

Climate Change- Related Hazard Vulnerability Assessment

Upper Township

Upper Township Planning Board
Nicholas Dickerson, PP, AICP, CFM

An aerial photograph showing a coastal town built on a narrow peninsula. The town is densely packed with buildings and has a grid-like street pattern. To the left of the town, a river winds through a marshy, brownish landscape. The town is bordered by a sandy beach and the ocean on the right side. In the top right corner, there is a logo for 'Colliers' with a blue background and a yellow and red horizontal stripe below the text.

Colliers

Agenda

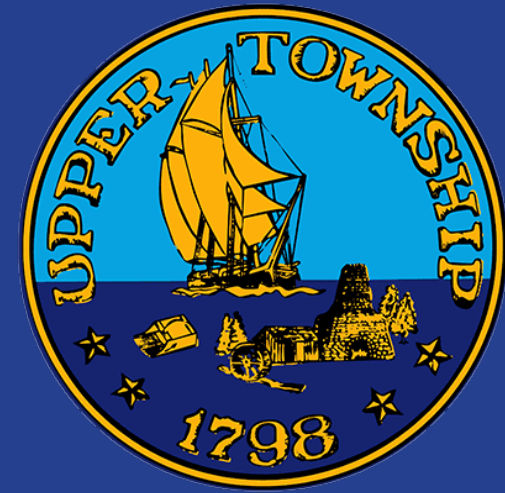
- 01 Introduction
- 02 What Is Resilience
- 03 What We've Been Doing
- 04 Vulnerability Assessment
- 05 Action Items
- 06 Next Steps



Introduction

About the Project

- Upper Township participant in Resilient NJ's municipal assistance program, sponsored by NJ Department of Environmental Protection and funded by National Oceanographic and Atmospheric Administration (NOAA)
- State awarded funding for a Vulnerability Assessment and Identification of Resilience and Adaptation Action Items
- Township awarded funding for stakeholder and community engagement
- Climate Resilience Strategy now requirement for plan endorsement





Capacity of social, economic, and ecosystems to cope with a hazardous event or trend or disturbance

What is Resilience?



New Jersey defines “climate resilience” as the ability of social and ecological systems to absorb and adapt to shocks and stresses resulting from a changing climate, while becoming better positioned to respond in the future. Resilience is not an end-state, but a dynamic state-of being that will grow more difficult to attain as the climate continues to change. Resilience is perseverance with grace, strength in the face of adversity and hardship, resourcefulness to leverage what is available, and faith in the road that lies ahead.

State of New Jersey Climate Change
Resilience Strategy (2021)

State of New Jersey Climate Change Resilience Strategy

State Priorities

- Build Resilient and Healthy Communities
- Strengthen the Resilience of New Jersey's Ecosystems
- Promote Coordinated Governance
- Invest in Information and Increase Public Understanding
- Promote Climate-Informed Investments and Innovative Financing
- Costal Resilience Plan



Add additional information here

State of New Jersey Climate Change Resilience Efforts

New State Requirements

- 2018-Statement of Strategy requirement (MLUL)
- 2021-Climate change-related hazard vulnerability assessment (MLUL)
 - Analyze current and future threats to, and vulnerabilities of, the municipality associated with climate change-related natural hazards, including, but not limited to increased temperatures, drought, flooding, hurricanes, and sea-level rise
 - How future development is threatened
 - Identification of critical facilities for sustaining quality of life
 - Examine potential impact of hazards on the Master Plan
 - Provide strategies to reduce or avoid risks
 - Policy statement on consistency, coordination, and integration with other plans
 - Rely on the most recent projections and best available science

Cape May County Comprehensive Plan (2022)

General Goals

- Promote Sustainability, Resiliency, and Equity
- Monitor and Respond to Change
- Implement Existing Plans

Land Use Goals

- Promote High Quality, Sustainable, and Resilient Development and Redevelopment

Environmental Goals

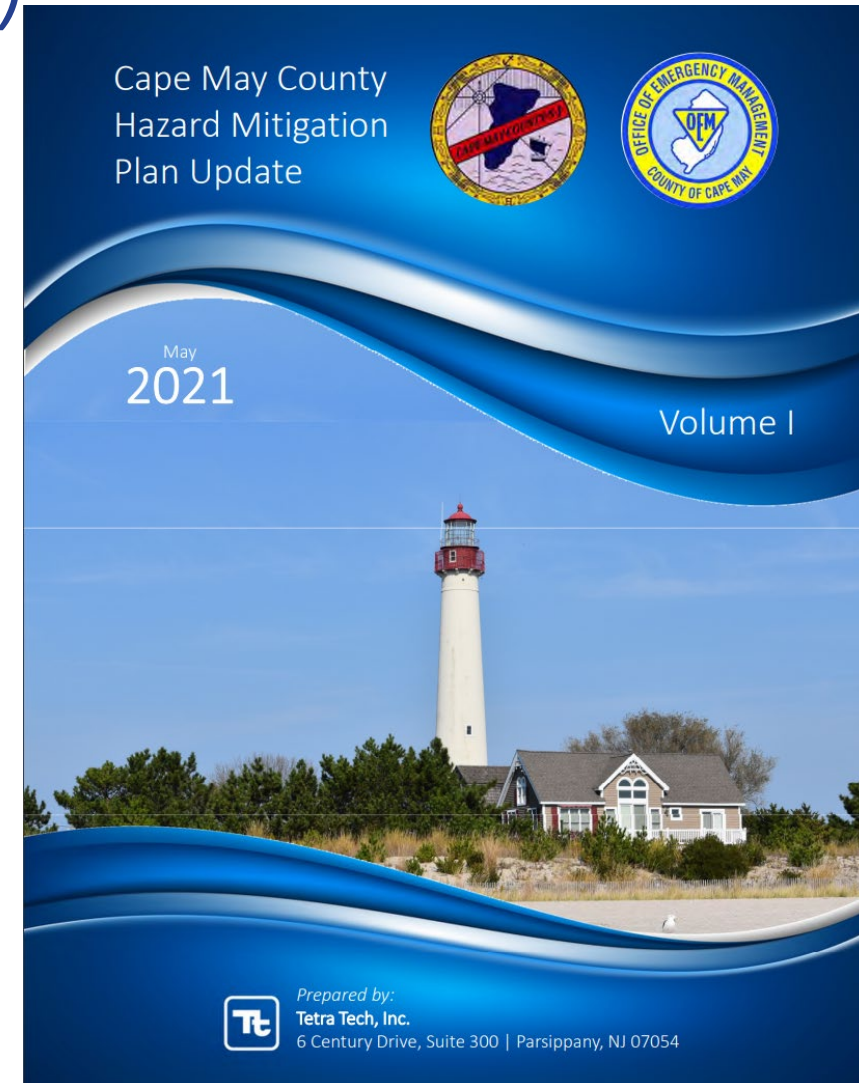
- Account for Climate Change Considerations
- Promote Natural Resource Conservation



Cape May County Hazard Mitigation Plan (2021)

- Goal 1: *Strategically* protect life and property.
- Goal 2: *Promote public awareness, education, and preparedness of hazards and their risks.*
- Goal 3: Promote resiliency, preparedness, and continuity of operations *between government, businesses, and community groups and organizations.*
- Goal 4: Enhance Disaster Preparedness, Response and Recovery
- Goal 5: Protect Open Space, the Environment, and Natural Resources *through short and long-term actions focused on preservation and sustainability.*
- Goal 6: Promote Partnerships *with government agencies, businesses, and non-profit organizations.*

Add additional information here



Upper Township

Resilience Planning (Selected Highlights)

- 2007 — Awarded plan endorsement by the State Planning Commission (and again in 2022)
- 2012 — Amended the flood hazard ordinance to require 1 foot of freeboard on all new homes
- 2017 — Amended the flood hazard ordinance again to require 2 feet of freeboard on new homes
- 2018 — Adoption of Ordinance requiring bulkheads be constructed to elevation 8 (NAVD 1988)
- 2020 — Amended the ordinance to require Strathmere to be at elevation 7 (NAVD 1988)
- 2021 — Completed the Watershed Master Plan and prepared a “repetitive loss” study
- 2022 — Classified as a “Class 5” community by the National Flood Insurance Program (NFIP)’s Community Rating System

A photograph showing a newly constructed waterway, possibly a stream or canal, with a rocky shoreline. The banks are landscaped with young trees planted in rows, supported by wooden stakes. The water is calm and reflects the surrounding greenery. In the background, there are more trees and a white guardrail. The overall scene is a well-maintained, landscaped waterway.

