zoom on January 9, 2024. The WGI team presented key findings for compound flooding, groundwater inundation, and extreme heat. The team then presented the focus areas created by WGI and the top adaptation strategies that were voted on in the second Ambassador meeting. The Steering Committee was then given the opportunity to provide input on the focus areas and strategies that were presented. Following this feedback, WGI presented a list of potential projects by focus area. The meeting concluded with a look at the next steps and an announcement of the City Commission presentation on February 8, 2024.



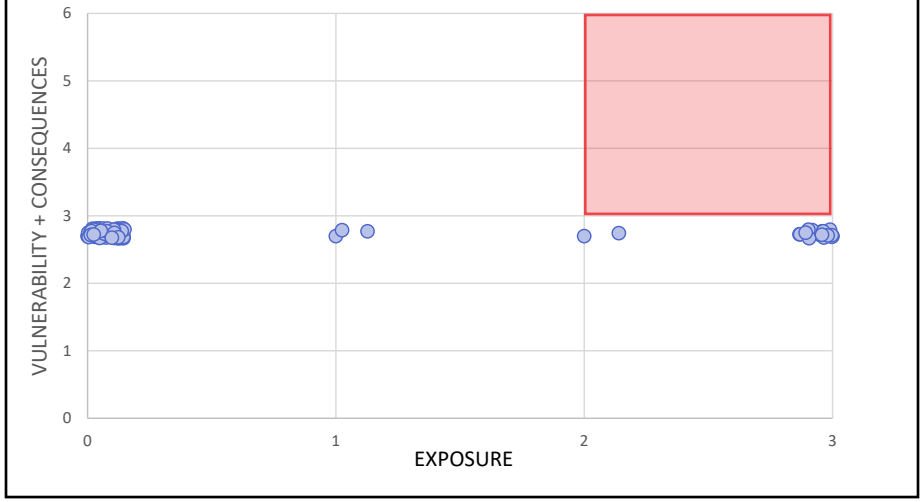
Promenade at Coconut Creek
Source: City of Coconut Creek

