

# Highlands County Adaptation Action Areas

## Task 2: Proposed Adaptation Strategies

Completed by:

Michael Baker International

January 17, 2025

# Contents

1. Overview of County CVA Process .....	3
2. Identified Hazards .....	5
a. Extreme Heat .....	5
b. Flooding .....	6
c. Hurricane/Tropical Storms .....	11
d. Severe Storms .....	11
f. Wildfire .....	12
g. Housing .....	12
h. Transportation.....	13
i. Healthy Foods.....	14
3. County’s Underserved Communities Adaptation Strategies .....	17
References .....	20

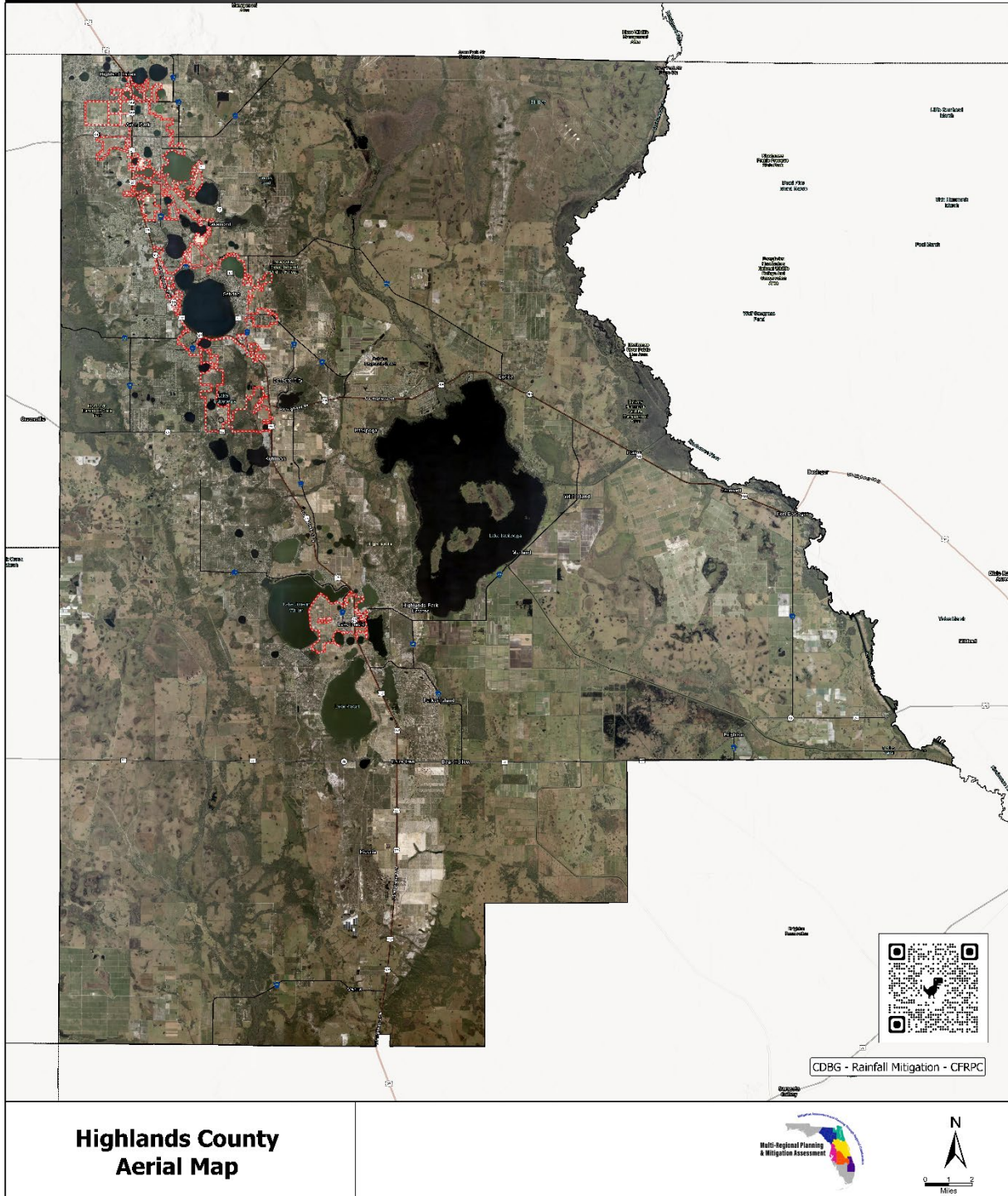
## 1. Overview of County CVA Process

The Highlands County Comprehensive Vulnerability Assessment (CVA) is being completed in accordance with the requirements outlined in Section 380.093, Florida Statutes<sup>1</sup>. The CVA aims to identify and address vulnerabilities related to flooding, sea level rise, and social vulnerability. The assessment began with a kick-off meeting to outline goals, timelines, and responsibilities. A steering committee was assembled, and public outreach conducted to gather input and ensure community involvement. The next step involves data collection, including acquiring background data such as critical asset inventory, topographic data, and flood scenario-related data. An exposure analysis was performed to assess the exposure of critical assets and infrastructure to flooding and sea level rise, followed by a sensitivity analysis to evaluate the sensitivity of these assets to the identified hazards. The findings will be compiled into a draft vulnerability assessment report, which includes associated maps and tables. Additional public outreach will be conducted to gather feedback and identify focus areas for intervention. Lastly, the final report will incorporate feedback and provide detailed recommendations for adaptation measures.

In addition to the required vulnerability assessment, Highlands County is also conducting additional analyses of underserved communities within the County and will identify Adaptation Action Areas (AAAs). Adaptation Action Areas were adopted into Florida Statutes in 2011 through the Community Planning Act, Chapter 163, F.S. “Adaptation Action Area” is an optional comprehensive plan designation for areas that are vulnerable to flooding and can be used to prioritize funding for infrastructure needs and adaptation planning<sup>2</sup>. This process includes assessing added vulnerabilities and risks to the identified hazards as they pertain to socially vulnerable (underserved) populations. Additional risks are being examined beyond flooding, including heat, tornadoes, wildfire, transportation, housing, and access to healthy foods. The County organized meetings with County, city, and community representatives to gather information and comments from underserved communities. The comments were addressed by providing a crosswalk of applicable adaptation strategies to reduce or mitigate potential impacts on underserved communities. All comments received and the corresponding adaptation strategies are included in this report and in a separate spreadsheet. The location and aerial map of Highlands County is displayed in Figure 1.