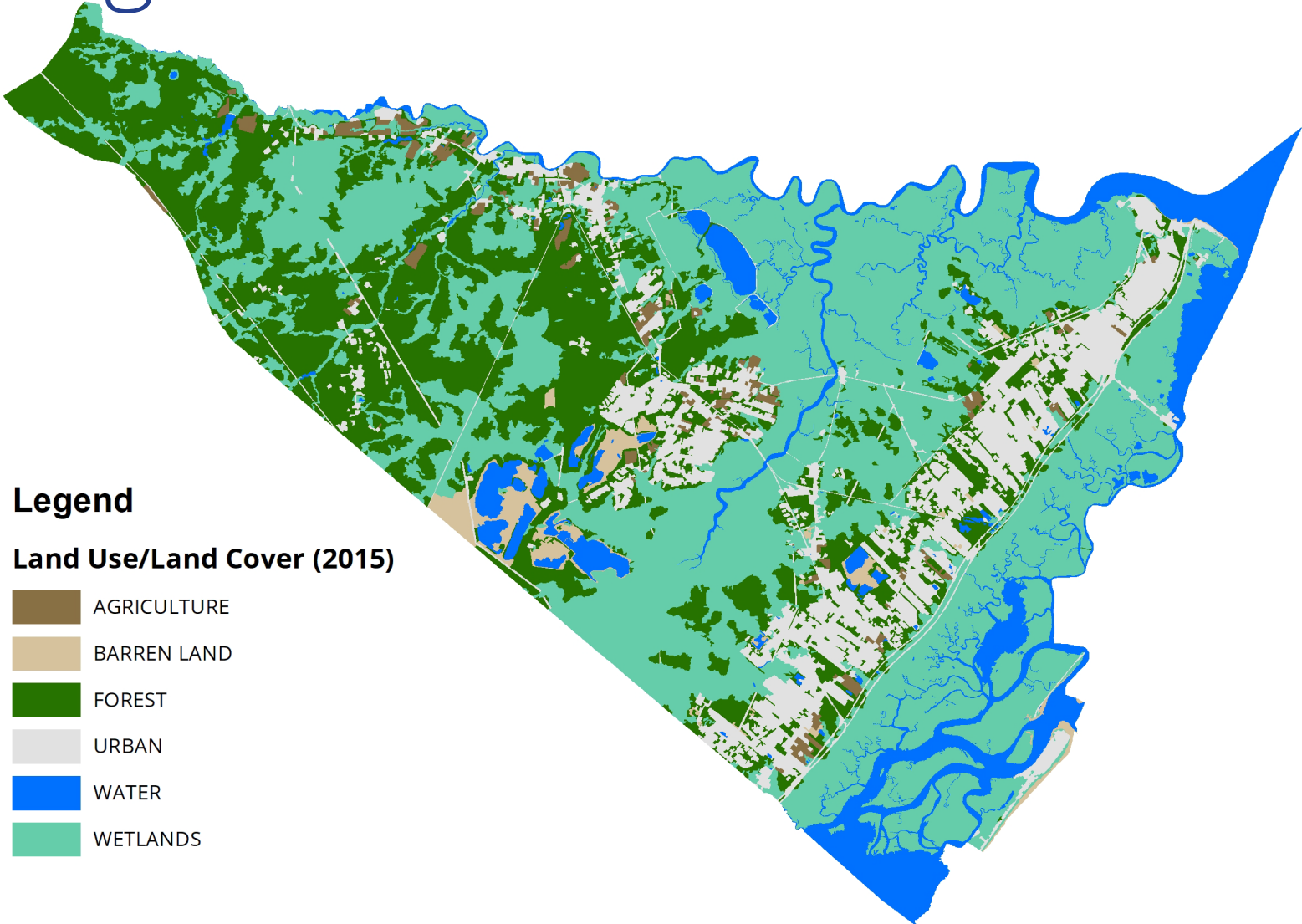
Identifying and Measuring Vulnerability

Climate Change Related Hazard Vulnerability Assessment

What is the purpose of this report?

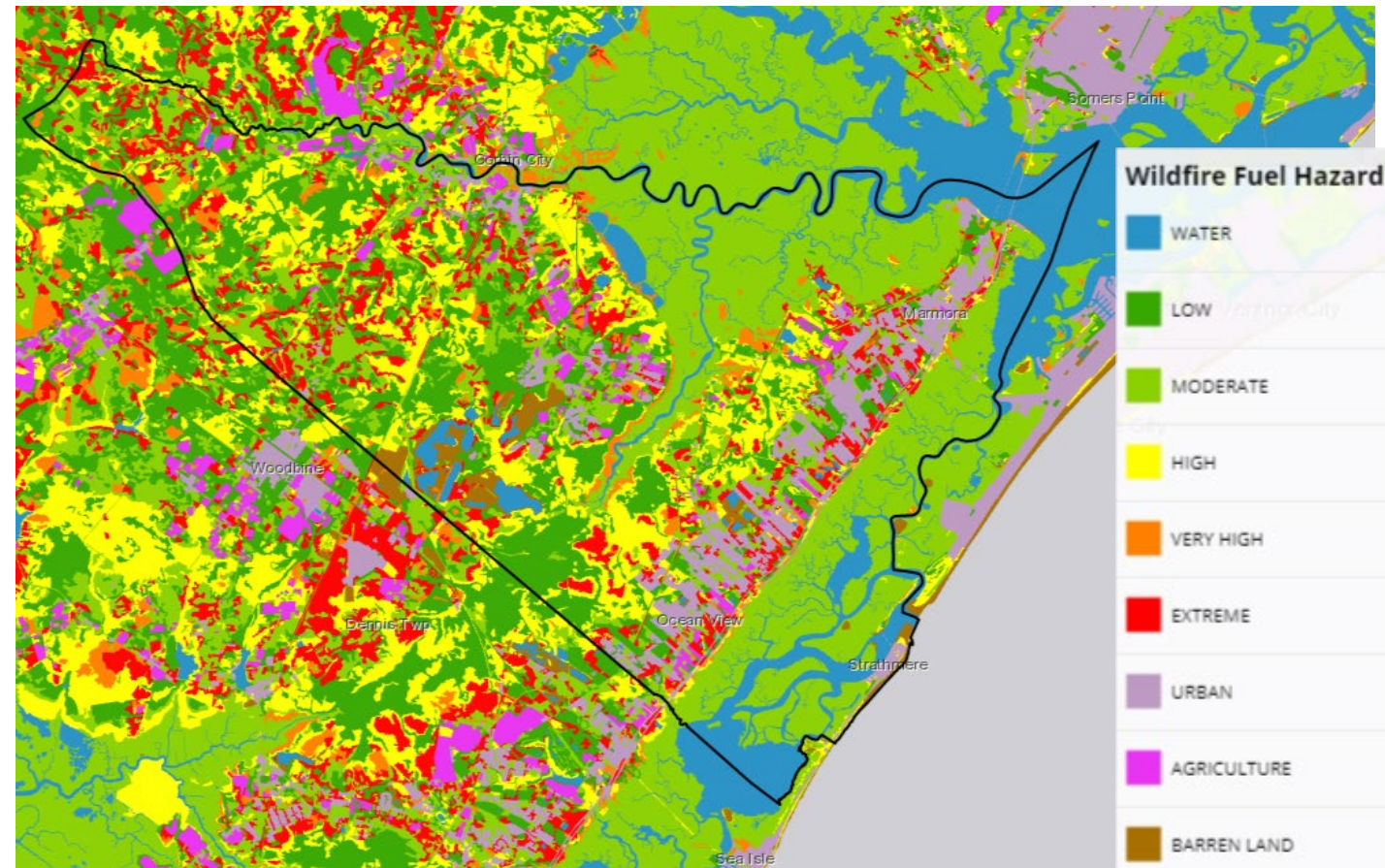
- To analyze current and future threats to the municipality
- To provide a buildout analysis of future development
- To identify necessary critical facilities and infrastructure
- To identify the impact of natural hazards
- To provide strategies and design standards
- To outline a specific policy statement