Appendix A
ASSET PRIORITIZATION GRAPHS

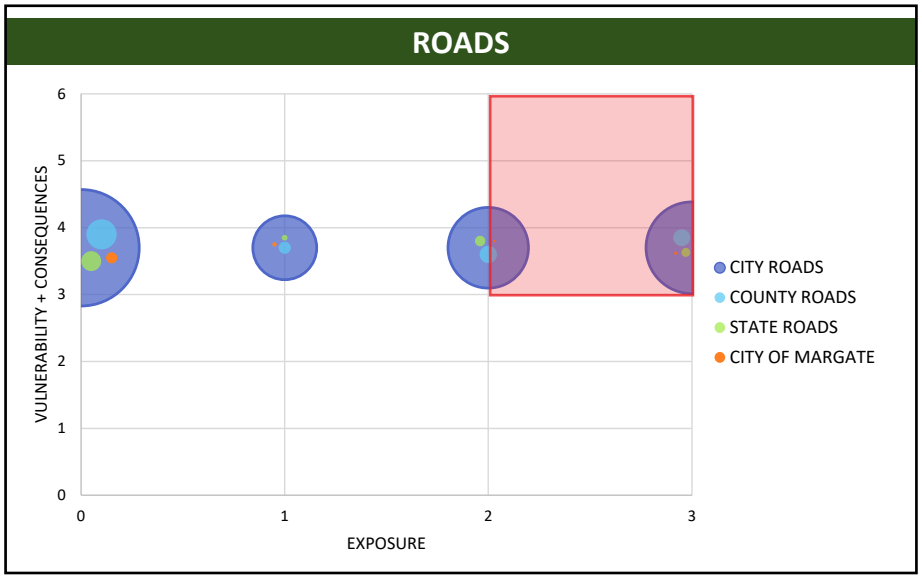
BRIDGES



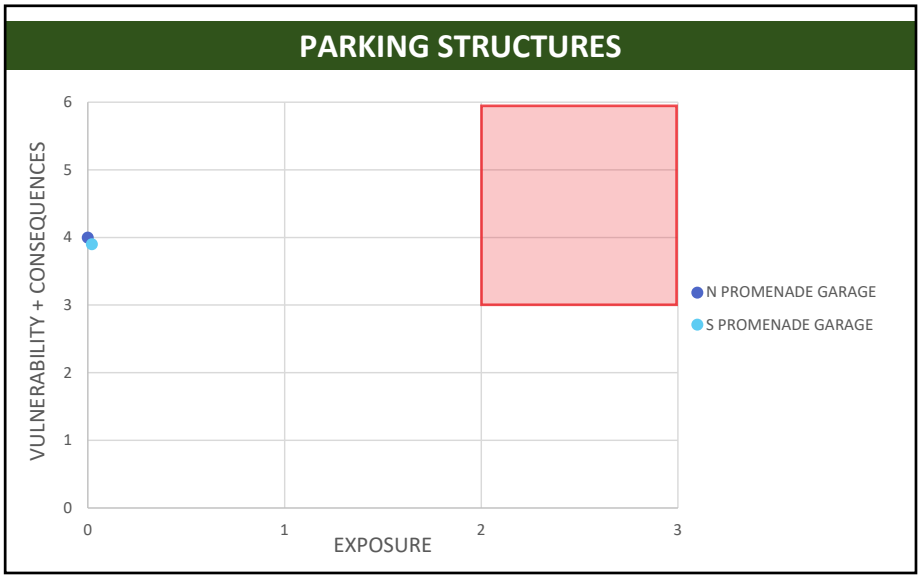
BUS STOPS



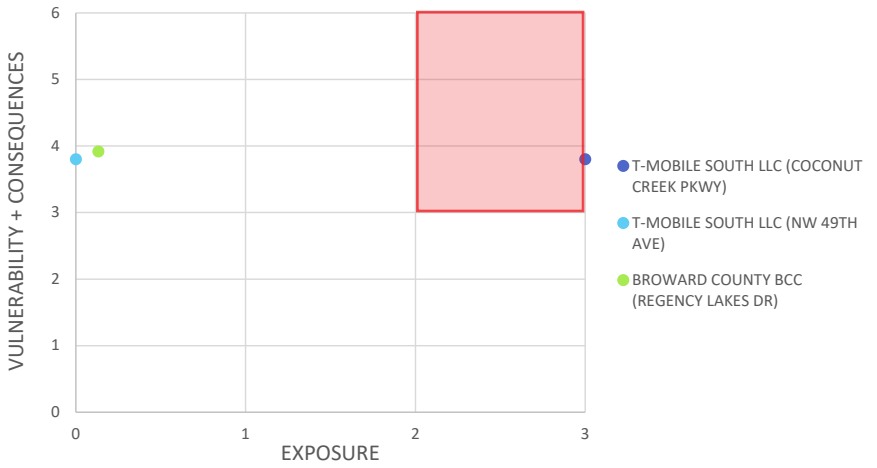
ROADS



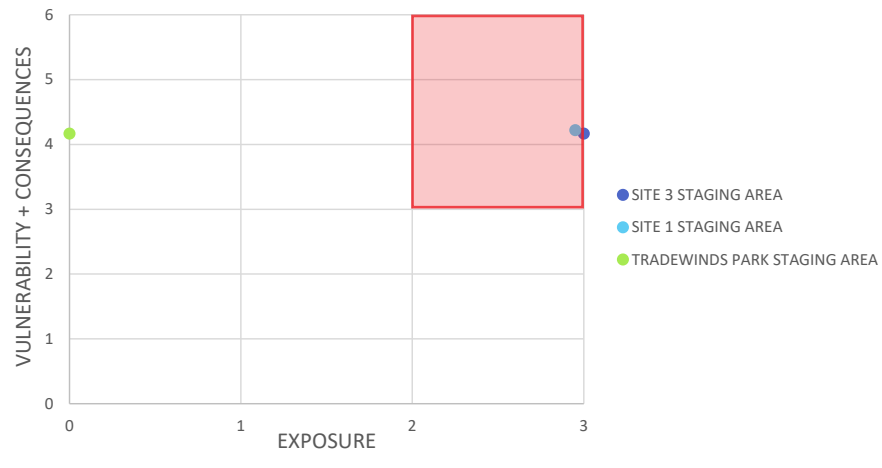
PARKING STRUCTURES



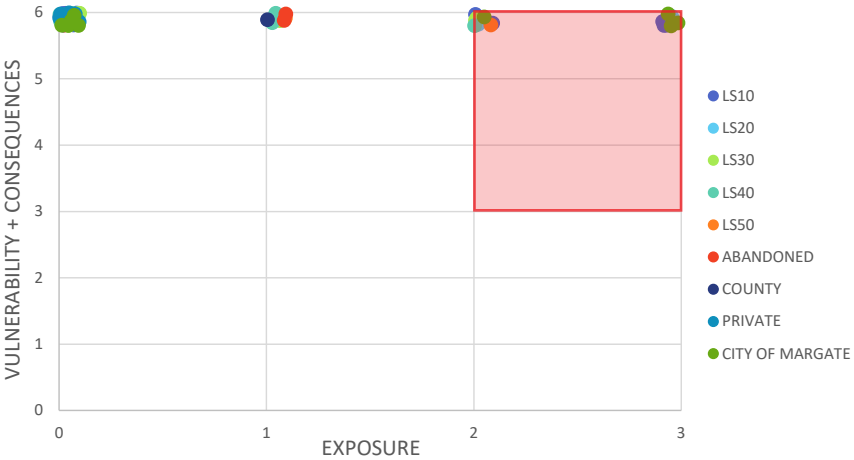
COMMUNICATION INFRASTRUCTURE



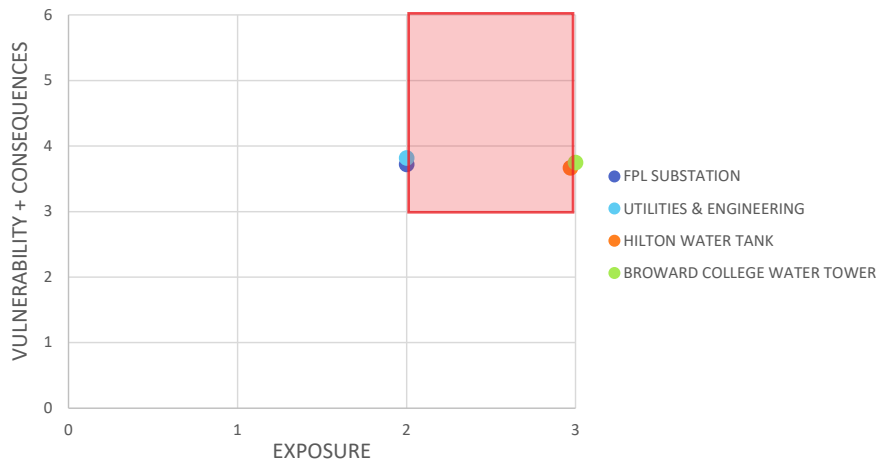
DISASTER DEBRIS MANAGEMENT SITES



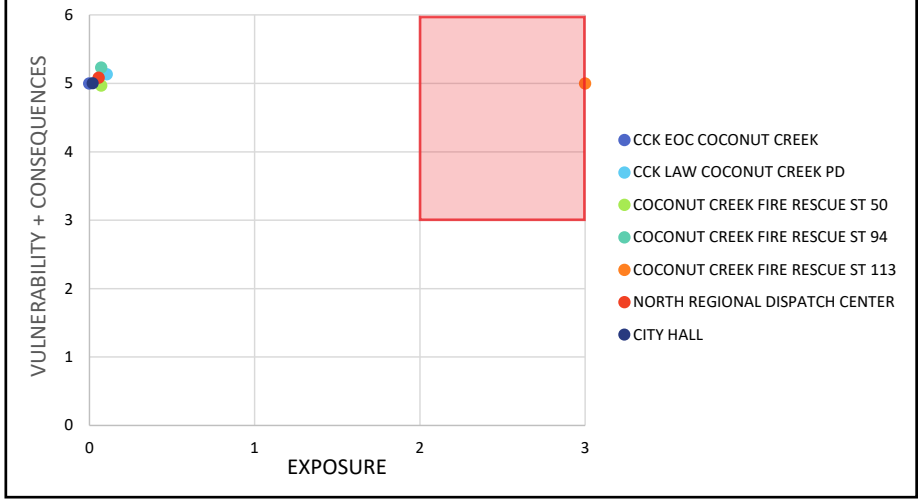
LIFT STATIONS



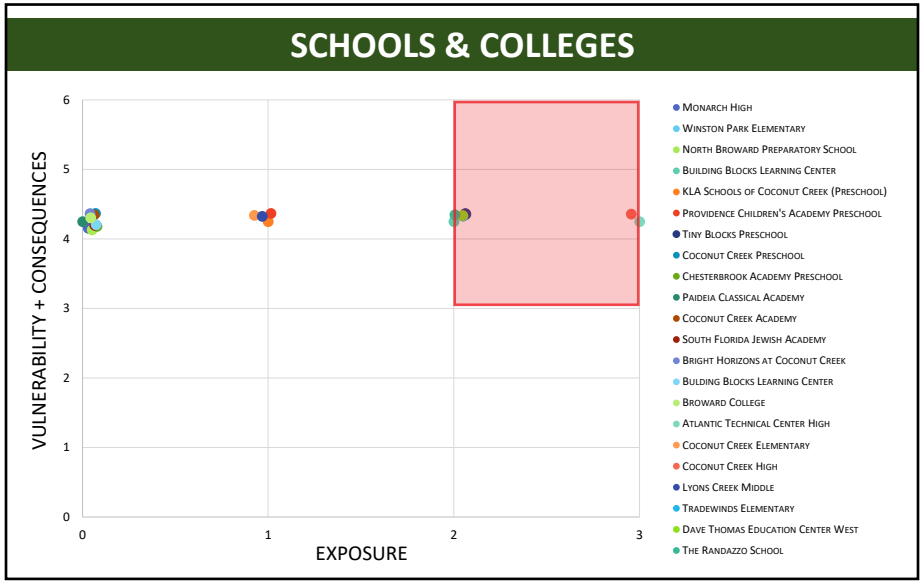
MISC UTILITIES & SUBSTATIONS



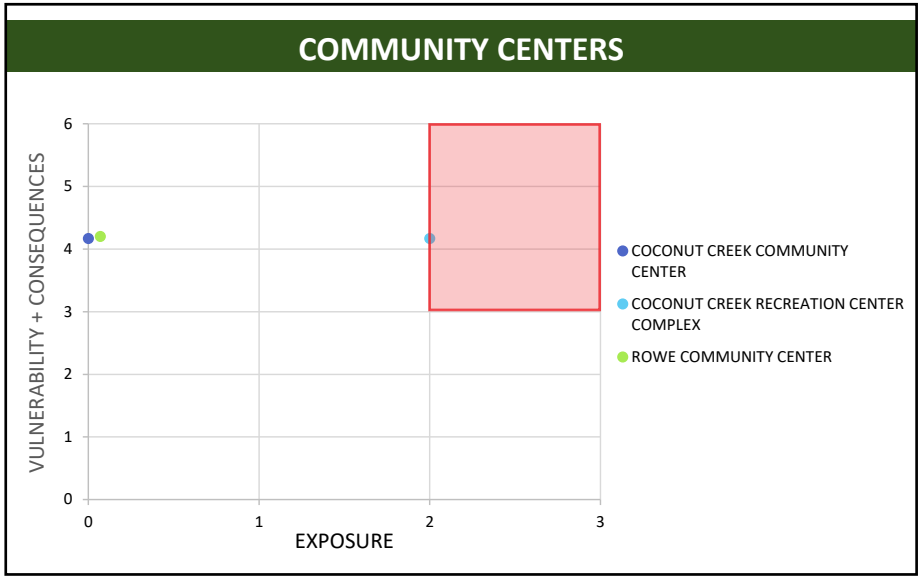
ESSENTIAL FACILITIES



SCHOOLS & COLLEGES

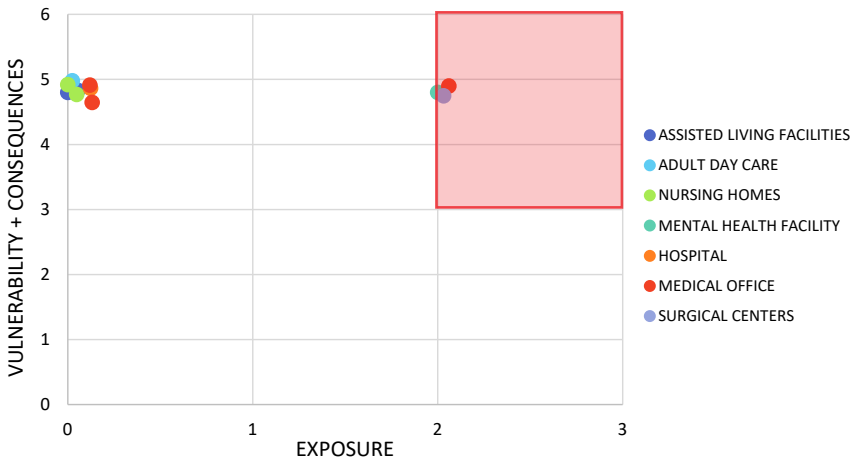


COMMUNITY CENTERS

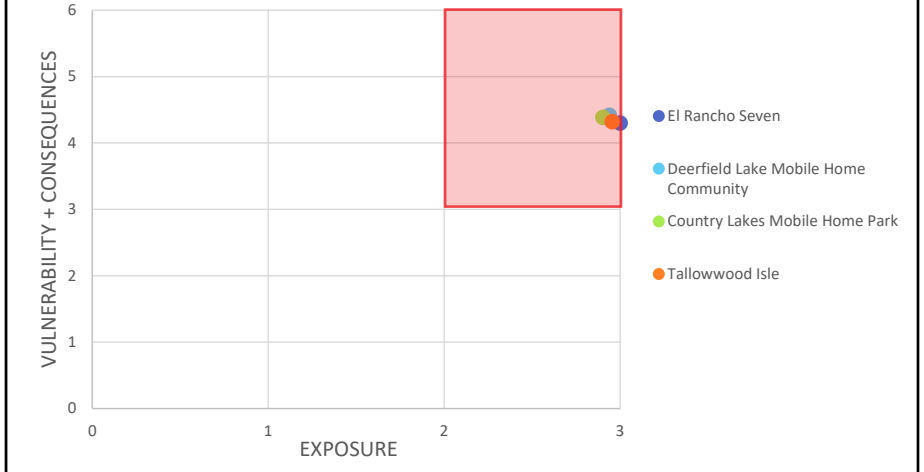


GROCERY STORES

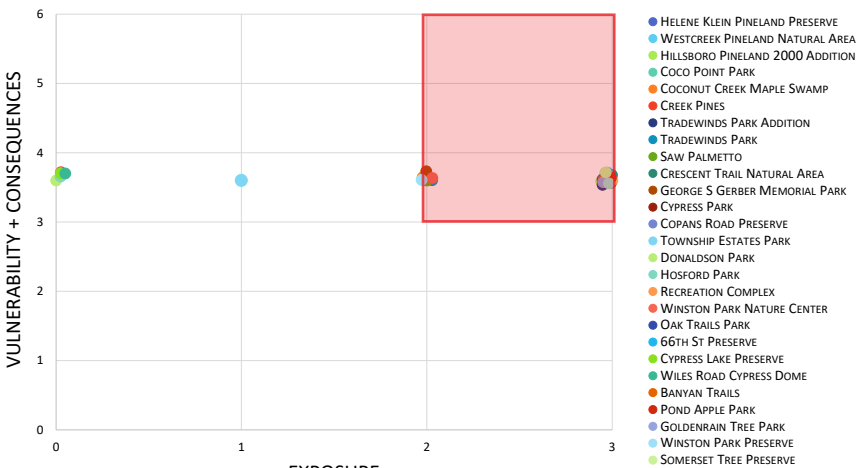
HEALTHCARE FACILITIES



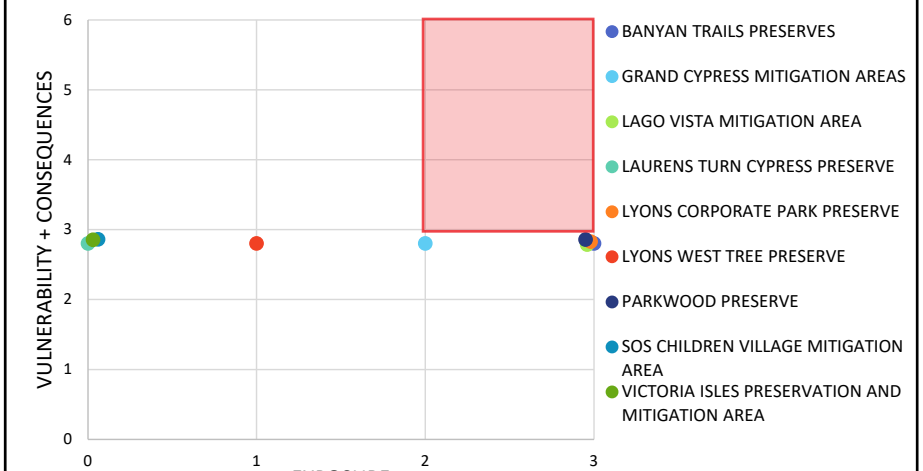
MOBILE HOME PARKS



PARKS



PROTECTED NATURAL LANDS



Appendix B
GIS LAYERS

Feature Dataset Layer	Theme	Layer Name	Layer Type	Layer Source
Transportation Assets and Evacuation Routes				
Transportation_and_Evacuation_Routes	Transportation	Bridges	Point (GIS)	National Bridge Inventory
Transportation_and_Evacuation_Routes	Transportation	Bus_Stops	Point (GIS)	Broward County Transit Division-Service and Capital Planning Section
Transportation_and_Evacuation_Routes	Transportation	Parking_Structures	Point (GIS)	City of Coconut Creek
Transportation_and_Evacuation_Routes	Transportation	Roads	Polyline (GIS)	Broward County GIS (BCGIS)
Critical Infrastructure				
Critical_Infrastructure	Communications	Communications	Point (GIS)	State Emergency Response Team (SERT)
Critical_Infrastructure	Solid Waste Disaster Debris Management Sites	Disaster_Debris_ Management_Sites	Point (GIS)	Florida Department of Environmental Protection (FDEP) OTIS/GIS Section
Critical_Infrastructure	Utilities	Drain_Structures	Point (GIS)	City of Coconut Creek
Critical_Infrastructure	Utilities	EV_PV_Charge_Stations	Point (GIS)	City of Coconut Creek
Critical_Infrastructure	Utilities	Miscellaneous_Utilities	Point (GIS)	City of Coconut Creek
Critical_Infrastructure	Utilities	OHUG_Structures	Point (GIS)	City of Coconut Creek