# Highlands County

Aerial



## Highlands County Aerial Map

Date: 1/9/2025

Disclaimer: This map and its contents are for illustrative and planning purposes only. It should not be used for legal delineation and location purposes.

Figure 1: Highlands County Aerial Map (CFRPC)



## 2. Identified Hazards

The hazards identified by the County, community representatives, and public, include:

- Extreme Heat
- Flooding
- Hurricane/Tropical Storm
- Severe Storms
- Tornado
- Wildfire
- Housing
- Transportation
- Healthy Foods

### a. Extreme Heat

Highlands County's location makes it highly vulnerable to the effects of extreme heat. Research from the National Oceanic and Atmospheric Administration (NOAA) shows that the number one weather-related cause of death is heat.<sup>3</sup> Florida, especially in the summer, experiences significant humidity, which along with the extreme heat makes it even more difficult for people to cool down, which can lead to illness and even death.<sup>4</sup> Extreme heat has a significant impact on health and on other threats, such as transportation and wildfires. The Highlands County Multi-Hazard Local Mitigation Strategy (LMS) notes that the areas of the County that are most vulnerable to extreme heat, and subsequently drought conditions, are citrus groves, row crops, pasture lands, dairy farms, and ornamental agriculture. From 2014 to 2019, Highlands County experienced five weeks of extreme drought and is expected to experience a similar level in the future. These drought conditions also increase the risk of wildfire occurrence.

Both outdoor workers and the elderly are especially vulnerable to the effects of extreme heat. Highlands County has a population of 107,614<sup>5</sup>, with approximately 35.7% of the County population aged 65 or older. Around 4% of those employed work in agriculture and 12.4% work in the construction industry, both of which require a significant amount of time outdoors.<sup>5</sup> Additionally, according to the U.S. Census Bureau, 12.7% of the County's population does not have health insurance coverage, making this significant portion of the population especially vulnerable.<sup>5</sup> Additionally, those who rely on walking or bicycling as their mode of transportation are also vulnerable to the effects of extreme heat. Approximately 5.2% of households in Highlands County do not have access to a personal vehicle. With no access to a vehicle and limited public transportation options, many have no choice but to be exposed to extreme heat conditions. Walking and bicycling can also pose a safety hazard due to the lack of multi-use paths throughout the County.

According to the Florida Statewide Resilience Dataset<sup>6</sup>, Highlands County does not have any bus stops in the area. During every meeting with the County, community representative and the public, it was mentioned that Highlands County does not have a public transportation system.

MTM Transit does provide limited door-to-door transportation service for Transportation Disadvantaged individuals in the County for medical appointments, employment, education, shopping, social activities, and other services, with reservations required at least two days in advance. Registration is required to enroll for this transportation service. According to stakeholders, a majority of the available rides are used for medical appointments, reducing the number of rides available for other uses.