Existing Conditions



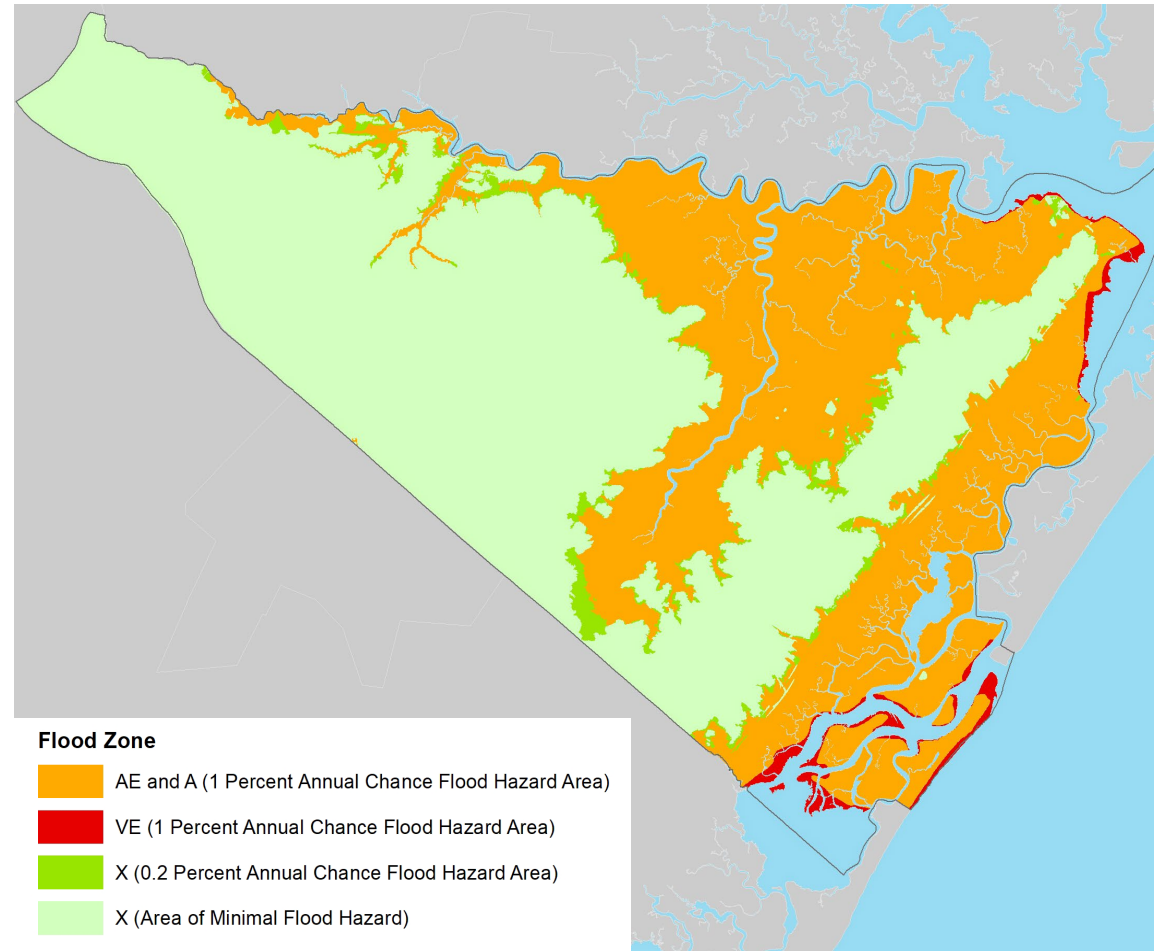
Overarching Threats

- Increased Temperatures
- Drought
- Wildfire
- Sea Level Rise
- Precipitation and Flooding
- Hurricanes and Tropical Weather

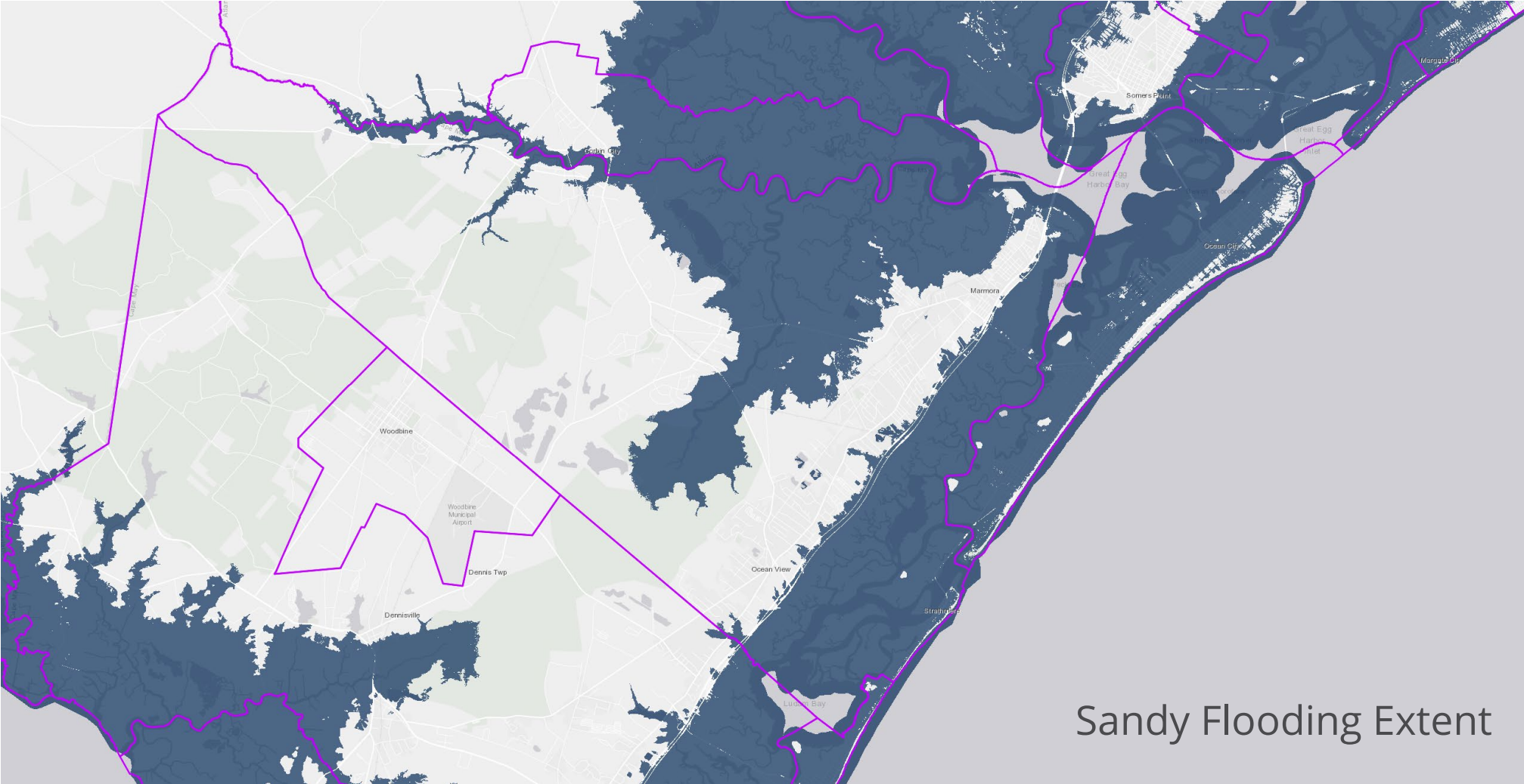


Existing Conditions (Flood Risk)

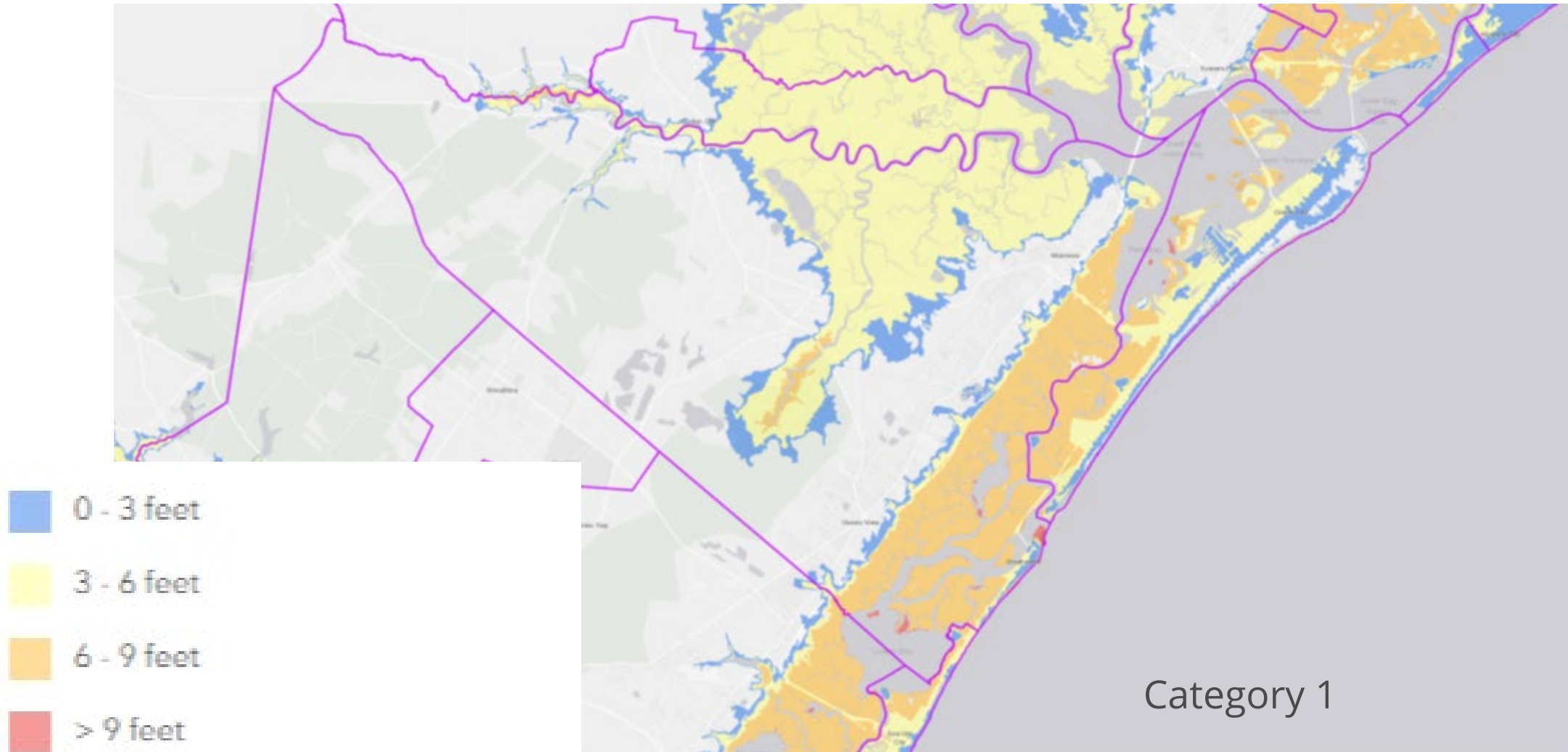
- 45 percent of Township is exposed to the 1 percent annual chance flood hazard area (approx. 1,085 buildings with \$794 million replacement value)
- Another 1,367 buildings in the 0.2 percent annual chance flood hazard area (replacement value: \$981 million)



