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UNDERSTANDING FLOOD SCENARIOS: A ROADMAP TO RESILIENCE FELLSMERE, FL

PROJECT REPORT 2025-005

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Understanding Flood Scenarios: A Roadmap to Resilience for Fellsmere, FL

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This report was prepared by the Project IN-CORE Team as part of the Geos Institute's Climate Ready America Southeast Navigator Network with funding from the Walmart Foundation to analyze future flood hazard scenarios and implement risk reduction and resilience planning strategies.

February 2025

Credits and Acknowledgements

Project IN-CORE Team
Project IN-CORE is a fiscally sponsored project of Community Initiatives, a non-profit dedicated to helping communities thrive. Project IN-CORE's objective is to apply IN-CORE capabilities to provide technical assistance and scenario-based modeling to develop resilience strategies for future flood hazards.

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The Geos Institute's Navigator program supports communities in building climate resilience by providing access to funding, capacity-building resources, and technical assistance. Through its Southeast Navigator Network, the program fosters collaboration across Florida, South Carolina, North Carolina, and Georgia, focusing on Community Disaster Resilience Zones.

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The mapped flood depths used in these analyses have been developed from flood maps generated. Collective Water is the City's stormwater consultant and provided flood maps for our 25yr 24hr, 100yr 24hr, and 500yr 24hr storms.

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This report was prepared by the Project IN-CORE Team as part of the Geos Institute's Climate Ready America Southeast Navigator Network with funding from the Walmart Foundation to analyze future flood hazard scenarios and implement risk reduction and resilience planning strategies. The findings, conclusions, and recommendations presented in this report are those of the authors alone and do not necessarily reflect the opinions of the Walmart Foundation.

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1. Purpose and Objective

This study presents a comprehensive flood resilience analysis for Fellsmere, FL, to inform policy decisions and guide resilience planning strategies. The analysis evaluates future flood hazard scenarios, identifying areas within the community vulnerable to current and mid-century flooding. The analysis was conducted using the IN-CORE platform (www.in-core.org), incorporating its Flood Damage Analysis and Population Dislocation Models. To account for mid-century climate conditions, flood data from Collective Water, the City stormwater consultant, was integrated, providing a comprehensive assessment of climate projections and future risks.

2. Background

Fellsmere, Florida, is a small city located in Indian River County along the central east coast of the state (Figure 1). Initially established in 1911, Fellsmere has a rich agricultural heritage and is best known as the first city in Florida to grant women the right to vote, a milestone achieved in 1915 (Historical Marker Database, n.d.). With just over 5,000 residents, the city maintains a rural charm, characterized by vast farmlands, conservation areas, and a strong connection to the surrounding natural environment. Given its location in a low-lying region with a subtropical climate, the city is susceptible to flooding, particularly during hurricane season and heavy rainfall events. Over the past decade, Fellsmere has experienced several significant flood events, primarily due to tropical storms and hurricanes impacting the region. In September 2017, Hurricane Irma, a powerful Category 4 hurricane, landed in Florida, leading to substantial flooding across the state. Fellsmere experienced heavy rainfall and strong winds, resulting in localized flooding and power outages (Sebastian Daily, 2017).

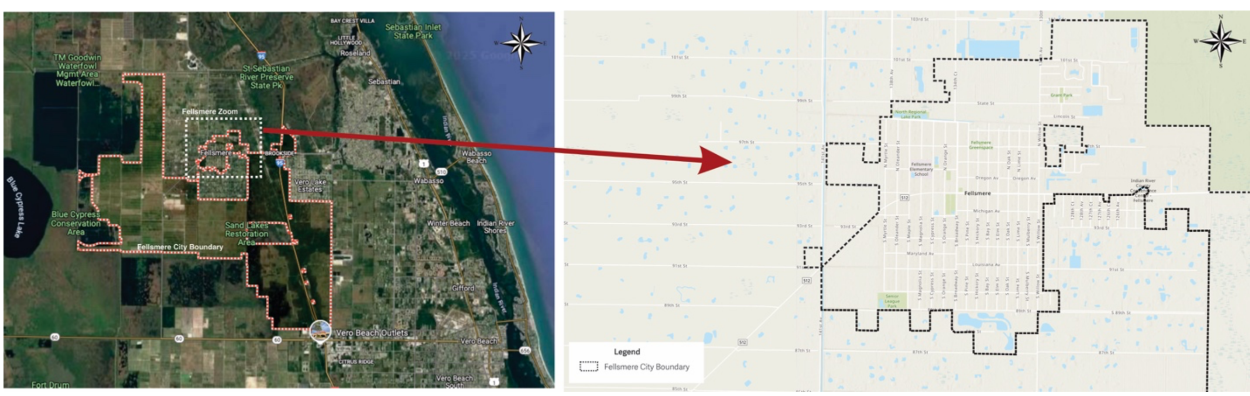

Figure 1. Fellsmere, FL

3. Future Flood Hazard Scenarios and Impacts

This section was developed using the Interdependent Networked Community Resilience Modeling Environment (IN-CORE) and Collective Water flood hazard data. IN-CORE is a powerful computational tool designed to help communities model natural hazards, assess risks, and develop strategies to enhance resilience and recovery. To run IN-CORE, we used building data inventory from the National Structures Inventory (NSI). The details of the methodology are provided in Appendix A.