City_of_Margate_Waterworks	Utilities	sCleanOut	Point (GIS)	City of Margate
City_of_Margate_Waterworks	Utilities	sControlValve	Point (GIS)	City of Margate
Critical_Infrastructure	Utilities	Sewer_Structures	Point (GIS)	City of Coconut Creek
City_of_Margate_Waterworks	Utilities	sFitting	Point (GIS)	City of Margate
City_of_Margate_Waterworks	Utilities	sLateralPoint	Point (GIS)	City of Margate
City_of_Margate_Waterworks	Utilities	sManhole	Point (GIS)	City of Margate
City_of_Margate_Waterworks	Utilities	sNetworkStructure	Point (GIS)	City of Margate
City_of_Margate_Waterworks	Utilities	sPumpStation	Point (GIS)	City of Margate
City_of_Margate_Waterworks	Utilities	sSystemValve	Point (GIS)	City of Margate
Critical_Infrastructure	Utilities	Water_Structures	Point (GIS)	City of Coconut Creek
City_of_Margate_Waterworks	Utilities	wControlValve	Point (GIS)	City of Margate
City_of_Margate_Waterworks	Utilities	wFitting	Point (GIS)	City of Margate
City_of_Margate_Waterworks	Utilities	wHydrant	Point (GIS)	City of Margate
City_of_Margate_Waterworks	Utilities	wLateralPoint	Point (GIS)	City of Margate
City_of_Margate_Waterworks	Utilities	wNetworkStructure	Point (GIS)	City of Margate
City_of_Margate_Waterworks	Utilities	wServiceValve	Point (GIS)	City of Margate

Feature Dataset Layer	Theme	Layer Name	Layer Type	Layer Source
City_of_Margate_Waterworks	Utilities	wSystemValve	Point (GIS)	City of Margate
Critical_Infrastructure	Utilities	Drain_Lines	Polyline (GIS)	City of Coconut Creek
Critical_Infrastructure	Utilities	OHUG_Lines	Polyline (GIS)	City of Coconut Creek
Critical_Infrastructure	Utilities	Sewer_Lines	Polyline (GIS)	City of Coconut Creek
City_of_Margate_Waterworks	Utilities	sGravityMain	Polyline (GIS)	City of Margate
City_of_Margate_Waterworks	Utilities	sLateralLine	Polyline (GIS)	City of Margate
City_of_Margate_Waterworks	Utilities	sPressurizedMain	Polyline (GIS)	City of Margate
Critical_Infrastructure	Utilities	Water_Lines	Polyline (GIS)	City of Coconut Creek
City_of_Margate_Waterworks	Utilities	wLateralLine	Polyline (GIS)	City of Margate
City_of_Margate_Waterworks	Utilities	wPressurizedMain	Polyline (GIS)	City of Margate
Critical Community and Emergency Facilities				