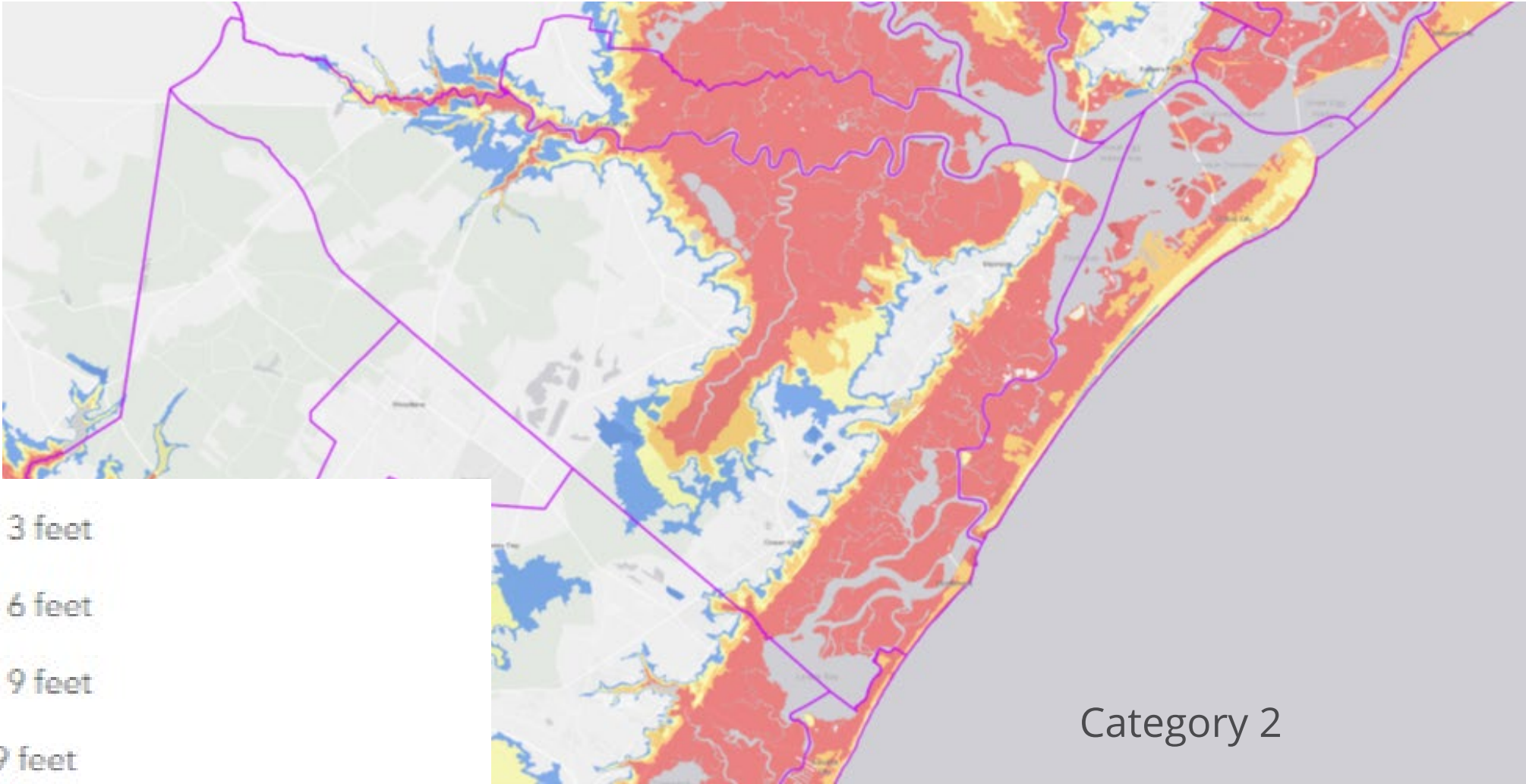
Existing Conditions (Hurricane Risk)



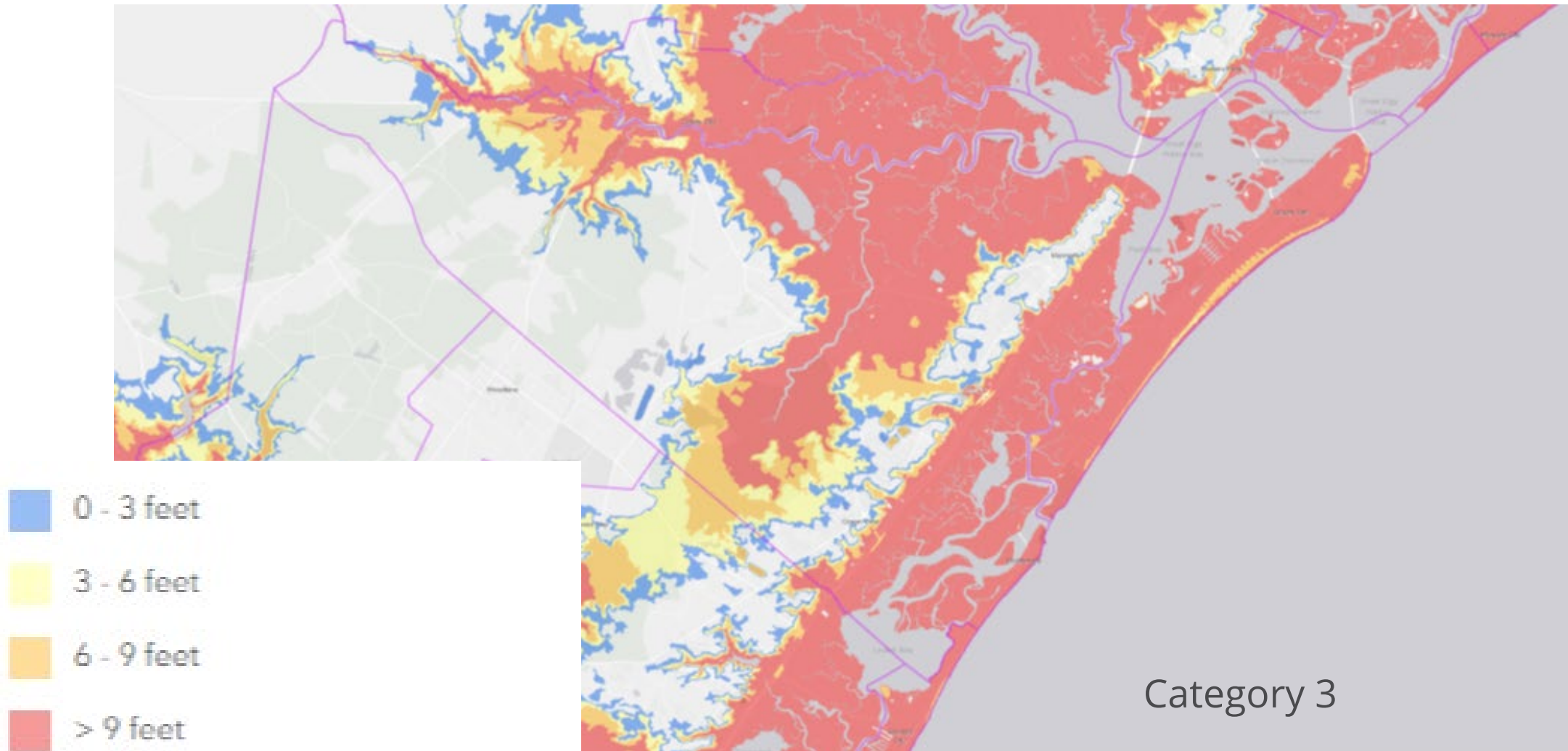
Existing Conditions (Hurricane Risk)