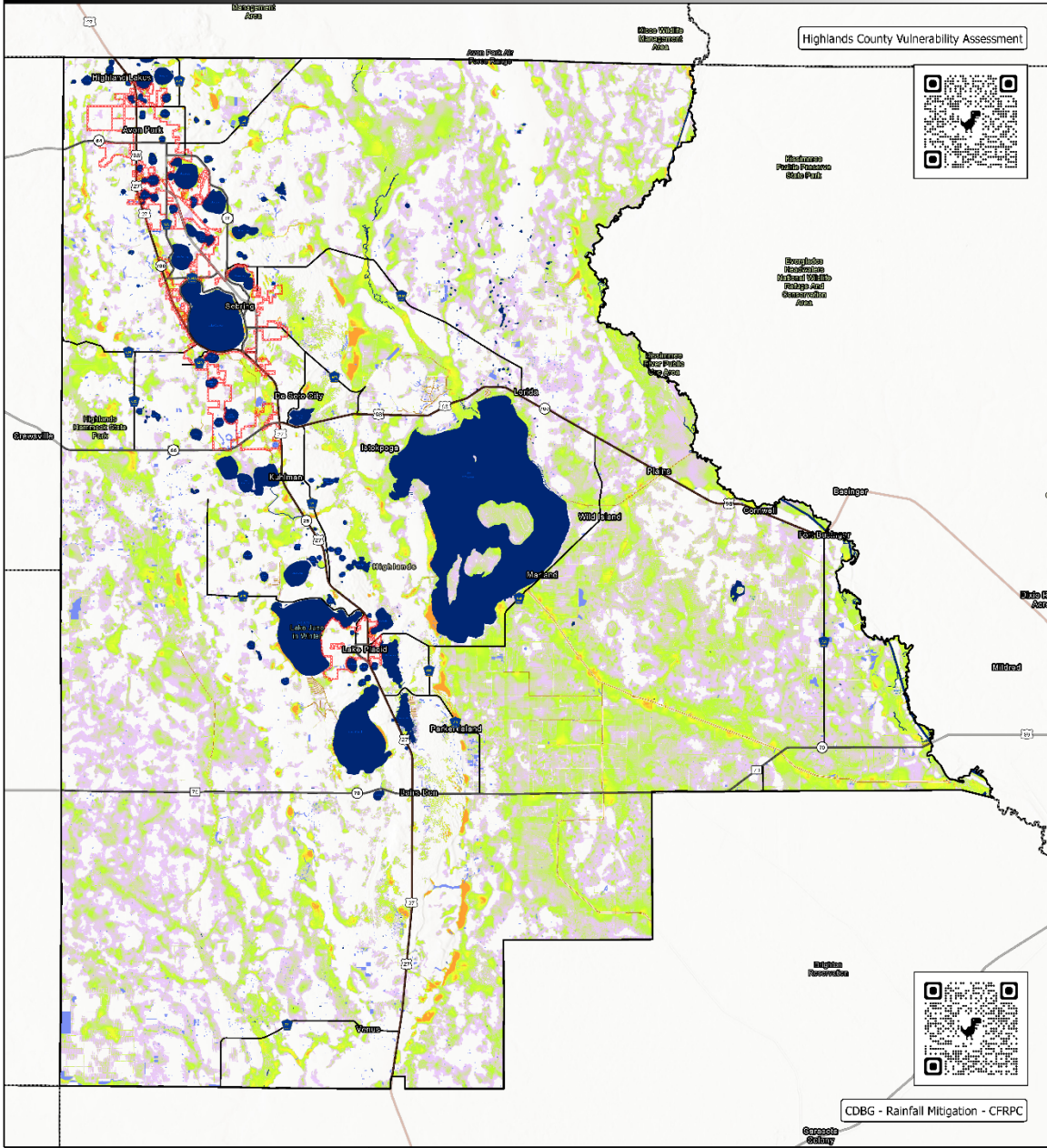
### b. Flooding

Highlands County's location and its numerous lakes make it particularly susceptible to rainfall-induced flooding. According to the 2020 Highlands County LMS report<sup>3</sup>, the County is classified as having a moderate flood risk, with riverbank overflow and pond flooding being common in low-lying areas. Flooding was the most frequently reported issue during public meetings, highlighting the community's concern. The County's flat terrain and poorly drained soils further exacerbate the flooding risk, presenting ongoing challenges for residents and local authorities. Inundation in Highlands County and the Cities of Avon Park, Lake Placid and Sebring are displayed in Figures 2-5.

Rainfall-induced flooding can have significant impacts on the socially vulnerable populations of Highlands County. Many do not own their housing and therefore have no control over insurance coverage. Those who own their homes cannot afford insurance. Renters face similar issues, as they frequently cannot afford renters insurance. Additionally, these populations struggle to afford necessary repairs or adaptations to make their homes more resilient. Moving away from flood-prone areas is also financially unfeasible for many. Limited access to financial resources and support services further exacerbates their difficulties in recovering from flood-related damages and disruptions. While flooding can affect any resident, socially vulnerable individuals face additional challenges due to limited access to transportation, whether personal vehicles or public transit. Additionally, housing in these communities may already be in poor condition, making them more susceptible to damage during flood events. This can lead to displacement and long-term housing instability, exacerbating the difficulties faced by these communities. Addressing these vulnerabilities requires tailored strategies that consider the needs of socially vulnerable residents to ensure equitable and effective mitigation efforts.

# Highlands County

## Inundation Results



Extreme Rainfall 2070  
24 Hour/100 Year Storm

**RAINFALL INUNDATION 2070**  
 Shallow  
 Deepest

**HYDROLOGY**  
 Lake / Pond / Rivers  
 Reservoirs  
 County Boundary



Date: 1/9/2025

Disclaimer: This map and its contents are for illustrative and planning purposes only. It should not be used for legal delineation and location purposes.

Figure 2: Highlands County Extreme Rainfall 24 Hour/100 Year Storm Inundation Results (CFRPC)