Critical_Community_and_Emergency_Facilities	Affordable Housing	Affordable_Housing	Point (GIS)	Shimberg Center for Housing Studies, University of Florida
Critical_Community_and_Emergency_Facilities	City Hall	City_Hall	Point (GIS)	Broward County GIS (BCGIS)
Critical_Community_and_Emergency_Facilities	Colleges	Colleges	Point (GIS)	Broward County Environmental Protection and Growth Management Department (EPGM), Planning & Redevelopment Division, GIS Section
Critical_Community_and_Emergency_Facilities	Community Centers	Community_Centers	Point (GIS)	State Emergency Response Team (SERT), City of Coconut Creek
Critical_Community_and_Emergency_Facilities	Essential Facilities	Essential_Facilities	Point (GIS)	Broward County GIS (BCGIS)
Critical_Community_and_Emergency_Facilities	Private Buildings	Grocery_Stores	Point (GIS)	City of Coconut Creek
Critical_Community_and_Emergency_Facilities	Healthcare	Health_Care_Facilities	Point (GIS)	State Emergency Response Team (SERT)
Critical_Community_and_Emergency_Facilities	Schools	Private_Schools	Point (GIS)	City of Coconut Creek
Critical_Community_and_Emergency_Facilities	Schools	Schools	Point (GIS)	Broward County School Board
Critical_Community_and_Emergency_Facilities	Building Footprints	Buildings	Polygon (GIS)	Microsoft
Critical_Community_and_Emergency_Facilities	Mobile Home and RV Parks	Mobile_Home_RV_Parks	Polygon (GIS)	Broward County GIS (BCGIS)
Natural, Cultural, and Historic Resources				
Natural_Cultural_and_Historical_Resource	Parks	Parks	Polygon (GIS)	Broward County GeoHub
Natural_Cultural_and_Historical_Resource	Protected Natural Lands	Protected_Natural_Lands	Polygon (GIS)	Natasha Herne Natural Resources Planning and Management Division Land Stewardship Program
Natural_Cultural_and_Historical_Resource	Surface Water	Surface_Water	Polygon (GIS)	Natasha Herne Natural Resources Planning and Management Division Land Stewardship Program
Natural_Cultural_and_Historical_Resource	Wetlands	Wetlands	Polygon (GIS)	National Wetlands Inventory (NWI)
Flood Scenario				
Flood_Scenario	Groundwater	Groundwater_ Elevations_2060_thru_2069	Polygon (GIS)	Cocomar WMD
Flood_Scenario	Flood_Scenario	Flood_2017_PROJ_2040_ int_hi	Raster (GIS)	Broward County