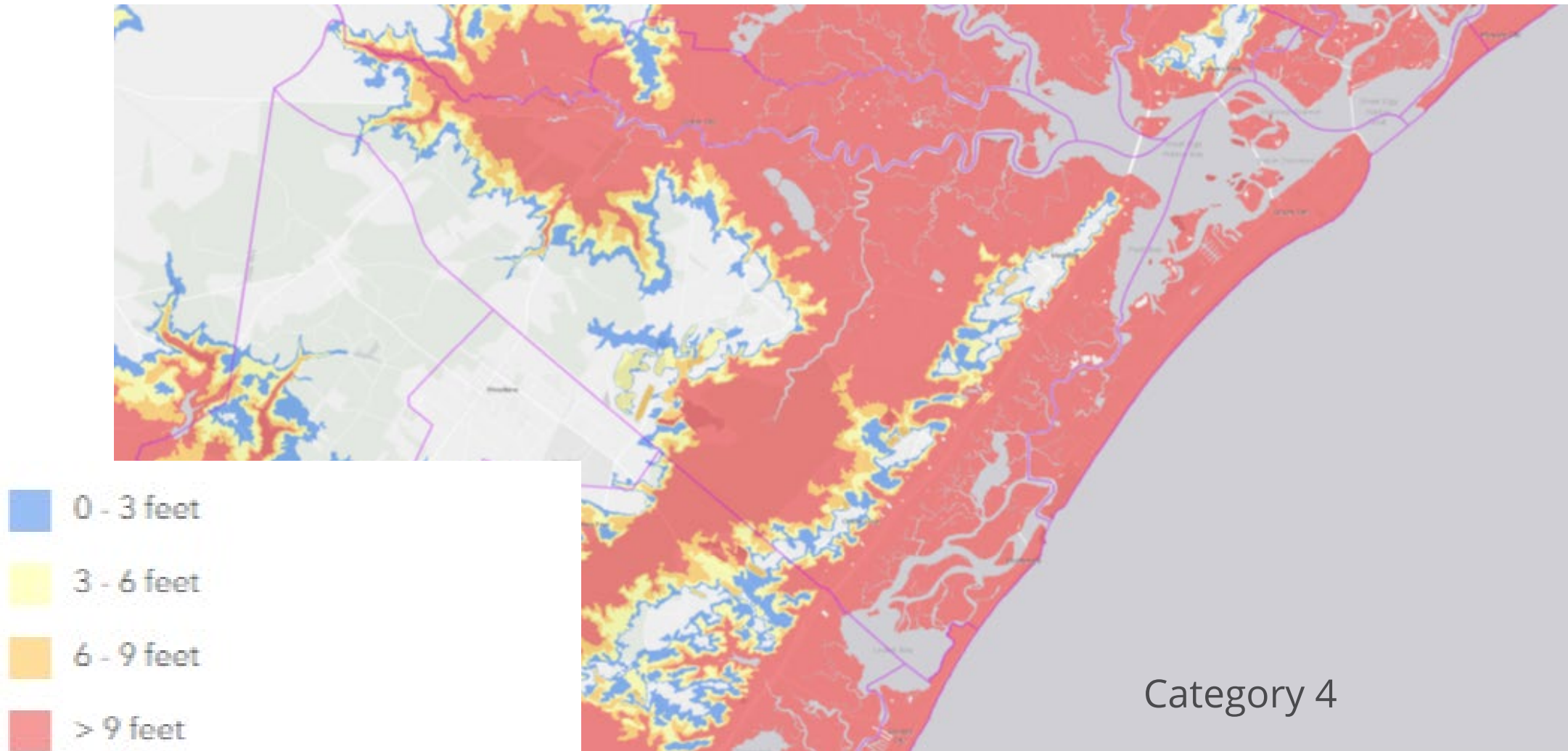
Existing Conditions (Hurricane Risk)



Existing Conditions (Hurricane Risk)

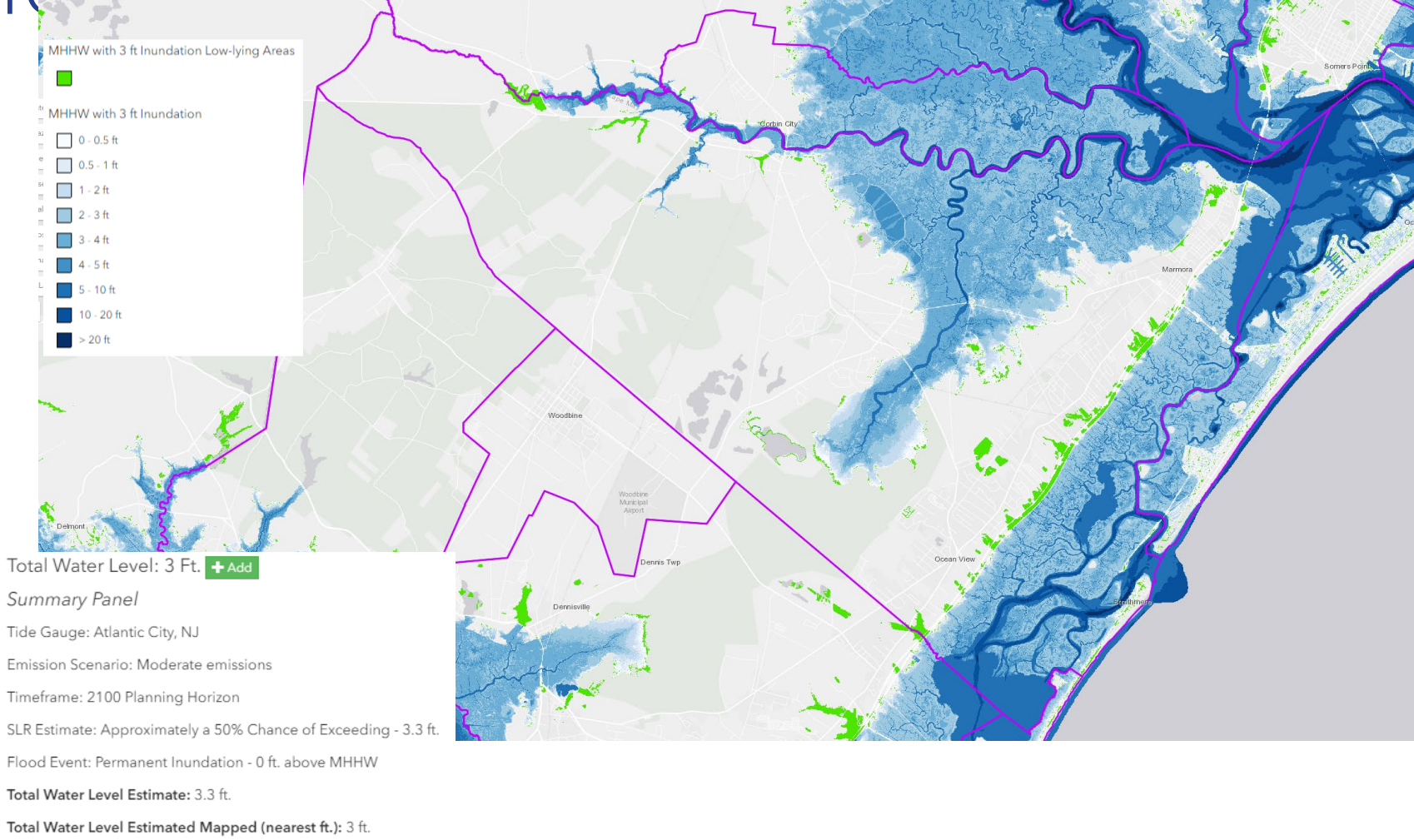


Existing Conditions (Hurricane Risk)