3.1. Flood Hazard Zones

Flood hazard zones are designated areas that reflect varying levels of flood risk, helping communities plan for and mitigate potential flood impacts. These zones are established by FEMA through Flood Insurance Rate Maps (FIRM), which assess flood probability based on historical data, topography, and hydrological modeling. Figure 2 shows the areas in Fellsmere that fall within the FEMA-established Hazard Zones.

- **Zone A:** Areas subject to flooding during a 1% annual chance flood event (also known as the 100-year flood) but without detailed hydraulic analysis. Base Flood Elevations (BFE) are not determined for these zones, making flood risk estimation more uncertain. Properties in Zone A must have flood insurance if they have federally backed mortgages. Development in these areas may require additional floodplain management regulations to mitigate potential flood risks.
- **Zone AE:** Areas with a 1% annual chance of flooding, where detailed flood studies have been conducted and Base Flood Elevations (BFE) have been established. These zones indicate higher flood risk, with specific elevation and floodplain management requirements for development. Properties in Zone AE with federally backed mortgages must carry flood insurance under the National Flood Insurance Program (NFIP).

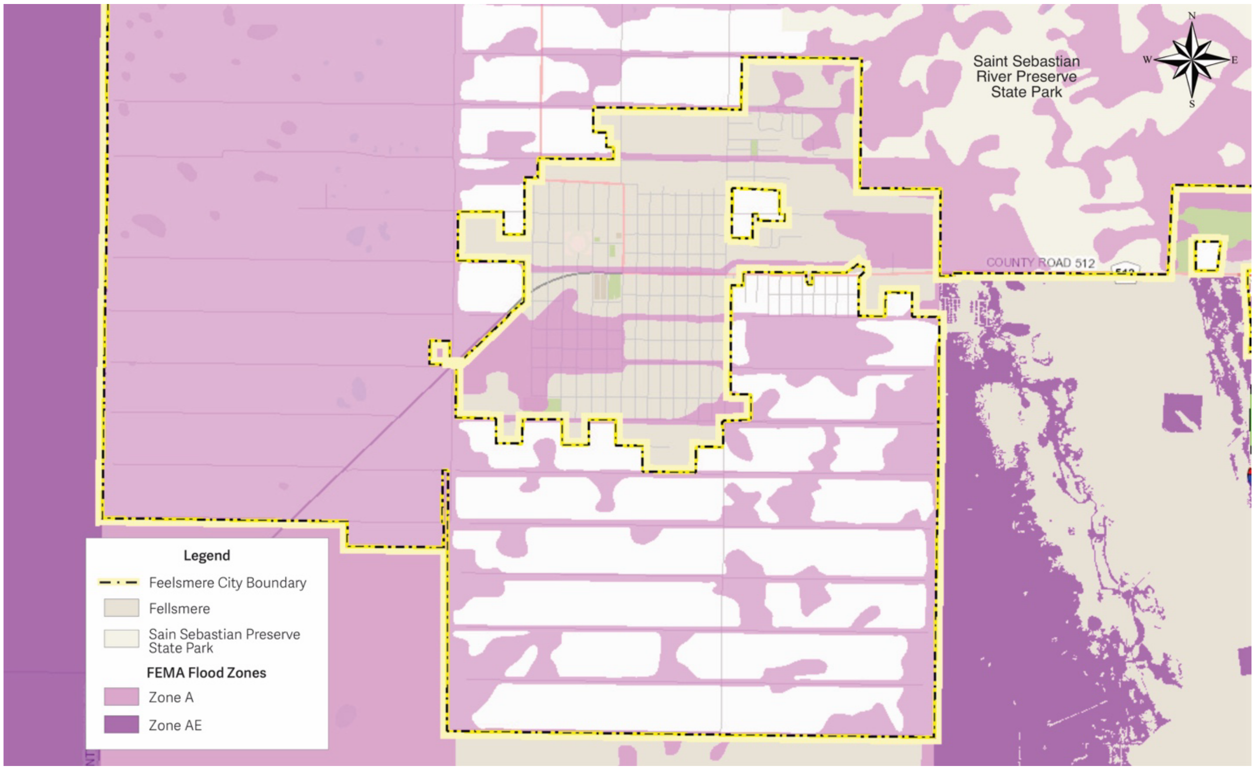

Figure 2. Fellsmere FEMA Flood Zones

3.2. Flood Damage Analysis

The building damage analysis estimates damage levels by considering building categories and simulated flood scenarios across the region, as detailed in the methodology in Appendix A. In this analysis, the term Damage State (DS) is used to represent different levels of damage, which are explained below:

- **DS 0 (No Damage or Slight Damage)**: The building experiences no visible damage from flooding. All structural and non-structural elements remain intact, with no repair required. It can have minor impacts from flooding, such as superficial water staining, damp walls, or minimal seepage into basements or ground floors. Repairs are light and typically involve cleaning or cosmetic fixes.
- **DS 1 (Moderate Damage):** Floodwaters cause more significant damage, such as partial inundation of ground floors, damage to finishes like flooring and drywall, and minor effects on electrical or plumbing systems. Repairs are required, but the structural integrity remains intact.
- **DS 2 (Severe Damage):** Substantial flooding leads to significant structural impacts, such as prolonged submersion of key components, damage to load-bearing

walls, or failure of essential systems (e.g., electrical, HVAC). The building may be uninhabitable until extensive repairs are completed.

- **DS 3 (Complete Damage):** The building is fully inundated or structurally compromised, resulting in total loss. Repairs are not feasible, and the structure may need to be demolished and rebuilt.

Table 1 summarizes the building damage analysis results, highlighting only buildings with a probability greater than 50% of being damaged within each category. This analysis does not identify any buildings within Fellsmere City boundaries at risk of flood damage. Figure 2 highlights the city's most urbanized area.

Table 1: Summary of the building damage analysis – City of Fellsmere

Damage State	Building Count	% of Buildings
Damage State 0	2086	100%
Damage State 1	0	0
Damage State 2	0	0
Damage State 3	0	0