# Avon Park - Highlands County

## Inundation and Critical Facilities

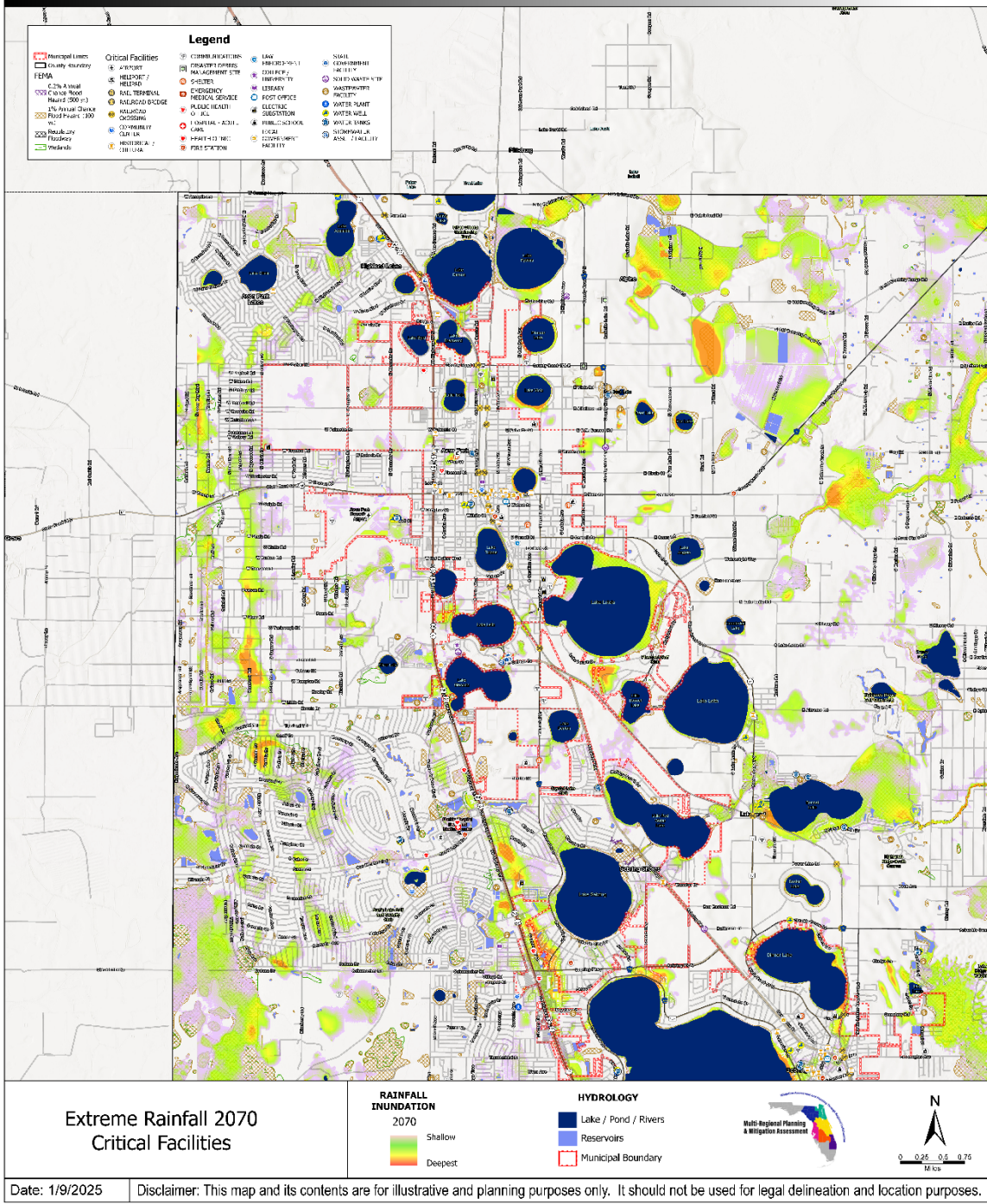


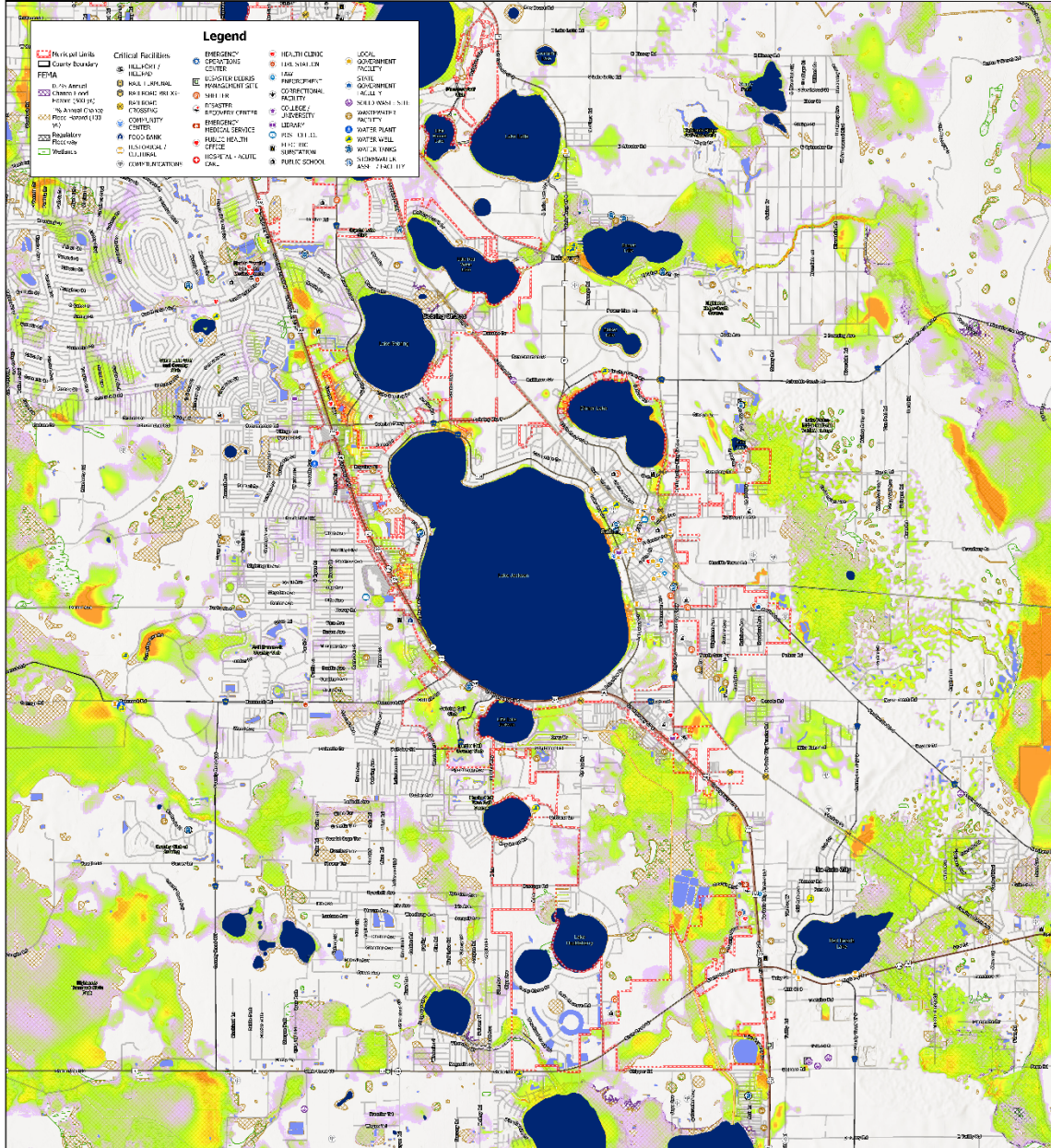
Figure 3: City of Avon Park Extreme Rainfall 2070 Inundation Results (CFRPC)





# Sebring - Highlands County

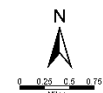
## Inundation and Critical Facilities



Extreme Rainfall 2070  
Critical Facilities

**RAINFALL INUNDATION 2070**  
Shallow  
Deepest

**HYDROLOGY**  
Lake / Pond / Rivers  
Reservoirs  
Municipal Boundary



Date: 1/9/2025

Disclaimer: This map and its contents are for illustrative and planning purposes only. It should not be used for legal delineation and location purposes.