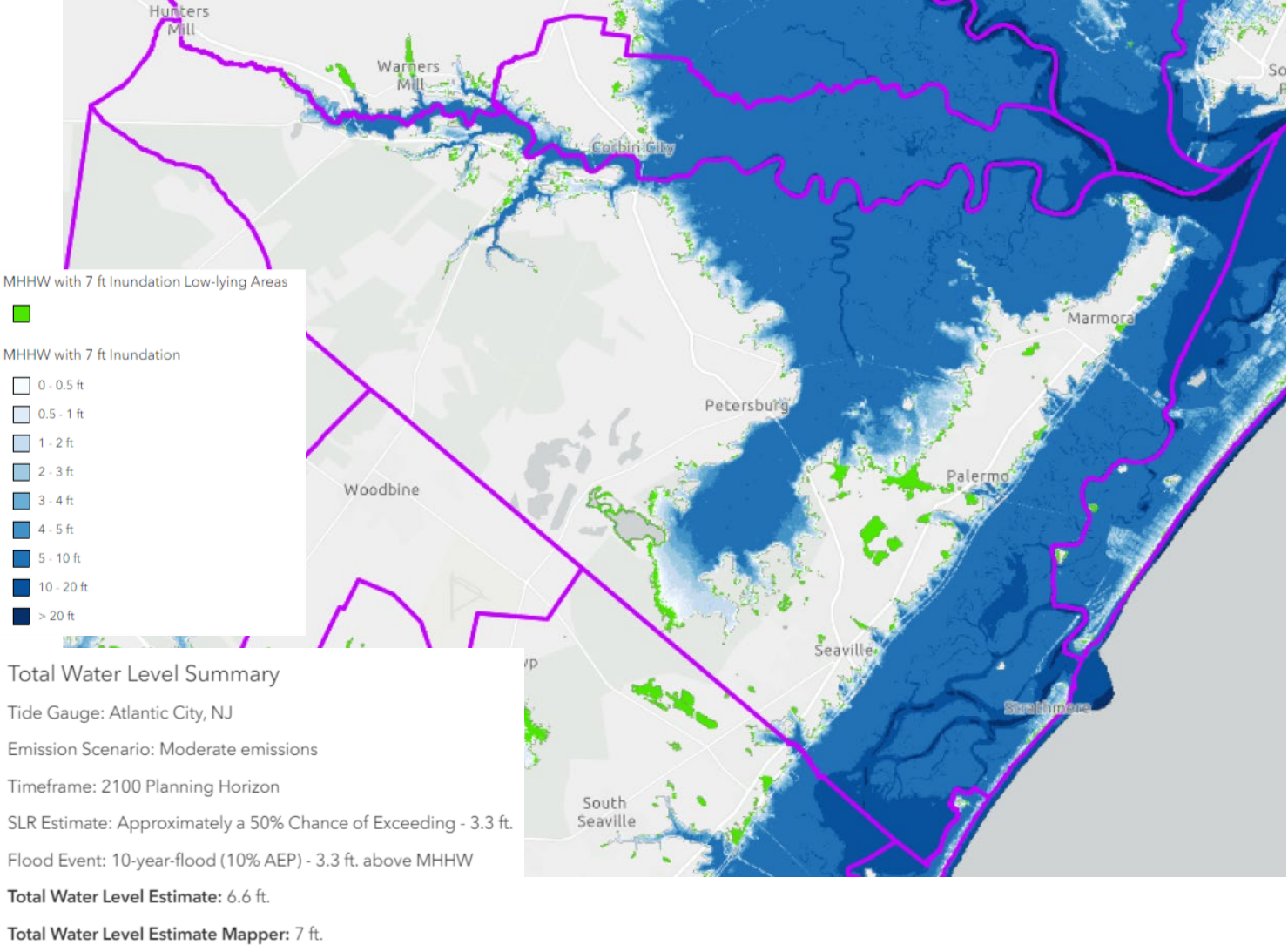
2100 Projections

- 50% chance of sea level rise by 2.8 feet (Low Emissions) to 3.9 feet (High Emissions) by 2100
- More instances of high tide/"sunny day" flooding
- Increased precipitation/sea level rise/storm surge
- Inundation of marshlands and portions of Strathmere, as well as areas around Cedar Swamp Creek and eastern half of Tuckahoe River



2100 Projections

- 50% chance of sea level rise by 2.8 feet (Low Emissions) to 3.9 feet (High Emissions) by 2100
- More instances of high tide/"sunny day" flooding
- Increased precipitation/sea level rise/storm surge
- Combined with 10 year flood event, extensive flooding.



Impact to Infrastructure

Table 1: Buildings in Upper Township expected to be exposed to hurricane inundation by hurricane category

Buildings	943	2,207	4,518	6,845
Replacement Value	\$674,165,922	\$1,558,257,463	\$3,101,293,501	\$4,683,127,959

Table 2: Critical Facilities Exposed to Sea Level Rise

	1 foot SLR	2 foot SLR	3 foot SLR	4 foot SLR
Bridges	4	5*	5	5
Marinas	3	3	4	5
Wells	0	1	1	1
Fire Stations				1
Library				1

Impact on Evacuation Route

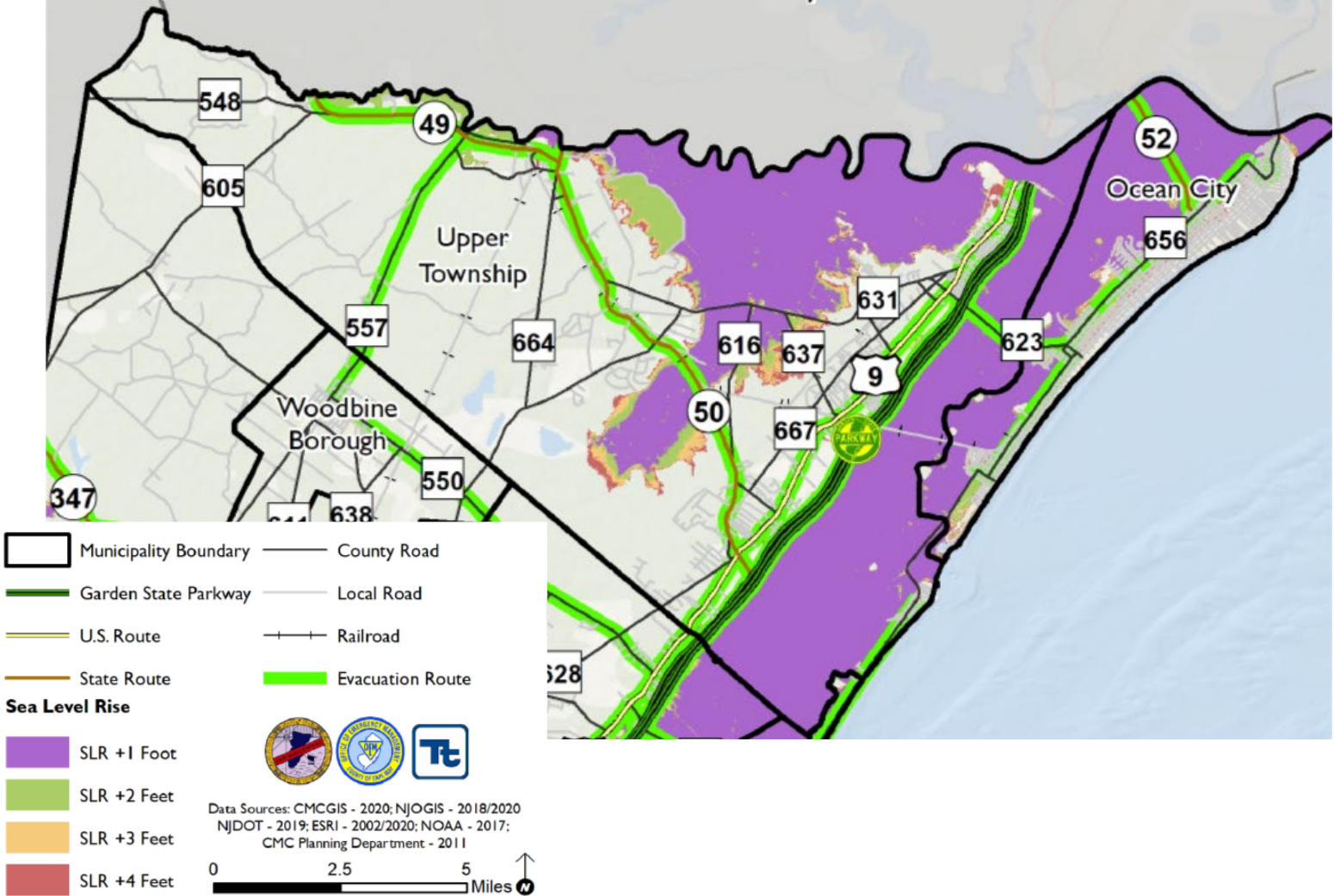


Figure 5: Evacuation Routes and Projected Sea Level Rise (Source: Cape May County HMP)

Impact to Natural Resources

Increased Temperature, Drought, and Wildfire will affect

- Native species
- Wetlands
- Tidal Marsh
- Beaches and Dunes
- Agricultural Land
- Forest

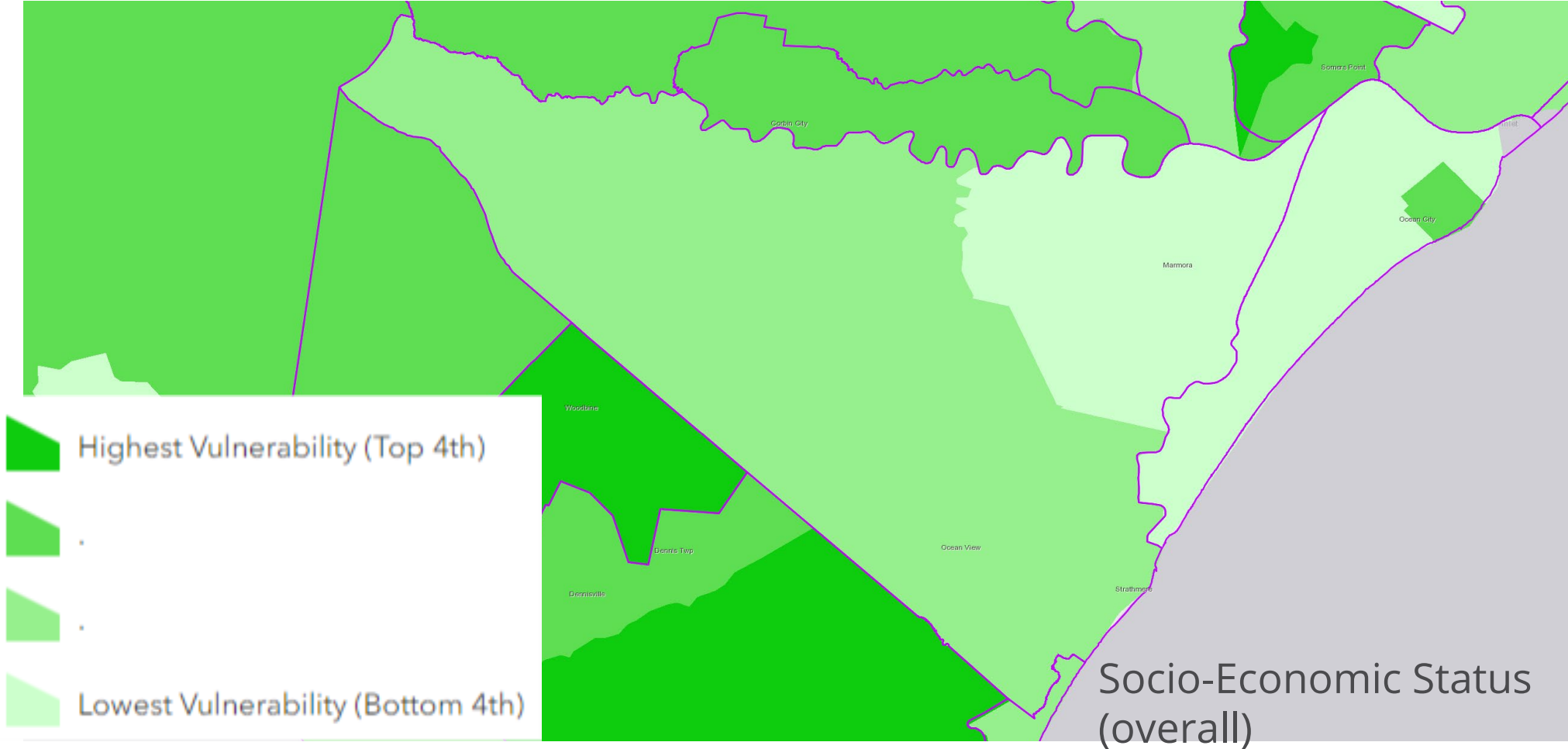
Table 4: Land Use/ Land Cover Affected by Sea Level Rise