Source: IN-CORE

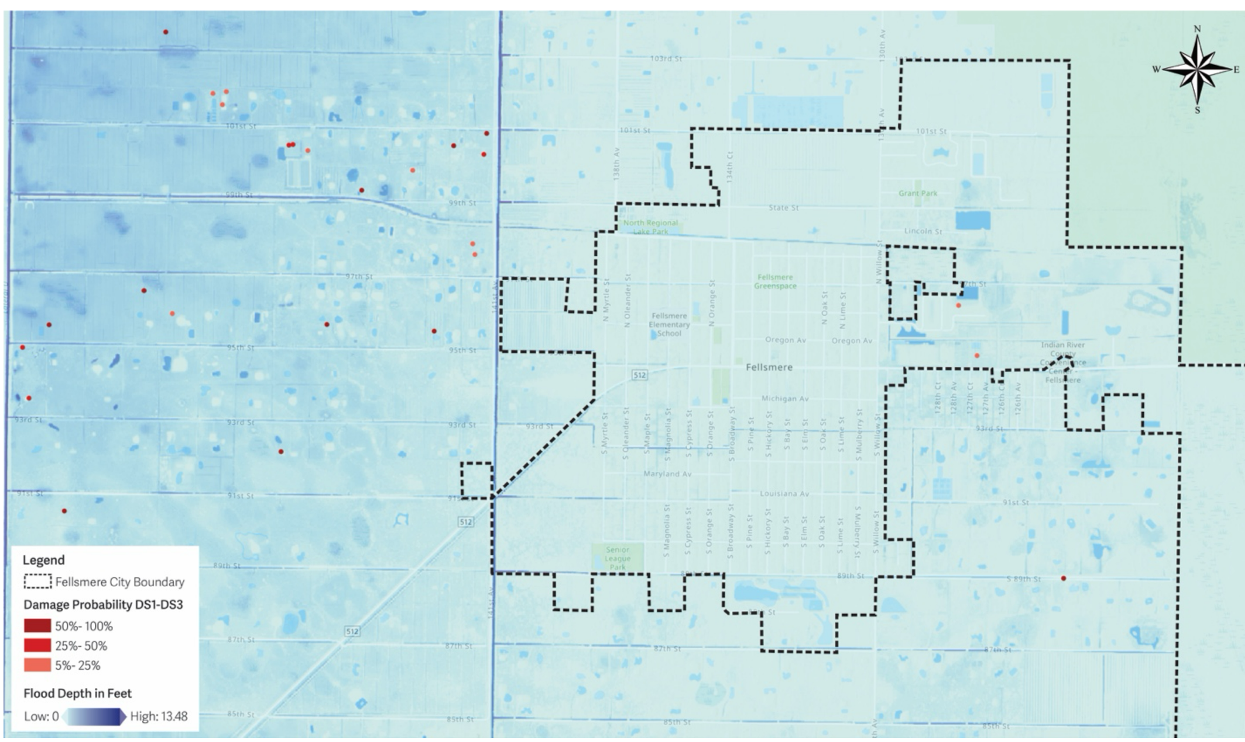

Figure 3. Areas with the probability of experiencing flood damage

3.3. Population Dislocation

Population dislocation refers to the displacement or temporary relocation of individuals due to disasters (Oliver-Smith, 2018). While people are the cornerstone of community resilience planning, existing models prioritize buildings and infrastructure over human-centered considerations. This repository addresses this gap by integrating people into community resilience models and linking population dynamics with building data.

The dislocation model relies on data about both people and structures. A specialized Python package, **Pyncoda**, developed under the Center of Excellence for Risk-Based Community Resilience Planning, is utilized to allocate population data to housing units (Rosenheim et al., 2021). This tool synthetically assigns households to housing units, enabling a more comprehensive understanding of community resilience. A detailed explanation of the methodology is provided in Appendix B. The synthetic population's demographic characteristics match the Census block group's characteristics. This work is described as follows by Pyncoda's README file on GitHub authored by Nathanael Rosenheim (2022).

Once a housing unit allocation has been generated, then the damage result for each building can be combined with the social data for each household, such as tenure status, race, and household income, to determine whether a household is likely to temporarily relocate due to a hazard event, in this case, flood. The results of a population dislocation analysis can be analyzed further to understand the equity impacts of such hazards. Details of this procedure can be found in the population dislocation methodology section (Appendix B). However, since Fellsmere did not have issues with flood damage, it also did not face population dislocation.

4. Current Planning Initiatives for Flood Resilience

Fellsmere has implemented several planning initiatives to strengthen flood resilience and mitigate future risks. As part of Indian River County's Local Mitigation Strategy (LMS), the city has prioritized flood mitigation projects, including stormwater management and drainage infrastructure improvements. The Fellsmere Water Control District (FWCD) is key in managing water flow through canals and retention areas to reduce flooding impacts. The city also participates in the National Flood Insurance Program (NFIP) and adheres to floodplain management regulations that limit development in high-risk areas. Additionally, Fellsmere has worked to protect and restore wetlands, recognizing their role in absorbing floodwaters and improving overall resilience. This section examines key plans and ordinances related to flood resilience, assessing the city's efforts toward flood resilience.

City of Fellsmere Watershed Master Plan and Vulnerability Assessment 2024

The City of Fellsmere Watershed Master Plan and Vulnerability Assessment was developed to evaluate stormwater-related flood vulnerabilities and provide a framework for resilience planning. The plan, prepared under the Community Rating System (CRS) Activity 450 and the Resilient Florida Program, assesses current and future flood risks based on climate projections for 2040, 2070, and 2100. The analysis focuses on stormwater-induced flooding rather than riverine flooding and identifies critical infrastructure, evacuation routes, and essential facilities at risk. Key findings indicate that major roadways and evacuation routes are the most vulnerable, with seventeen roadways experiencing flooding under current conditions and increased flood exposure anticipated in future climate scenarios. The report categorizes land inundation risks and prioritizes assets based on immediate, intermediate, and long-term needs. The study underscores the increasing flood sensitivity due to rising rainfall amounts, necessitating targeted intervention to mitigate risk.

The plan recommends a multifaceted approach to enhancing flood resilience, including regulatory changes, regional coordination, structural and non-structural controls, and public engagement. Regulatory updates propose increasing stormwater retention requirements for new developments and redevelopments from 1 to 2.5 inches. Structural improvements include stormwater infrastructure upgrades and the implementation of neighborhood-scale water management systems. Non-structural strategies emphasize wetland preservation, improved stormwater system maintenance, and sustainable land-use planning. Additionally, the plan advocates for public education initiatives and establishing a dedicated stormwater utility to secure long-term funding.

Economic Development and Resiliency Plan 2022

The Fellsmere Economic Development and Resiliency Plan aims to strengthen the city's economic sustainability by addressing workforce development, business support, infrastructure needs, and disaster resilience. Developed through public outreach and collaboration with local stakeholders, the plan emphasizes building human capacity, attracting new businesses, and enhancing community resilience to economic disruptions. The plan does not specifically focus on flood resilience but incorporates broader strategies, including business continuity planning, infrastructure investments, and economic diversification. Key findings highlight limited affordable housing, workforce skill gaps, the need for improved broadband connectivity, and vulnerabilities to economic shocks. The plan identifies strategies to support small businesses, create a stronger commercial base, and improve infrastructure to sustain economic growth.