Feature Dataset Layer	Theme	Layer Name	Layer Type	Layer Source
Flood_Scenario	Flood_Scenario	Flood_2017_PROJ_2040_int_lo	Raster (GIS)	Broward County
Flood_Scenario	Flood_Scenario	Flood_2017_PROJ_2070_int_hi	Raster (GIS)	Broward County
Flood_Scenario	Flood_Scenario	Flood_2017_PROJ_2070_int_lo	Raster (GIS)	Broward County
Flood_Scenario	Flood_Scenario	Flood_4_HTF_MINOR	Raster (GIS)	National Oceanic and Atmospheric Administration (NOAA)
Flood_Scenario	Groundwater	Flood_60_69_GW_2017_2	Raster (GIS)	South Florida Water Management District (SFWMD), City of Coconut Creek
Topographic, Boundaries, and Miscellaneous				
Topographic_Boundaries_and_Miscellaneous	Census	Census_Block_Groups	Polygon (GIS)	United States Census
Topographic_Boundaries_and_Miscellaneous	City Limits	City_Boundary	Polygon (GIS)	Broward County Environmental Protection and Growth Management Department (EPGM), Planning & Redevelopment Division, GIS Section
Topographic_Boundaries_and_Miscellaneous	City Limits	City_Boundary_buffered100ft	Polygon (GIS)	Broward County Environmental Protection and Growth Management Department (EPGM), Planning & Redevelopment Division, GIS Section
Topographic_Boundaries_and_Miscellaneous	Future Land Use	Future_Land_Use	Polygon (GIS)	Broward County Planning Council
Topographic_Boundaries_and_Miscellaneous	Parcels	Parcels	Polygon (GIS)	Florida Department of Revenue, Florida Department of Transportation, Broward County
Topographic_Boundaries_and_Miscellaneous	Parcels	Parcels_Simplified	Polygon (GIS)	Florida Department of Revenue, Florida Department of Transportation, Broward County

Appendix C
GRANT PROGRAMS

Mobilizing for Grants

With the historic investment in resilience, safety, and infrastructure, cities can count on funds for the next several years. The State of Florida has likewise established funds for mitigating and adapting to climate change.

With the increased investment comes processes to ensure funding is directed to the most necessary projects. Some of the process-related trends to be aware of include:

- Two step funding wherein an eligible applicant must first develop a plan (or submit existing plans that qualify) to later apply for implementation and construction grants.
- Entities are required, in most cases, to contribute matching funds, typically 20%
- Applicants need to study grantmakers' priorities and selection criteria. This informs how to write a successful proposal that "checks all the boxes."
  - For the latest round of federal grants, there are additional points for (1) addressing climate impacts, (2) preventing future climate impacts, and (3) addressing underinvestment in low-income neighborhoods. Each grant specifies criteria differently.
  - Some of those success criteria are applying jointly with other eligible entities. Increasingly, resilience is required or given higher points during scoring.
  - Grantmakers are posting grant awards which contain useful insights on the types of projects funded.
  - Applicants may need to conduct National Environmental Policy Act (NEPA) reviews and cost-benefit analyses, particularly for construction grants.

Appendix E lists the strategies with funding notes on grant programs and application details. The sections below describe some of the more common federal, state, and regional grant programs used for mitigation and resilience strategies such as those listed in this study.

Regional Programs

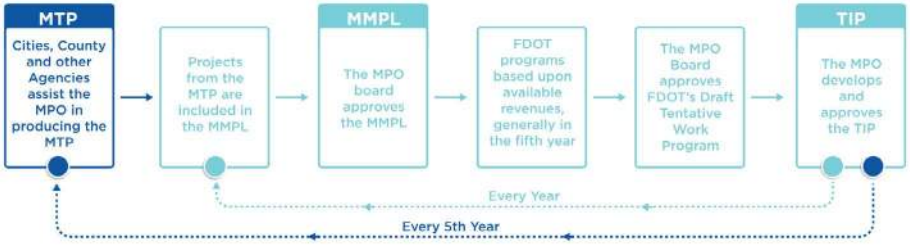
Broward MPO

The Broward MPO oversees major planning and funding initiatives in the County addressing mobility, infrastructure, and related resilience activities. One of the first tasks is to align this Vulnerability Assessment with the array of MPO plans. At the highest level, the MPO produces the long-range transportation plan (LRTP), which is currently named Commitment 2040. Projects must align with the LRTP's goals which are (1) Move People, (2) Create Jobs, and (3) Strengthen Communities.

Each year the MPO announces a "call for projects" from its member localities. The graphic on the follwing page shows the process of how projects are selected through a series of three plans: the Metropolitan Transportation Plan (MTP), the Multimodal Priority List (MMPL), and the Transportation Improvement Program (TIP).

For Coconut Creek, it's important to nominate projects to add to the MPO's list of priority projects to qualify for funding under federal, state, and local programs. It's also important to understand allocation. The Complete Streets and Localized Initiatives Programs and Complete Streets Master plan together receive 45% of the program funding. Thus having Complete Streets as a strong resilience strategy can help in the competition for funding.

(Source: Broward MPO)



Example Strategies	MPO link	Notes
Coconut Creek Mobility Hub	Mobility Hub Project	Determine how to incorporate resilience into the Mobility Hub
Focus Area 2: Increase awareness and accessibility of information on foreseeable risks communities face. Communicate and share data on risks posed by flooding, extreme heat and other compounding risks.	Commitment 2045	Within Environmental Stewardship planning Factor/ Criteria: "Improvements Related to Sea-Level Rise Mitigation/Extreme Weather Resiliency"
Focus Area 3: Adopt Complete Street and Vision Zero plans to prioritize safety and comfort of non-motorized users	Complete Streets Master Plan; Complete Streets Localized Initiatives Program (CSLIP); Multimodal Priorities List	Latest priority list as of June 2023 CSLIP Evaluation Criteria
Focus Area 3: Incorporate green infrastructure into transportation planning and design	Complete Streets Localized Initiatives Program (CSLIP);	CSLIP Evaluation Criteria: Projects analyzed and awarded points based on whether the project improves or addresses an identified resiliency issue.

State Programs

Resilient Florida

Resilient Florida funds five types of programs; this vulnerability assessment is among those projects.

1. Community resilience planning, including necessary data collection
2. Vulnerability assessments
3. Projects, plans, and policies that allow communities to prepare for threats from flooding and sea level rise
4. Preconstruction activities for projects in small towns (less than 10,000 people) and counties
5. Feasibility studies and the cost of permitting for nature-based solutions

Within the strategies, there are funds for additional planning, as well as opportunities for implementation projects, for which the application window is July-September. This study is designed to meet the requirements of F.S. 380.093 and thus allows for project funding.

For implementation, scoring is base on the following:

Tier 1 (40%)

- The degree to which the project addresses the risks posed by flooding and sea level rise
- The degree to which the project addresses risks to regionally significant assets.
- The degree to which the project reduces risks to areas with an overall higher percentage of vulnerable critical assets.
- The degree to which the project contributes to existing flooding mitigation projects that reduce upland damage costs by incorporating new or enhanced structures or restoration and revegetation projects.

Tier 2 (30%)

- The degree to which flooding and erosion currently affect the condition of the project area.
- The overall readiness of the project to proceed in a timely manner, considering the project's readiness for the construction phase of development, the status of required permits, the status of any needed easement acquisition, and the availability of local funding sources.
- The environmental habitat enhancement or inclusion of nature-based options for resilience, with priority given to state or federal critical habitat areas for threatened or endangered species.
- The cost-effectiveness of the project.

Tier 3 (20%)

- The availability of local, state, and federal matching funds, considering the status of the funding award, and federal authorization, if applicable.
- Previous state commitment and involvement in the project, considering previously funded phases, the total amount of previous state funding, and previous partial appropriations for the proposed project.
- The exceedance of the flood-resistant construction requirements of the Florida Building Code and applicable floodplain management regulations.