Area Name	Total Acres of Natural and Working Land Types	Acres Exposed at 2 ft Total Water Level (TWL)	Acres Exposed at 7 ft Total Water Level (TWL)
Wetlands (Interior)	10,081	1,388	3,857
Tidal Marsh	10,418	10,359	10,417
Open Space	19,896	8,619	10,659
Beaches and Dunes	114	39	88
Agricultural Lands	664	1	109
Forest	11,252	161	945

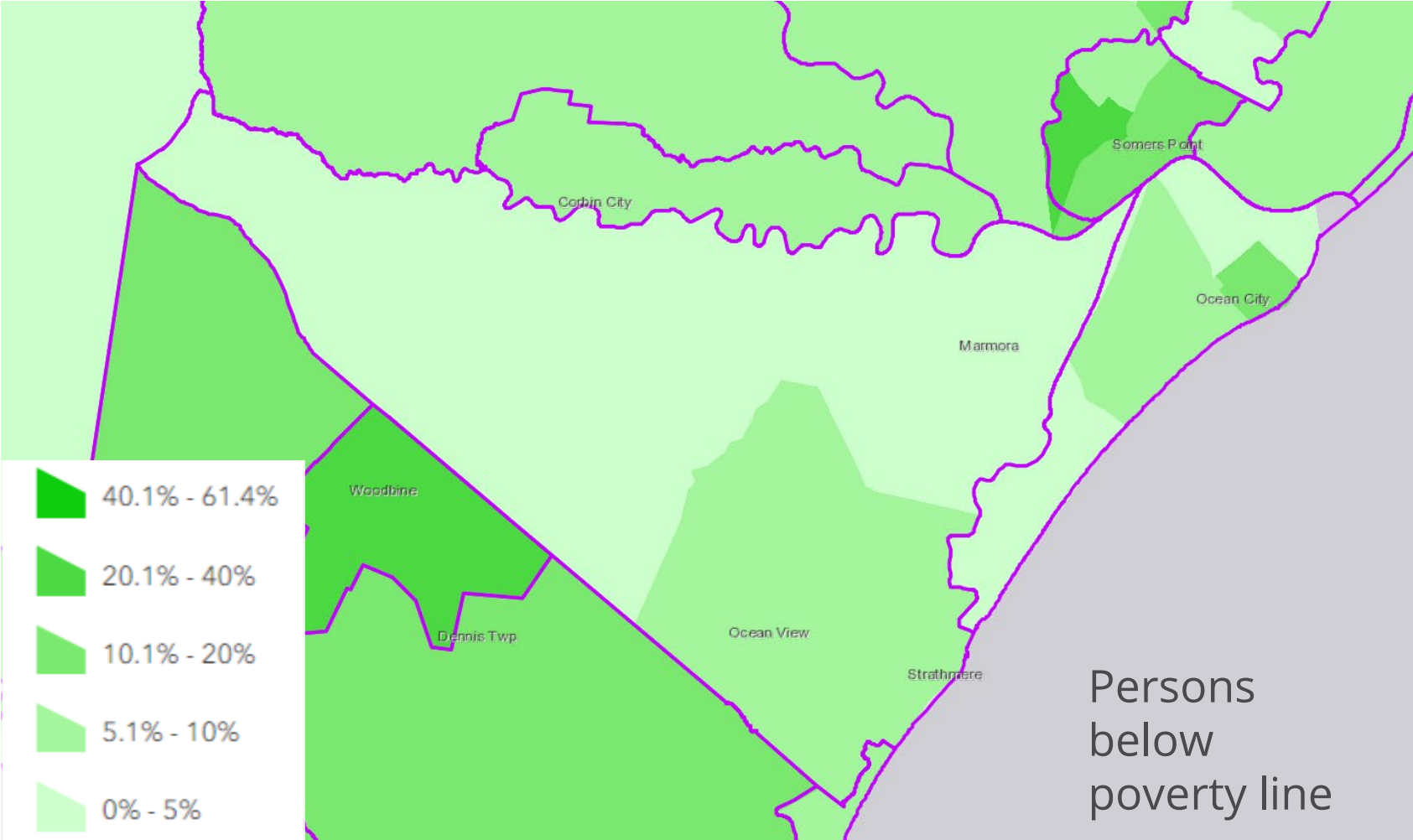
Impacts to Vulnerable Populations

- CDC examines a number of demographic factors:
 - Socioeconomic status (below poverty, unemployed, income, no high school diploma)
 - Household composition & disability (aged 65 or older, aged 17 or younger, older than age 5 with a disability, single-parent households)
 - Minority status & language (minority, speak English “less than well”)
 - Housing type & transportation (multi-unit structures, mobile homes, crowding, no vehicle, group quarters)
- FEMA also suggests “visiting populations”—i.e. tourists—should be considered
- Environmental Justice communities—none identified
- “Asset Limited, Income Constrained, and Employed” (ALICE)—26 percent of Households
- Veteran populations—7.8 percent township population

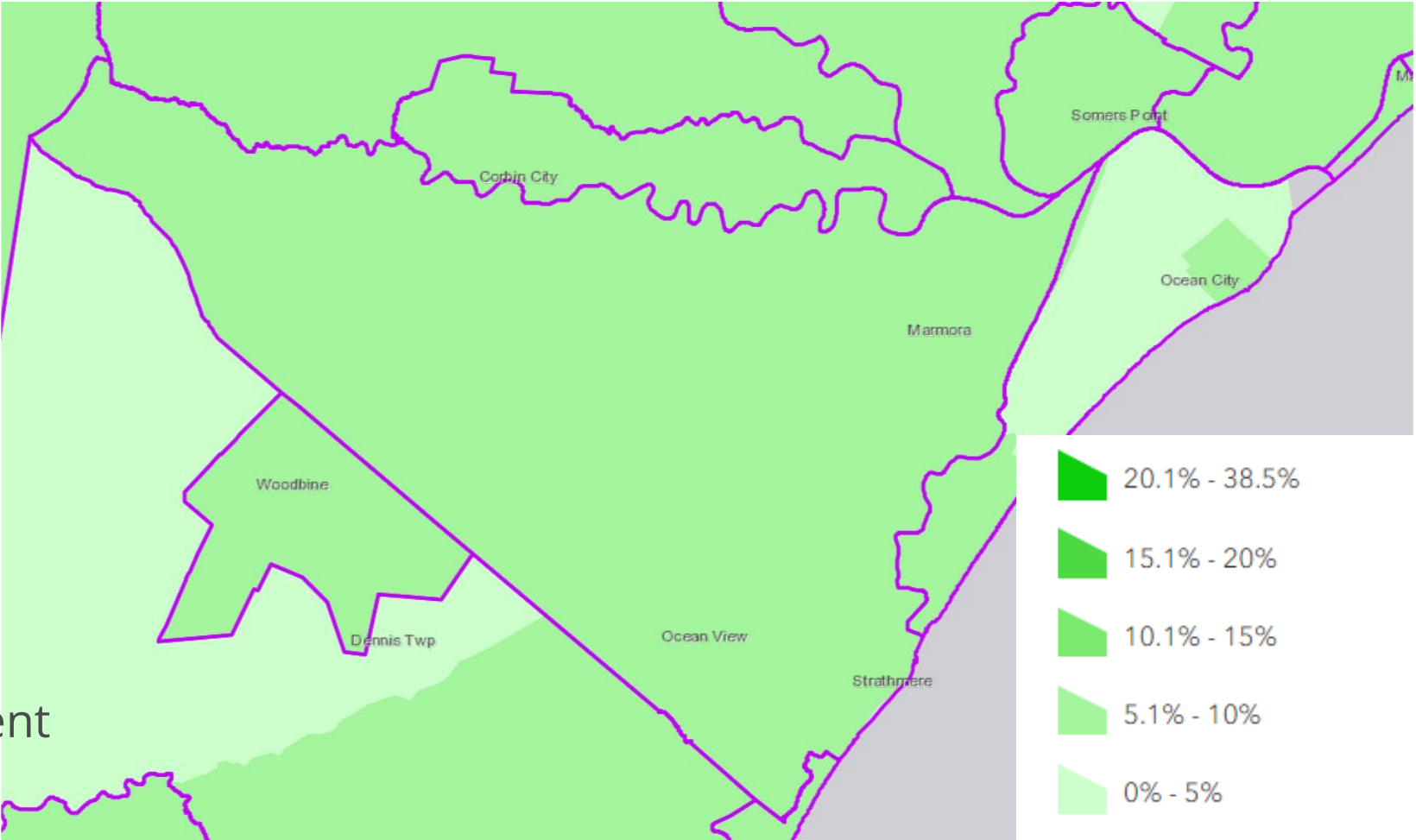
Social Vulnerability: Socio-Economic Status