Proposed infrastructure improvements—such as roadway enhancements, broadband expansion, and sewer system upgrades—can help mitigate the effects of extreme weather events, including flooding. The plan also emphasizes public-private partnerships and regional coordination, essential for developing sustainable stormwater management systems and nature-based flood mitigation strategies. Additionally, encouraging local economic self-sufficiency, supporting small businesses, and promoting "buy local" initiatives strengthen the city's ability to recover from climate-related disruptions.

Indian River County Unified Local Mitigation Strategy 2020

The Indian River County Unified Local Mitigation Strategy (LMS) aims to reduce long-term risks from natural hazards, including flooding, hurricanes, and wildfires, across all municipalities, including Fellsmere. The plan highlights flooding and hurricanes as the county's most frequent and damaging hazards, emphasizing the need for proactive mitigation measures. While the report identifies properties and infrastructure vulnerable to flooding, it also outlines stormwater management improvements, floodplain protection strategies, and public awareness initiatives as key components of local resilience efforts. Like other municipalities, Fellsmere benefits from participation in the NFIP but does not currently maximize opportunities within the Community Rating System, which could provide financial incentives for further flood mitigation efforts.

To enhance flood resilience, the LMS proposes a range of mitigation projects and policy recommendations for Fellsmere. These include stormwater drainage system retrofits, elevation requirements for new construction, and wetland conservation efforts to absorb floodwaters. Public infrastructure improvements, such as storm shutter installations on critical buildings and emergency generator placements, contribute to disaster preparedness and recovery. The report stresses the importance of regional coordination between Fellsmere and neighboring jurisdictions to address shared flood risks through watershed-based planning and multi-jurisdictional mitigation projects.

Fellsmere Comprehensive Plan 2018

The City of Fellsmere Comprehensive Plan serves as a strategic guide for land use, infrastructure development, and environmental conservation, strongly emphasizing stormwater management and natural resource protection, which contribute to flood resilience. The Public Facilities Element outlines the need for stormwater system improvements, drainage infrastructure upgrades, and the protection of natural drainage features. Additionally, the Conservation Element includes floodplain maintenance, wetland preservation, and erosion prevention policies, all of which are crucial in reducing flood risks. The plan also promotes land and water resource management strategies, reinforcing its commitment to sustainability and climate adaptation.

To further enhance flood resilience, the plan encourages low-impact development (LID) practices, stormwater-conscious urban planning, and coordinated land use and transportation strategies to ensure that critical infrastructure can withstand extreme weather events. Policies supporting wetland conservation, open space preservation, and sustainable stormwater management provide a foundation for nature-based flood mitigation solutions. Below are key specific flood resilience policies from the Fellsmere Comprehensive Plan and their role in mitigating flood risks:

- **Stormwater Management and Infrastructure Improvements**
    - **Objective PF B-4:** The plan prioritizes stormwater system upgrades to improve the city's primary conveyance facilities. Enhancing drainage infrastructure is crucial for mitigating localized flooding and ensuring effective stormwater runoff management.
    - **Objective PF C-1:** Protecting natural drainage features helps maintain the city's flood resilience by reducing runoff volume and improving stormwater infiltration.
- **Conservation and Natural Flood Mitigation**
    - **Objective CON A-3:** Floodplain maintenance is a key policy to ensure that natural flood-prone areas remain undeveloped and function as buffer zones. This reduces the impact of urban flooding by allowing excess water to disperse naturally.
    - **Objective CON A-4:** Wetland protection and preservation enhance flood resilience by maintaining natural water retention areas that help absorb excess rainfall and stormwater.
    - **Objective CON A-5:** Policies on soil erosion prevention help reduce sedimentation in waterways, improving stormwater drainage and reducing flood risk.
- **Land Use and Development Strategies for Flood Resilience**
    - **Objective FLUE C-1:** The plan promotes innovative land and water resource management, which can include green infrastructure, permeable surfaces, and retention ponds to manage stormwater sustainably.
    - **Objective FLUE A-7:** Establishing design and performance standards ensures that new developments minimize flood risk by incorporating elevated structures, green spaces, and enhanced drainage systems.
    - **Objective FLUE A-6:** Allocating sites for public open spaces can serve as flood mitigation zones by absorbing stormwater and reducing urban runoff.
- **Transportation and Infrastructure Resilience**
    - **Objective TRAN A-6:** The plan emphasizes coordination between land use and transportation planning, ensuring that critical infrastructure—such as roads and utilities—is designed to withstand flood hazards and climate change impacts.