Tier 4 (10%)

Tier 4 can be allocation for innovative technologies designed to reduce project costs and provide regional collaboration.

Example Strategies	Links	Notes
Focus Area 1: Provide real time flood forecasting information at the neighborhood level	Resilient Florida Implementation Grants	Could be a complement to flood prevention/mitigation projects
Focus Area 1: Evaluate roadway elevations and stormwater improvements to improve resiliency and accessibility	Resilient Florida Implementation Grants	Need to identify specific construction project for Resilient Florida; Work with MPO on priority project lists
Focus Area 3: Incorporate green infrastructure into transportation planning and design	Resilient Florida Implementation Grants	Need to identify specific construction project for Resilient Florida
Focus Area 3: Establish stormwater system maintenance initiative	Resilient Florida Implementation Grants	Need to identify specific construction project for Resilient Florida
Focus Area 3: Identify city-owned open space that could double as stormwater storage areas	Resilient Florida Implementation Grants	Need to identify specific construction project for Resilient Florida
Focus Area 3: Land acquisitions for additional city-wide stormwater storage	Resilient Florida Implementation Grants	Need to identify specific construction project for Resilient Florida
Focus Area 3: Develop alternative routes planning for emergency access on routes vulnerable to flooding	Resilient Florida Implementation Grants	Need to identify specific construction project for Resilient Florida

Florida Urban and Community Forestry Grants

There are several programs administered through the Florida Department of Agriculture and Consumer Services. While other programs focus on water, these programs target canopy and shading to address urban heat. There is typically a 50% match (half federal government/half applicant).

Urban and Community Forestry Grant – Planting, Preservation, and Invasives Control

This program provides resources necessary for the retention and expansion of community tree canopy through national and state urban forestry programs. The most recent program was posted in September

2023 with applications due in November. The application requires a project budget and narrative demonstrating:

1. Need for federal assistance
2 Expected project outcomes
3. Plan of action
4. Timeline of activities
5. Partnerships (if any)
6. Project location
7. Statement of whether this project relates to any other project, current or anticipated.

Selection criteria place priority on:

- Replacing invasive trees with native trees to reduce energy use, mitigate urban heat, improve water or air quality, avoid stormwater runoff, and/or increase greenspace accessibility.
- Plant trees in disadvantaged communities
- Plant trees in riparian or coastal waterways
- Conduct an analysis to identify the most valuable locations for tree planting.

Example Strategies	Links	Notes
Focus Area 1: Establish tree canopy goals on most vulnerable areas of the city	USDA program, Florida Department of Agriculture and Consumer Services program	
Focus Area 2: Implement heat mitigation and management strategies, including citywide workplace standards:	USDA program, Florida Department of Agriculture and Consumer Services program	Analysis to identify most valuable locations for tree planting
Focus Area 2: Explore partnerships and funding opportunities to increase tree canopy on areas outside of City ownership		Use partnerships to apply for federal and state funding

Federal Programs

Energy Efficiency & Conservation Block Grant Program

The Energy Efficiency and Conservation Block Grant (EECBG) Program is designed to assist states, local governments, and Tribes in implementing strategies to reduce energy use, to reduce fossil fuel emissions, and to improve energy efficiency. For the next funding cycle, applications are due April 30, 2024.

The Department of Energy has established a voucher program to rebate energy efficient purchases. The vouchers are intended to help small entities with low capacity to access grants with lesser application and reporting requirements.

The voucher categories are:

- Retrofit Technologies - HVAC equipment, Water heater equipment, weatherization materials (including solar panels and screens), and efficient lighting.
- Renewable Energy Technologies
- Metering Equipment, Micromobility Equipment (e.g., E-bike fleets)
- Alternative Fuel Vehicles and
- Electric Charging Stations

There is also a companion Technical Assistance Voucher plan to reimburse entities for program design, energy audits, and planning.

Example Strategies	MPO link	Notes
Focus Area 2: Increase accessibility to energy efficient solutions by prioritizing vulnerable populations	Energy Efficiency and Conservation Block Grant Program	
Focus Area 2: Expansion of public EV charging infrastructure focus on vulnerable populations, workplaces, retail centers	Energy Efficiency and Conservation Block Grant Program	See EECBG Program Voucher Handbook (August 2023) for more information. FPL offers advisory service and installation through its Evolution Fleet website
Focus Area 2: Establish cooling center locations	Energy Efficiency and Conservation Block Grant Program	Can be used to replace HVAC equipment in emergency shelters
Focus Area 2: Implement heat mitigation and management strategies, including citywide workplace standards	Energy Efficiency and Conservation Block Grant Program	Use for replacing older energy inefficient equipment

Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) grant program

This four-part program is intended to ensure surface transportation resilience to natural hazards and climate change through planning and implementation **grants that apply to infrastructure the "cost of which is assumed by a State transportation department."** This is a discretionary grant which means cities apply directly to USDOT.

- The 2023 cycle posted the notice of funding in April with an application deadline in August. Note – the next Notice of Funding may include new or revised requirements.
- Award sizes are a minimum of $100,000 for planning grants and $500,000 for the others, though an applicant may submit a justification for projects less than the stated minimums above. There are no maximum amounts.
- The match for local government projects is 20%. If the Broward MPO has adopted the state resilience plan into the metropolitan transportation plan, there is a 3% reduction.
- Note: the State has developed its Resilience Action Plan with a list of priority projects (see Appendix A of the FDOT Resilience Action Plan).

PROTECT Planning Grants

For selection, FHWA will evaluate:

1. Program Alignment
2. Schedule and Budget
3. Public Engagement, Partnerships and Collaboration
4. Innovation

The following activities can be funded:

1. Resilience planning
2. Project predesign and design (planning, feasibility analysis, revenue forecasting, environmental review, preliminary engineering and design work, other preconstruction activities)
3. Development of data tools to simulate transportation disruption scenarios, including vulnerability assessments

4 Evacuation planning and preparation

5. Technical capacity building by the eligible entity to facilitate the ability of the eligible entity to assess the vulnerabilities of the surface transportation assets and community response strategies of the eligible entity under current conditions and a range of potential future conditions

Example Strategies	MPO link	Notes
Focus Area 1: Establish tree canopy goals on most vulnerable areas of the city	PROTECT Grant home page	Also Navigating Federal Funding for Green Infrastructure and Nature-Based Solutions
Focus Area 1: Expand green infrastructure strategies specific to stormwater management	PROTECT Grant home page	Also Navigating Federal Funding for Green Infrastructure and Nature-Based Solutions
Focus Area 2: Improve communication to vulnerable communities during times of emergencies	PROTECT Grant home page	
Focus Area 2: Enhance engagement with vulnerable populations on risks of flooding and heat	PROTECT Grant home page	
Focus Area 3: Further review of impacts to drainage, water, and sanitary facilities.	PROTECT Grant home page	
Focus Area 3: Further review of potential impacts of compound flooding and groundwater intrusion on roadway infrastructure	PROTECT Grant home page	
Focus Area 3: Evaluate impacts of changes in groundwater on wastewater and storm water systems, including septic systems and surface water retention systems	PROTECT Grant home page	
Focus Area 3: Evaluate roadway elevations and stormwater improvements to improve resiliency and accessibility	PROTECT Grant home page	Meet with the MPO to compare vulnerability & asset maps with their funding programs (TIP, safety). Determine opportunities to apply jointly with MPO and/or other jurisdictions
Focus Area 3: Develop alternative routes planning for emergency access on routes vulnerable to flooding	PROTECT Grant home page	
Focus Area 3: Work with FDOT to identify and report on areas of localized flooding to prioritize improvement projects, particularly on evacuation routes.	PROTECT Grant home page	