Figure 5: City of Sebring Extreme Rainfall 2070 Inundation Results (CFRPC)



### c. Hurricane/Tropical Storms

Despite being an inland county, Highlands County still faces significant threats from hurricanes and tropical storms. The County was impacted by three hurricanes in 2004 alone – Hurricanes Charley, Frances, and Jeanne – with total damages amounting to over \$480 million. More recently, Hurricane Irma in 2017 caused approximately \$430 million in damages to property and crops (LMS). These events typically bring torrential rain, hurricane-force winds, and debris from destroyed structures. Mobile homes, which house approximately 23.1%<sup>4</sup> of the County's residents, are particularly vulnerable to these conditions, with an increased risk of damage and displacement of occupants.

Highlands County's existing infrastructure, the age of its population, and its history of hurricanes demonstrate its high vulnerability. With 27.2% of the population living below 150% of the poverty line<sup>7</sup>, many residents struggle to prepare for storms and manage post-disaster repairs. Additionally, 35.7% of the population is aged 65 and older and 20.3% of the population has a community-based disability<sup>6</sup>, adding to the complexity of evacuation efforts and the recovery processes. The combination of economic hardship and an aging population significantly heightens the community's overall vulnerability to natural disasters.

### d. Severe Storms

Located in central Florida, Highlands County is highly vulnerable to severe storms outside of hurricane season. These storms are often accompanied by tornadoes, hail, flash flooding, lightning, and wind. Highlands County often experiences more than 2 severe storm warnings per year.<sup>8</sup> Many of these hazards can endanger residents, as well as damage crops and agricultural land. Flash flooding and lightning can endanger the lives of residents. Highlands County LMS highlights that the County is located within an area that has the second highest lightning strike density.<sup>3</sup>

Severe storms have a devastating impact on underserved communities in Highlands County. These communities often lack the resources and infrastructure to effectively prepare for and recover from such events. Limited access to emergency services, inadequate housing, and financial constraints exacerbates the damage caused by storms. Similar to hurricanes and tropical storms, individuals who are 65 and older, those with community-based disabilities, and residents living in mobile homes are significantly more vulnerable to injury, death, displacement, and infrastructure and property damage related to severe storms.

### e. Tornadoes

Highlands County is particularly susceptible to tornadoes. Tornadoes can cause injury and death, as well as significant property damage. The Highlands County LMS noted that there were 43 tornadoes in the County between 1959 and 2019, averaging 0.75 events per year<sup>3</sup>. The damages

from these storms exceeded \$5 million. With increasing severe storm and hurricane events, the risk of tornadic activity also increases. In late 2024, ahead of Hurricane Milton, the National Weather Service confirmed four tornadoes in Highlands County, including an EF2 tornado in Lake Placid.<sup>6</sup>

The economic impact of tornado damage is significant in Highlands County. Approximately 27.2% of the population lives below 150% of the poverty line and 23.1% of housing units in the County are mobile homes<sup>7</sup>, which are especially susceptible to damage from wind and debris and increase displacement risk for those residents. Additionally, timely and adequate shelter is a concern as 35.7% of the population is age 65 and over and 20.3% of the noninstitutionalized population has a disability.

#### f. Wildfire

Wildfire is an ongoing threat to Highlands County, endangering residents, timber, and agriculture. According to the Florida Department of Agriculture's Florida Forest Service (FFS), Highlands County ranks among the top 10 areas in the state at risk of urban-woodland fire disasters. The Highlands County LMS highlighted that in five years (2014-2019), 454 wildfires were reported to FFS, burning nearly 6,932.2 acres<sup>3</sup>. As a rural County with many undeveloped open spaces and underbrush, Highlands County has ample fuel for wildfires, making it particularly susceptible to these events.

Although this hazard was not highlighted by County representatives or the public, wildfires remain a significant risk in Highlands County. Underserved communities may lack disaster preparedness plans and resources to effectively respond to wildfires. These communities often reside in areas with higher exposure to environmental hazards and may live in inadequate housing. Additionally, job and economic loss is a considerable risk for underserved populations, many of whom work in construction and agriculture sectors that are particularly vulnerable to the impacts of wildfires.

#### g. Housing

Highlands County's housing vulnerability is a significant concern, especially in the unincorporated areas, which comprise 80.5% of the County's 55,502 housing units, according to the 2020 Highlands County LMS<sup>3</sup>. Community organization comments have highlighted that residents in underserved areas face numerous challenges, including lack of affordable infrastructure and many dilapidated structures. These homes often require new roofs, lack air conditioning, and suffer from poor insulation. These conditions not only compromise the safety and comfort of the residents but also exacerbate their vulnerability to environmental hazards such as wildfires and hurricanes. Addressing these issues is crucial for improving the resilience and quality of life for these communities.

Highlands County's housing exhibits significant social vulnerability, particularly in its unincorporated areas. Public comments have identified nine homes as repetitive loss properties, indicating a pattern of recurring damage and insufficient resilience. According to Social Vulnerability Index (SVI) data<sup>7</sup>, 23.1% of the housing units are mobile homes, which are more susceptible to damage from environmental hazards. Additionally, 21.3% of occupied housing units with annual incomes less than \$75,000 are cost-burdened, spending over 30% of their income on housing costs. Furthermore, 27.2% of the County population is below 150% of the poverty line. This financial strain limits the ability of residents to invest in necessary home improvements and disaster preparedness measures, further exacerbating their vulnerability to natural disasters and economic instability. Addressing these issues is crucial for enhancing the resilience and well-being of Highlands County's residents.

#### h. Transportation

Highlands County does not have a public transportation system, which makes it vulnerable to transportation-related hazards. As mentioned previously, MTM Transit does provide a door-to-door transportation service for disadvantaged populations in the County, but many may not be aware of this service and reservations must be made two days in advance. The Highlands Transit Plan<sup>9</sup>, published to fulfill the requirement for the State of Florida Public Transit Block Grant Program, provides a 10-year plan for public transit in Highlands County. Public involvement for this effort showed that 85% of survey participants agreed public transportation is needed in their community and 66% agreed that people in the County would be willing to fund more public transportation options.<sup>3</sup>

With no access to a vehicle and a lack of public transportation options, many have no choice but to walk or ride a bicycle, which exposes them to adverse weather conditions and roadway safety hazards. Highlands County has limited multi-use paths, so walking or cycling can be dangerous depending on roadway corridor conditions where this mode of transportation is prevalent. In a recent report, statistics show that Florida leads the nation in pedestrian and bicycle deaths and injuries.