- **Objective TRAN A-7:** Right-of-way protection policies can enhance stormwater drainage to reduce flooding along key transportation corridors.

- **Regional Coordination and Climate Adaptation**
  - **Objective ICE A-5:** The city supports multi-jurisdictional environmental planning, essential for addressing regional flood risks through partnerships with Indian River County, FEMA, and the St. Johns River Water Management District.

5. Recommended Actions

The IN-CORE analysis offers critical insights into identifying high-risk areas and assessing the severity of flood impacts, enabling the development of more targeted and effective protection strategies. Our study does not propose additional flood mitigation measures since the building damage analysis and model results indicate that Fellsmere currently does not exhibit direct flood damage risks within its city boundaries. Below is a list of potential funding sources available to support flood resilience strategies.

Federal Level

- **HMGP – FEMA Hazard Mitigation Grant Program:** This program provides funding for projects that reduce risks from natural disasters, including retrofitting high-risk structures:
- **FMA—FEMA Flood Mitigation Assistance:** This program offers grants for flood mitigation activities, including elevation, acquisition, and floodproofing of buildings.
- **BRIC – Building Resilient Infrastructure and Communities:** This program offers Funds to proactive community resilience projects, including retrofitting vulnerable properties.
- **USDA Rural Development Water and Environmental Programs:** This program provides funding for stormwater-related projects in rural and unincorporated areas that could complement building retrofits.
- **NOAA Coastal Resilience Grants:** This program supports flood mitigation projects in coastal areas
- **EPA Water Infrastructure Finance and Innovation Act (WIFIA):** Provides low-interest loans for water infrastructure projects, including retention ponds and stormwater systems.
- **USDA Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP):** Funds conservation practices, including nature-based flood mitigation solutions.

- **Department of Housing and Urban Development (HUD) Grants:**
  - **Community Development Block Grant Disaster Recovery (CDBG-DR)**: Provides flexible funding for rebuilding efforts in disaster-affected areas.
  - **Community Development Block Grant Mitigation (CDBG-MIT):** Supports strategic flood mitigation projects to reduce future risks.
- **New Federal Funding Programs:**
  - **Bipartisan Infrastructure Law (IIJA):** Includes $50 billion for climate resilience, flood protection, and environmental justice programs.
  - **Inflation Reduction Act (IRA):** Funds nature-based resilience solutions and provide grants for community resilience projects.

Key state funds include:

- **Resilient Florida Program:** Administered by the Florida Department of Environmental Protection (DEP), this program funds local and regional resilience projects, including flood control infrastructure, stormwater management, and sea-level rise adaptation.
- **Florida Forever Program:** A state-funded land acquisition and conservation initiative that helps protect floodplains, wetlands, and coastal buffer zones, reducing flood risks and enhancing natural resilience.
- **Rebuild Florida Mitigation Program:** Managed by the Florida Department of Economic Opportunity (DEO), this program provides disaster mitigation funding for stormwater improvements, infrastructure hardening, and flood risk reduction projects in disaster-prone areas.
- **Florida Small Cities Community Development Block Grant (CDBG) Program:** Offers funding to small municipalities for stormwater drainage improvements, floodplain management, and infrastructure upgrades to enhance resilience.
- **South Florida Water Management District (SFWMD) Cooperative Funding Program:** Supports stormwater management, wetland restoration, and flood mitigation projects, providing matching funds to local governments and water management districts.
- **Florida Office of Resilience and Coastal Protection Grants:** Funds coastal resilience initiatives, such as living shorelines, storm surge mitigation, and floodplain restoration, to reduce flood risks in coastal communities.

- **Florida Department of Transportation (FDOT) Resilient Roads Program:** Supports flood mitigation projects for transportation infrastructure, including stormwater drainage improvements and road elevation efforts in flood-prone areas.
- **Florida Water Infrastructure Improvement Program:** Provides funding for stormwater and flood control infrastructure projects to improve water quality and reduce flood risk across the state.

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Appendices

Appendix A. IN-CORE Methodology

In order to run an IN-CORE building damage analysis, information about the local building stock is required. To build this dataset, the publicly available data from the National Structures Inventory (NSI) is typically utilized. This data has information on the structure type and size, foundation type and height, and number of stories. This data is used to determine the most appropriate building flood archetype for each structure. Some uncertainty arises at this stage as the NSI makes necessary assumptions to populate missing records. The quality of this dataset at the local level should always be considered. The flood archetype assignment process bins all buildings into one of 15 possible building archetypes (Table 2), which are assumed to behave similarly under hazard loading. In the case of flood, these archetypes were developed in order to effectively predict the structural and non-structural damage caused by a given flood depth on different types of buildings. The full list of building archetypes and their defining characteristics was put forth in the work of Omar Nofal and John W. van de Lindt in the peer-reviewed paper Minimal Building Flood Fragility and Loss Function Portfolio for Resilience Analysis at the Community Level (2020) and has been referenced in several subsequent publications.