PROTECT Resilience Improvement

For selection, FHWA will assess several project components:

1. Vulnerability and Risk (Exposure, Sensitivity, and Adaptive Capacity)
2. Criticality to Community
3. Design Elements
4. Public Engagement, Partnerships and Collaboration
5. Equity and Justice40 (including workforce provisions)
6. Climate Change and Sustainability
7. Schedule and Budget (including construction readiness)
8. Innovation
9. Economic Analysis and Statutory Prioritization

Eligible activities:

- improve the ability of an existing surface transportation asset to withstand one or more elements of a weather event or natural disaster, or
- to increase the resilience of surface transportation infrastructure from the impacts of changing conditions, such as sea level rise, flooding, wildfires, extreme weather events, and other natural disasters

For this grant program, a benefit-cost analysis is required.

- For development phase activities, tasks include planning, feasibility analysis, revenue forecasting, environmental review, preliminary engineering and design work, and other preconstruction activities.

- For construction activities, tasks including reconstruction, rehabilitation, and acquisition of real property (including land related to the project and improvements to land), environmental mitigation, construction contingencies, acquisition of equipment directly related to improving system performance, and operational improvements.

Activities include:

1. Resurfacing, restoration, rehabilitation, reconstruction, replacement, improvement, or realignment of an existing surface transportation facility eligible for assistance under this title;
2. The incorporation of natural infrastructure;
3. The upgrade of an existing surface transportation facility to meet or exceed a design standard adopted by FHWA;
4. The installation of mitigation measures that prevent the intrusion of floodwaters into surface transportation systems;
5. Strengthening systems that remove rainwater from surface transportation facilities;
6. Upgrades to and installation of structural stormwater controls;
7. A resilience project that addresses identified vulnerabilities described in the Resilience Improvement Plan of the eligible entity, if applicable;
8. Relocating roadways in a base floodplain to higher ground above projected flood elevation levels, or away from slide prone areas;
9. Stabilizing slide areas or slopes;
10. Installing riprap;
11. Lengthening or raising bridges to increase waterway openings, including to respond to extreme weather;
12. Increasing the size or number of drainage structures;
13. Installing seismic retrofits on bridges;
14. Adding scour protection at bridges;
15. Adding scour, stream stability, coastal, and other hydraulic countermeasures, including spur dikes;
16. Vegetation management practices in transportation rights-of-way to improve roadway safety, prevent against invasive species, facilitate wildfire control, and provide erosion control; and
17. Any other protective features, including natural infrastructure, as determined by the Secretary.

Example Strategies	Links	Notes
Focus Area 1: Expand green infrastructure strategies specific to stormwater management	PROTECT Grant home page	Need to specify installation/ construction projects that accomplish this strategy
Focus Area 3: Increase the resiliency of at-risk transportation routes with design to minimize disruption	PROTECT Grant home page	Need to specify construction projects that accomplish this strategy

Appendix D
POTENTIAL PROJECTS

FOCUS AREA 1 - RESILIENCY OF THE BUILT ENVIRONMENT				
Strategy - Resilience of the Land Development Code				
Potential Project	**Strategy Type**	**Threat**	**Term**	**Potential Funding Notes**
Review Comprehensive Plan and LDC for opportunities to include recommendations from VA	Planning, Policy, & Management	Heat/Flooding/Groundwater	Short	
Conduct resiliency audit of the LDC	Planning, Policy, & Management	Heat/Flooding/Groundwater	Short	
Establish tree canopy goals on most vulnerable areas of the city	Land Use, Building Codes & Standards	Heat	Short	PROTECT planning grant; USDA Urban and Community Forestry Grant
Expand green infrastructure strategies specific to stormwater management	Infrastructure	Flooding	Medium	PROTECT PLANNING grant or implementation program; Navigating Federal Funding for Green Infrastructure and Nature-Based Solutions
The City must update vulnerability assessment every 5 years.	Planning, Policy, & Management	Heat/Flooding/Groundwater	Medium	FDEP
Strategy - Climate Stressor Impact Fee				
Conduct study to explore the benefits of a Climate Stressor Impact Fee	Land Use, Building Codes & Standards	Heat/Flooding/Groundwater	Short	
Implement Climate Stressor Impact Fee if determined to be beneficial	Land Use, Building Codes & Standards	Heat/Flooding/Groundwater	Medium	

FOCUS AREA 2 - SOCIALLY VULNERABLE POPULATIONS AND COMMUNITY RESILIENCE				
Strategy - Build Community Resilience through Weatherization resources				
Potential Project	**Strategy Type**	**Threat**	**Term**	**Potential Funding Notes**
Increase awareness and accessibility of information on foreseeable risks communities face. Communicate and share data on risks posed by flooding, extreme heat and other compounding risks.	Public Engagement	Heat/Flooding	Short	AARP Demonstration Grant; Hazard Mitigation Grant Program (FEMA); Broward MPO
Improve communication to vulnerable communities during times of emergencies	Public Outreach	Heat/Flooding	Short	PROTECT PLANNING grant program; AARP Demonstration Grant
Enhance engagement with vulnerable populations on risks of flooding and heat	Public Outreach	Heat/Flooding	Short	PROTECT PLANNING grant program
Ensure awareness of locations of public cooling centers	Public Outreach	Heat	Short	AARP Demonstration Grant
Deliver heat advisory warnings to sensitive populations, including city workers.	Public Outreach	Heat	Short	AARP Demonstration Grant

FOCUS AREA 2 - SOCIALLY VULNERABLE POPULATIONS AND COMMUNITY RESILIENCE				
Strategy - Build Community Resilience through Weatherization resources				
Potential Project	**Strategy Type**	**Threat**	**Term**	**Potential Funding Notes**
Seek funding for energy saving upgrades for homeowners and renters	Funding and Financing	Heat	Short	Florida Weatherization Assistance Program; Solar Energy Loan Fund
Identify the long term financial impact to homeowners due to increased water consumption due to irrigation demand	Public Outreach	Heat	Short	
Work with property owners to support adaptation strategies on private property due to flooding or heat	Funding and Financing	Heat/Flooding	Medium	
Increase accessibility to energy efficient solutions by prioritizing vulnerable populations	Funding and Financing	Heat/Flooding	Medium	AARP Flagship Grant; Solar Energy Loan Fund; Energy Efficiency and Conservation Block Grant Program
Expansion of public EV charging infrastructure focus on vulnerable populations, workplaces, retail centers	Infrastructure	Heat/Flooding	Medium	Energy Efficiency and Conservation Block Grant Program; FPL Evolution Fleet
Establish cooling center locations	Public Outreach	Heat	Medium	Energy Efficiency and Conservation Block Grant Program
Establish resilience hubs	Public Outreach	Heat/Flooding	Medium	Broward MPO Mobility Hub program
Utilize resilience hubs for pre/post disaster community resources	Public Outreach	Heat/Flooding	Medium	Broward MPO Mobility Hub program
Develop database of properties with PVs for fire rescue response efforts.	Planning, Policy, & Management	Heat	Medium	Encourage people to sign up with Broward County's Vulnerable Population Registery
Phase out septic systems	Funding and Financing	Flooding/Groundwater	Long	Nonpoint Source Funds; Water Quality Improvement Grants
Prioritize redundant energy systems at critical facilities, emergency shelters, senior living centers, and health centers	Infrastructure	Heat/Flooding	Long	
Provide real time flood forecasting information at the neighborhood level	Planning, Policy, & Management	Flooding	Long	Resilient Florida Implementation Grant
Improve FEMA National Flood Insurance Program Community Rating System (CRS)	Funding and Financing	Flooding	Long	
Strategy - Establish program to evaluate and monitor Community Resilience of Vulnerable Populations				
Incorporate climate equity in comprehensive, strategic and other relevant plans.	Planning, Policy, & Management	Heat/Flooding/ Groundwater	Short	
Ensure policy and infrastructure investments incorporate social & economic equity and social justice	Planning, Policy, & Management	Heat/Flooding/ Groundwater	Short	
Consider zoning policies to provide incentives, such as expedited permitting, for energy-efficient practices and renewable energy.	Land Use, Building Codes & Standards	Heat/Flooding/ Groundwater	Short	Assistance for the Adoption of the Latest and Zero Building Energy Codes
Implement heat mitigation and management strategies, including citywide workplace standards:	Planning, Policy, & Management	Heat	Short	Energy Efficiency and Conservation Block Grant Program; USDA & FL Urban and Community Forestry Grant