The lack of public transportation routes to underserved communities throughout the County impacts the elderly and disabled significantly, as well as others without access to a personal vehicle. According to SVI data approximately 5.2% of households in Highlands County do not have access to a vehicle.<sup>3</sup> For many, walking or cycling is not an option, and for those that cannot rely on friends and family or afford ridesharing options, this could mean missed medical appointments and limited access to healthy foods. A lack of transportation limits access to essential services for many, which can affect their overall health and wellbeing. With 35.7% of the County's population aged 65 and over, and 20.3% of the population with a disability<sup>3</sup>, there

is a significant need for transportation, especially for those who cannot rely on friends and family for assistance.

### i. Healthy Foods

Lack of access to healthy foods is a challenge that can lead to numerous health issues, including obesity, diabetes, and heart disease. This problem is often exacerbated in areas known as food deserts, where grocery stores and fresh produce markets are scarce. Residents in these areas may rely on convenience stores and fast food, which typically offer less nutritious options. The high cost of healthy foods can also be a barrier, making it difficult for individuals and families to maintain a balanced diet.

Socially vulnerable populations face even greater challenges in accessing healthy foods. These groups may have limited transportation options, making it difficult to reach stores that sell fresh produce. Additionally, food banks often only offer canned and non-perishable foods, which may not provide the necessary nutrients found in fresh foods. Financial constraints further limit their ability to access healthier options, even when they are available. As a result, underserved communities are at a higher risk of diet-related health problems.

The Highlands County Environmental Justice Demographic Index Analysis and Social Vulnerability Index Analysis are displayed in Figures 6 and 7.

# Highlands County

## Environmental Justice - Demographic Index

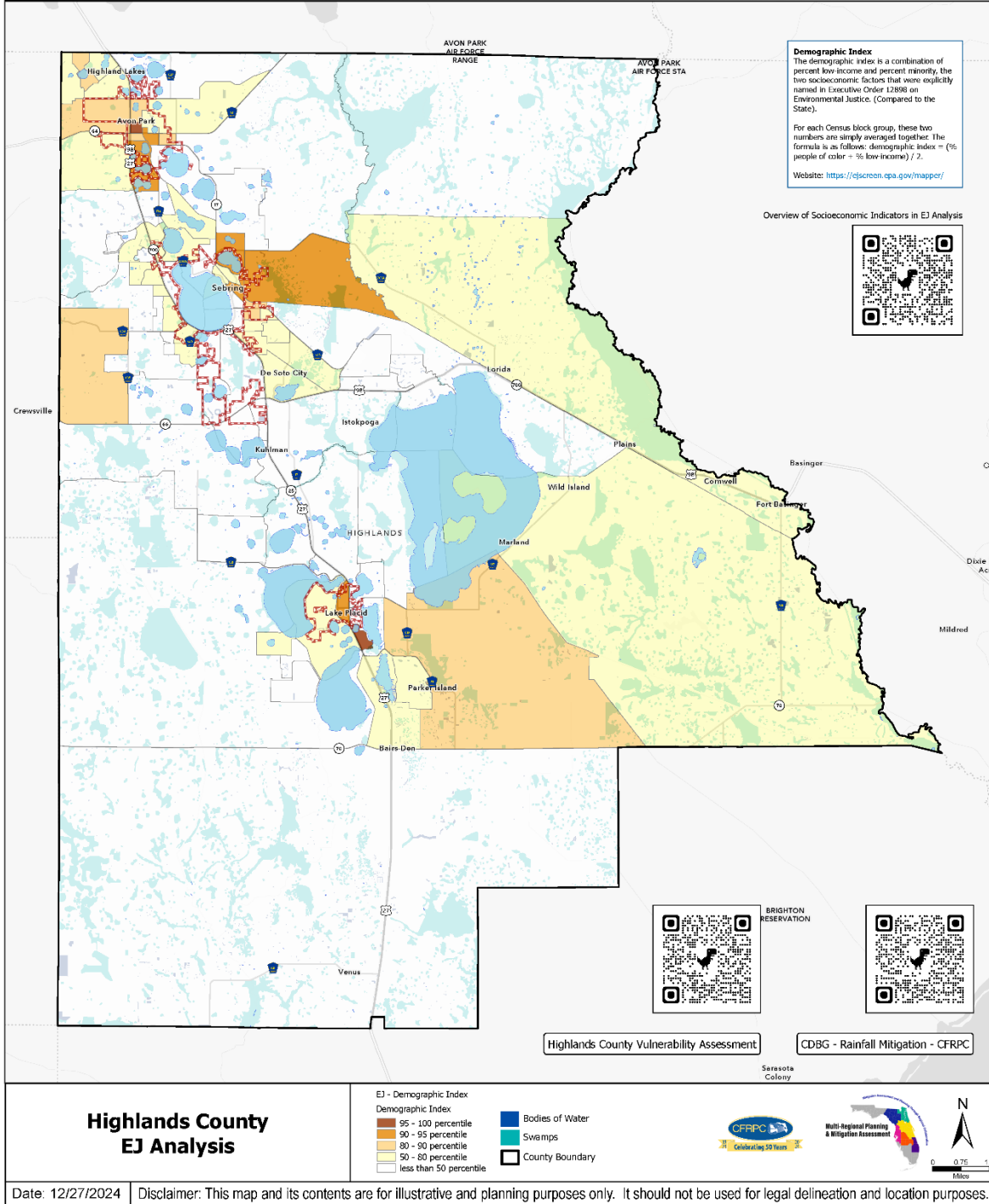


Figure 6: Highlands County Environmental Justice (EJ) – Demographic Index Analysis (CFRPC)