Table 2. A reproduction of the tabulated archetypes

Building Archetype	Building Description
F1	One-story single-family residential building on a crawlspace foundation
F2	One-story multi-family residential building on a slab-on-grade foundation
F3	Two-story single-family residential building on a crawlspace foundation
F4	Two-story multi-family residential building on a slab-on-grade foundation
F5	Small grocery store/Gas station with a convenience store
F6	Multi-unit retail building (strip mall)
F7	Small multi-unit commercial building
F8	Super retail center
F9	Industrial building
F10	One-story school
F11	Two-story school
F12	Hospital/Clinic
F13	Community center (place of worship)
F14	Office building
F15	Warehouse (small/large box)

Source: Nofal and van de Lindt (2020)

With buildings sorted into the most appropriate archetype category and archetypical building damage determined by flood depth, a flooding scenario in the form of mapped flood depths is the final element required to run a building damage analysis with IN-CORE.

Building the Damage Analysis: Running the Model and Obtaining Results

As described above, the building damage analysis is run by taking a set of buildings, binning them into 15 archetypical building categories, simulating a flood across the region of interest, and then determining the predicted damage level in accordance with these input factors. Upon running this analysis, you will note the term Damage State (DS) is used to denote varying levels of damage. In the latest version of IN-CORE, damage states are defined as DS0, DS1, DS2, and DS3. This is not in direct alignment with previously mentioned work and the figures shown below. This is because the most up-to-date version of IN-CORE has simplified the damage state prediction by grouping the slight damage category of "DS1" with the insignificant damage category of "DS0." Thus, in Figure 4, the original table of anticipated functionality from Nofal and van de Lindt (2020) has been annotated to show the new damage states and how they map to the original ones.

	DS Level	Functionality	Damage Scale	Loss Ratio
DS0	DS0	Operational	Insignificant	0.00–0.03
	DS1	Limited Occupancy	Slight	0.03–0.15
DS1	DS2	Restricted Occupancy	Moderate	0.15–0.50
DS2	DS3	Restricted Use	Extensive	0.50–0.70
DS3	DS4	Restricted Entry	Complete	0.70–1.00

Figure 4. Anticipated functionality by damage state according to Nofal and van de Lindt (2020) and augmented to align with the outputs of up-to-date IN-CORE models

Building Functionality Analysis: Defining Damage Probabilities

If the community experiences this event only once, our primary concern would be structures with a probability exceeding 50% of reaching Damage State 2 or 3. This would represent an impactful result for those structures with only a single occurrence of the modeled hazard event. However, global climate models suggest that the flooding event shown in this report will occur with greater frequency as we progress through this century. Thus, there becomes a greater level of concern with not only buildings in the DS2 and DS3 levels but also buildings in the DS1 level that will see a wearing down of their functionality as similar events become more common. As such, we have highlighted two scenarios. The first is the scenario where this event happens a single time, and the second is where this event happens frequently enough to degrade a larger portion of the building stock through repeated exposure. We have chosen to provide both of these scenarios because the flood depths we used for modeling do not represent a worse-case scenario for the local community but rather an event that the community should be very much expected to experience and successfully withstand in the coming years and possibly on multiple occasions. These two thresholds are superimposed onto Archetype 1's set of fragility curves in Figure 11 below. Thus, the following damage probability values do not represent damage probabilities due to separate events but rather serve to explore the possibility of how the flooding event described above would have varied impact if it occurred habitually versus a single time. The reality will likely be somewhere between these two scenarios.