FOCUS AREA 2 - SOCIALLY VULNERABLE POPULATIONS AND COMMUNITY RESILIENCE				
Strategy - Establish program to evaluate and monitor Community Resilience of Vulnerable Populations				
Potential Project	**Strategy Type**	**Threat**	**Term**	**Potential Funding Notes**
Explore partnerships and funding opportunities to increase tree canopy on areas outside of City ownership	Capacity Building/ Funding and Financing	Heat	Short	
Establish partnership with FDOH to collect and report on climate related health data	Capacity Building	Heat	Medium	
Encourage cool/reflective paving or roofing materials and establish a retrofit program for existing commercial and residential structures	Land Use, Building Codes & Standards	Heat	Medium	HUD Green and Resilient Retrofit Program
Develop a Green Infrastructure Master Plan	Planning, Policy, & Management	Heat/Flooding/ Groundwater	Long	"See Navigating Federal Funding for Green Infrastructure and Nature-Based Solutions "
Increase capability for City staff to work remote during emergency events so there is not diminishment in economic activity and critical services can still function	Planning, Policy, & Management	Heat/Flooding	Long	SOC

FOCUS AREA 3 - TRANSPORTATION INFRASTRUCTURE				
Strategy - Establish Long-term Monitoring Program of Asset Quality				
Potential Project	**Strategy Type**	**Threat**	**Term**	**Potential Funding Notes**
Adopt Complete Street and Vision Zero plans to prioritize safety and comfort of non-motorized users	Land Use, Building Codes & Standards	Heat/Flooding/ Groundwater	Short	Broward MPO Complete Streets CSLIP (small Complete Streets projects)
Incorporate green infrastructure into transportation planning and design	Infrastructure	Heat/Flooding/ Groundwater	Short	PROTECT PLANNING grant; Resilient Florida Implementation Grant
Prioritize tree canopy in high travelled areas and transit corridors	Infrastructure	Heat	Short	
Establish stormwater system maintenance initiative	Planning, Policy, & Management	Flooding/ Groundwater	Short	Resilient Florida Implementation Grant
Further review of impacts to drainage, water, and sanitary facilities.	Infrastructure	Flooding/ Groundwater	Short	PROTECT PLANNING grant
Protect, manage, and ensure BMPs for existing natural areas to protect existing habitat	Planning, Policy, & Management	Heat/Flooding/ Groundwater	Short	
Develop maintenance guidelines for green infrastructure	Planning, Policy, & Management	Heat/Flooding/ Groundwater	Short	Nonpoint Source Funds
Further review of potential impacts of compound flooding and groundwater intrusion on roadway infrastructure	Infrastructure	Flooding/ Groundwater	Medium	PROTECT PLANNING grant
Evaluate alternative fuel consumption based revenue such as mobility fees	Planning, Policy, & Management	Heat	Medium	
Revise planned CIP drainage improvements for 2070 compound flooding planning horizon	Planning, Policy, & Management	Flooding/ Groundwater	Medium	

FOCUS AREA 3 - TRANSPORTATION INFRASTRUCTURE				
Strategy - Establish Long-term Monitoring Program of Asset Quality				
Potential Project	**Strategy Type**	**Threat**	**Term**	**Potential Funding Notes**
Identify city-owned open space that could double as stormwater storage areas.	Infrastructure	Flooding/ Groundwater	Medium	Resilient Florida Implementation Grant
Evaluate impacts of changes in groundwater on wastewater and storm water systems, including septic systems and surface water retention systems	Infrastructure	Flooding/ Groundwater	Medium	PROTECT PLANNING grant
Explore greywater reuse system	Infrastructure	Flooding/ Groundwater	Medium	ALTERNATIVE WATER SUPPLY GRANTS
Create pre-disaster asset management plan	Planning, Policy, & Management	Heat/Flooding/ Groundwater	Medium	FEMA Pre-Disaster Mitigation (PDM) Grant Program
Land acquisitions for additional city-wide stormwater storage	Infrastructure	Flooding/ Groundwater	Long	Florida Recreation Development Assistance Program/The Land and Recreation Grants; Resilient Florida Implementation Grant
Strategy - Designate Alternative Travel Routes for Flood Events				
Review projects identified in the LRTP based on VA results	Infrastructure	Flooding	Short	Broward MPO
Identify and increase the resiliency of at-risk transportation routes with design to minimize disruption	Planning, Policy, & Management	Flooding	Short	PROTECT PLANNING grant; Broward MPO TIP & Workplan
Evaluate roadway elevations and stormwater improvements to improve resiliency and accessibility	Infrastructure	Flooding	Medium	PROTECT PLANNING grant; Resilient Florida Implementation Grant
Increase the resiliency of at-risk transportation routes with design to minimize disruption	Planning, Policy, & Management	Flooding	Medium	PROTECT Resilience Improvement grant OR At-Risk Coastal Infrastructure Grants; RAISE
Develop alternative routes planning for emergency access on routes vulnerable to flooding	Public Engagement	Flooding	Long	PROTECT PLANNING Grant
Ensure all critical facilities, public and private, have access plans that account for compound flooding	Planning, Policy, & Management	Flooding	Long	
Strategy - Implement a Local Roads Advisory Program				
Expand/Explore additional non-internet public communication alternatives due to power outages, such as community boards in public spaces	Public Engagement	Heat/Flooding	Short	AARP Demonstration Grant; Affordable Connectivity Program (federal - FCC)
Align with public emergency messaging and existing government notification systems to ensure redundant lines of communication.	Public Engagement	Heat/Flooding	Short	
Work with FDOT to identify and report on areas of localized flooding to prioritize improvement projects, particularly on evacuation routes.	Capacity Building	Flooding	Medium	PROTECT PLANNING grant; Resilient Florida Implementation Grant
Establish resilience hubs	Public Engagement	Heat/Flooding	Medium	CIP

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