# Highlands County

## Social Vulnerability Index (SoVI) Analysis

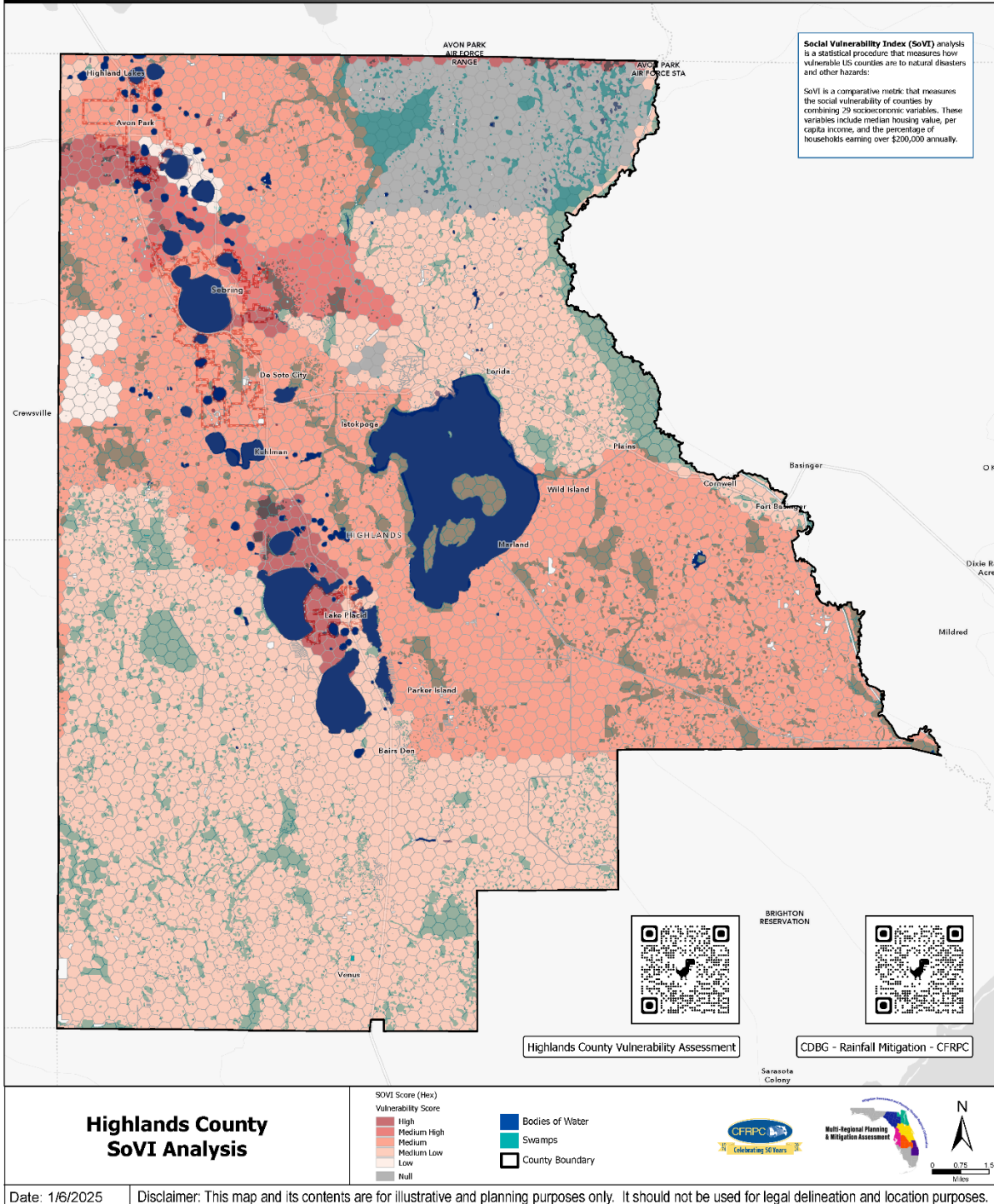


Figure 7: Highlands County Social Vulnerability Index (SoVI) Analysis (CFRPC)



### 3. County's Underserved Communities Adaptation Strategies

A special focus of Highlands County's Comprehensive Vulnerability Assessment (CVA) is an additional effort to identify priority Adaptation Action Areas (AAA) for socially vulnerable (underserved) populations. Creating an AAA can help the County prioritize projects that reduce flooding in the designated area. These designations are often included in the comprehensive plan of a city or county. While there are many ways to define it, according to the U.S Department of Transportation (DOT), disadvantaged populations are communities that experience disproportionately high and negative health, environmental, climate-related, economic, and other cumulative impacts.

To identify vulnerabilities in underserved communities in Highlands County, meetings were held with County and municipal staff, community organizers and the public. Based on feedback from these meetings, adaptation strategies were developed. A crosswalk of identified threats and adaptation strategies was created for each comment to address and mitigate potential impacts, particularly in underserved communities.

The following numbered list outlines the categories of adaptation strategies, i.e. buckets, identified based on the comments received from County/municipal, community, and public meetings. The strategies were categorized to address the diverse needs and concerns expressed by the community. Each strategy reflects a collaborative effort, ranging from infrastructure improvements to underserved community initiatives.

**1. Implement/strengthen stormwater systems. Increase maintenance of drainage systems and infrastructure.**

For example, the Lake Boulevard and Park Avenue area of Lake Placid experiences significant flooding during heavy rain, hurricanes, and tropical storms. An evaluation of the stormwater drainage system should be conducted to determine if upgrades or modifications are necessary. Increased maintenance of the drainage system and infrastructure can be extremely helpful in reducing flood levels. Improvements such as elevating lift stations and using bioswales could help reduce the impacts of flooding and protect water quality.

**2. Implement stormwater infrastructure with a focus on green infrastructure when feasible (e.g., bioswales, parks, greenways, buffers, stronger riparian area, etc.).**

For example, a stream near Taylor Street in Lake Placid experiences overflow during heavy rain events. Implementing a riparian buffer by increasing vegetation along the stream can enhance absorption of excess water and reduce erosion. Another option is a bioswale, which can slow down stormwater runoff and direct water away from the stream during heavy rains.