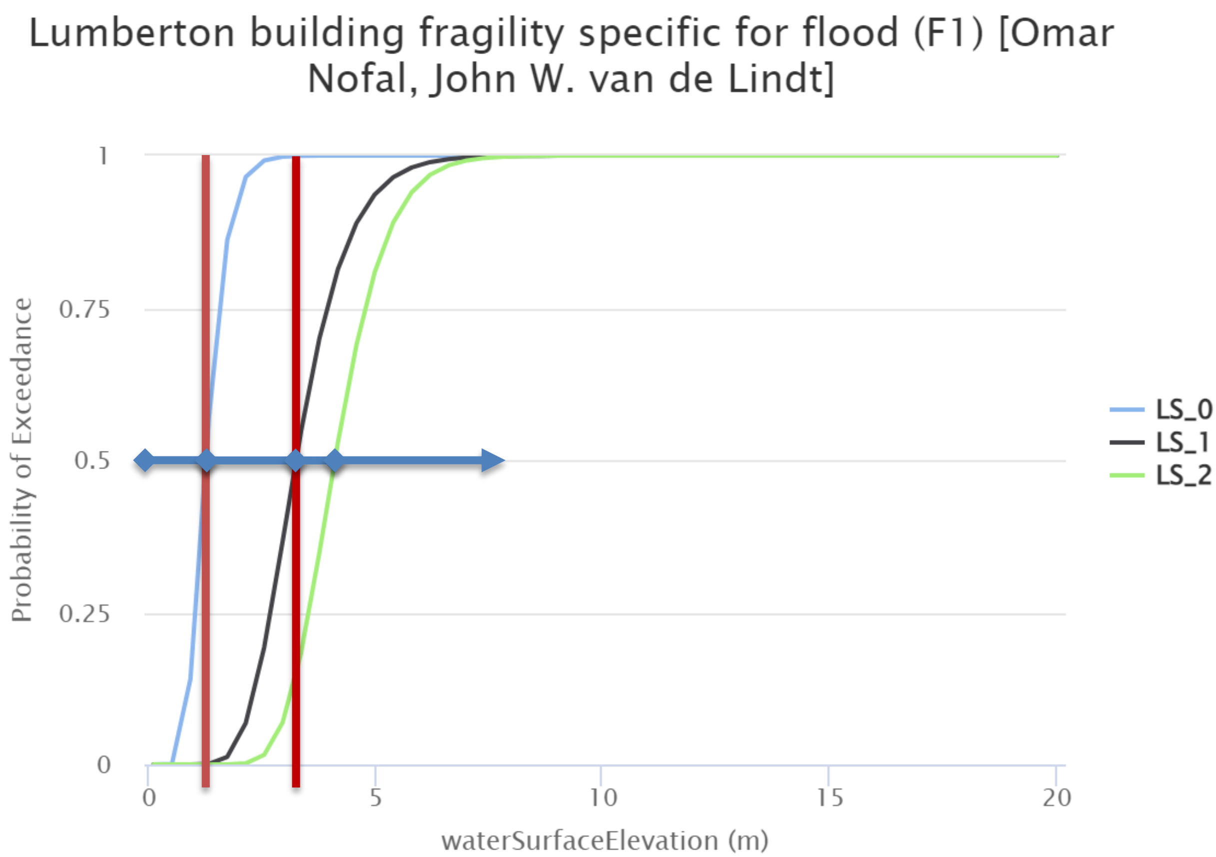

Figure 5. An example set of fragility curves to demonstrate the failure thresholds defined for this analysis
Source: Nofal and van de Lindt (2020)

Appendix B. Sourcing the Necessary Data to Run an IN-CORE Population Dislocation Analysis

The dislocation model requires data on people as well as on structures. To generate the housing unit population allocation, a separate python package called Pyncoda developed as part of the Center of Excellence for Risk-Based Community Resilience Planning, is used to synthetically allocate households to housing units. The demographic characteristics of the synthetic population matches the characteristics at the Census block group level. This work is described as follows by Pyncoda's README file on GitHub authored by Nathanael Rosenheim:

People are the most important part of community resilience planning. However, models for community resilience planning tend to focus on buildings and infrastructure. This repository provides a solution that connects people to buildings for community resilience models. The housing unit inventory method transforms aggregated population data into disaggregated housing unit data that includes occupied and vacant housing unit characteristics. Detailed household characteristics include size, race, ethnicity, income, group quarters type, vacancy type, and census block. Applications use the housing unit allocation method to assign the housing unit inventory to structures within each census block through a reproducible and randomized process. The benefits of the housing unit inventory include community resilience statistics that intersect detailed population characteristics with hazard impacts on infrastructure, uncertainty propagation, and a means to identify gaps in infrastructure data such as limited building data. This repository includes all of the Python code files. Python is an open-source programming language, and the code files provide future users with the tools to generate a 2010 housing unit inventory for any county in the United States. Applications of the method are reproducible in IN-CORE (Interdependent Networked Community Resilience Modeling Environment).

Population Dislocation Analysis: Running the Model and Obtaining Results

Once a housing unit allocation has been generated, then the damage result for each building can be combined with the social data for each household, such as tenure status, race, and household income, to determine whether a household is likely to temporarily relocate due to a hazard event, in this case a flood. The results of a population dislocation analysis can be analyzed further to understand the equity impacts of such hazards.