**3. Utilize federal, state, and local funding to support development/updates to affordable housing.**

For example, in the aftermath of hurricanes, homes often suffer roof damage, leading to temporary solutions like tarps. However, these tarps can disintegrate over time, leaving homes vulnerable without proper repairs or assistance from the City or County. To address this, establishing programs that provide roof repair assistance can prevent further damage, particularly for affordable housing.

**4. Identify grant funding opportunities.**

Grant funding can be used for a wide variety of infrastructure projects that could reduce flooding or address many other vulnerabilities. For example, there are open lots that could act as retention areas, providing a valuable opportunity to manage stormwater and reduce flooding. To capitalize on this opportunity, it is essential to identify grant funding opportunities that can support the land acquisition, development, and maintenance of these retention areas. Grants from federal, state, and local sources can provide necessary financial resources to design and implement effective solutions or to provide other community support.

**5. Establish a County buy-out program and offer incentives to community to move out of flood zones. Educate community on repetitive flooding.**

For example, there are nine repetitive loss properties in the area, which have suffered significant damage from repeated flooding events. To address this issue, it is crucial to establish a County buy-out program that offers fair compensation to property owners willing to relocate out of flood zones. Additionally, providing incentives such as financial assistance for moving costs or priority access to affordable housing can encourage community members to participate. Educating the community about the risks of repetitive flooding and the benefits of relocating can further support the initiative.

**6. Identify and apply for grant funding/partnership opportunities to expand public transportation options.**

Highlands County does not have a public transportation system, and many elderly and disabled residents must rely on friends, neighbors, and family for transportation. To address this critical need, it is essential to identify and apply for grant funding and partnership opportunities aimed at expanding public transportation options. By securing financial support from federal, state, and local grants, as well as forming partnerships, the County can develop a reliable and accessible multimodal transportation network,

including shared micromobility options such as scooters or bikes. While an attempt at a scooter program abruptly ended when the company pulled out, this could be an option to implement to fill the gap where other public transportation options are not yet available, keeping in mind that infrastructure may also need to be upgraded to provide safe and efficient routes.

**7. Increase multi-use path construction throughout County.**

The lack of multi-use paths countywide, particularly in Lake Placid, presents a significant challenge for residents seeking safe and accessible routes for walking, biking, and other nonmotorized transportation. Increasing the construction of multi-use paths throughout the County is essential. By investing in the development of these paths, the County can promote healthier lifestyles and enhance connectivity between neighborhoods, parks, and local amenities. This initiative is especially important for underserved communities that may not have access to a car, ensuring a safe and reliable means of transportation.

**8. Develop partnerships to create mobile markets and farm-to-community program.**

Access to healthy foods is a significant challenge, especially when food banks primarily provide canned foods rather than fresh produce. Developing partnerships to create mobile markets and a farm-to-community program can be highly effective. Mobile markets can bring fresh fruits, vegetables, and other nutritious foods directly to underserved neighborhoods, making health options more accessible. A farm-to-community program, like Farm Share, can connect local farmers with residents, ensuring access to fresh produce while supporting local agriculture.

**9. Promote telehealth services to provide remote consultations and reduce the need to travel for medical care.**

The shortage of specialty doctors in the area forces many residents to seek medical care outside of the community, leading to increased travel and inconvenience. Promoting telehealth services can provide a practical solution by offering remote consultations with specialists. This approach can significantly reduce the need for residents to travel long distances for medical care.

## References

1. Florida Legislature. (2024). Section 380.093, Florida Statutes. Retrieved from: [http://www.leg.state.fl.us/Statutes/index.cfm/Ch0838/index.cfm?App\\_mode=Display\\_Statute&Search\\_String=&URL=0300-0399/0380/Sections/0380.093.html](http://www.leg.state.fl.us/Statutes/index.cfm/Ch0838/index.cfm?App_mode=Display_Statute&Search_String=&URL=0300-0399/0380/Sections/0380.093.html)
2. AAA Planning Guidebook
3. Highlands County. (2020). Highlands County Multi-Hazard Local Mitigation Strategy. Retrieved from: [https://cms2.revize.com/revize/highlandscountyfl/departments/public\\_safety/emergency\\_management/LMS%20Plan%202020%20\(1\).pdf](https://cms2.revize.com/revize/highlandscountyfl/departments/public_safety/emergency_management/LMS%20Plan%202020%20(1).pdf).
4. Florida Division of Emergency Management (FDEM). (2024). Hazard Watch. Retrieved from <https://www.floridadisaster.org/hazards/>.
5. United States Census Bureau. (2023). QuickFacts Highlands County, Florida. Retrieved from: <https://www.census.gov/quickfacts/fact/table/highlandscountyflorida/PST045223>.
6. Florida Department of Environmental Protection (FDEP). (2023). Florida Statewide Resilience Dataset. Retrieved from: [https://floridadep.gov/sites/default/files/DEP%20Resilience%20Statewide%20Final%20Critical%20Assets%20Spatial%20Data%20Report%20-%20504\\_0.pdf](https://floridadep.gov/sites/default/files/DEP%20Resilience%20Statewide%20Final%20Critical%20Assets%20Spatial%20Data%20Report%20-%20504_0.pdf)
7. Centers for Disease Control and Prevention (CDC) and Agency for Toxic Substances and Disease Registry (ATSDR). (2024). Social Vulnerability Index. Retrieved from: <https://www.atsdr.cdc.gov/place-health/php/svi/index.html>.
8. Highlands County. (2024). 2024 Hurricane Season. Retrieved from <https://www.floridadisaster.org/hazards/>.
9. Highlands County. (2024). Highlands Transit Plan. Retrieved from: [https://www.heartlandregionaltpo.org/ht\\_files/ugd/d439d1\\_3265ba6df8e14479beacc145fa555f4f.pdf](https://www.heartlandregionaltpo.org/ht_files/ugd/d439d1_3265ba6df8e14479beacc145fa555f4f.pdf).