Social Vulnerability: Socio-Economic Status

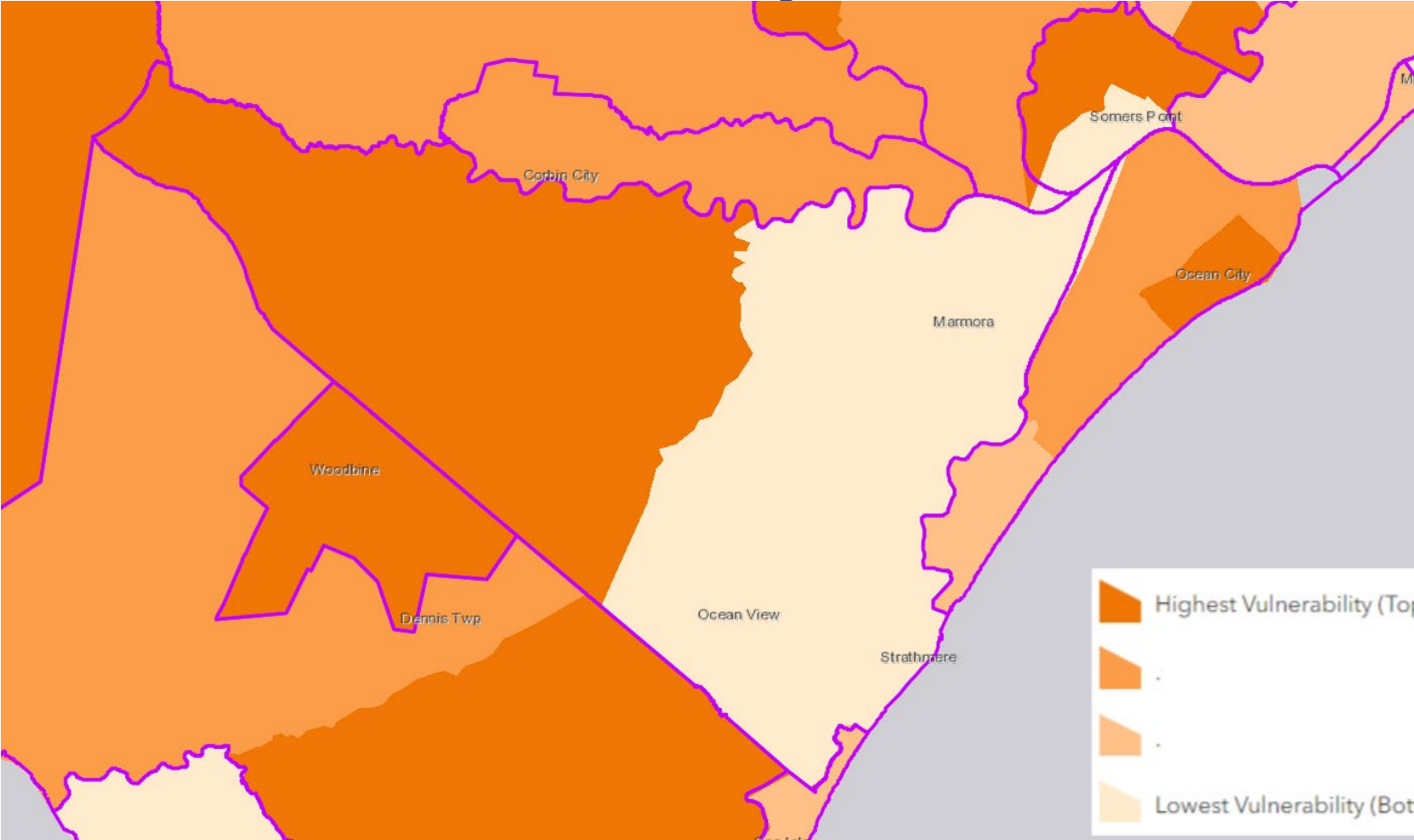


Social Vulnerability: Socio-Economic Status



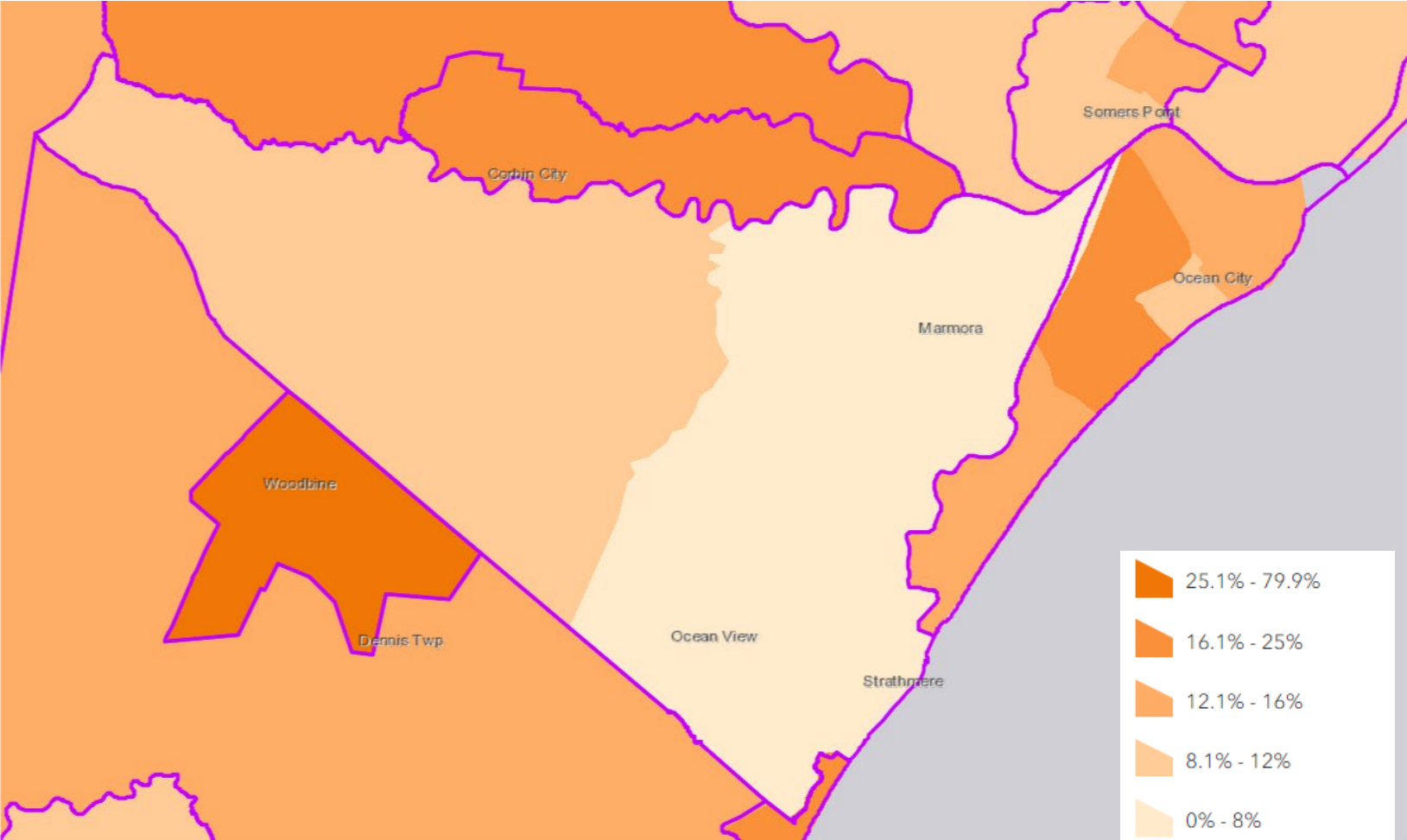
Civilian
Unemployment

Social Vulnerability: Household Composition & Disability



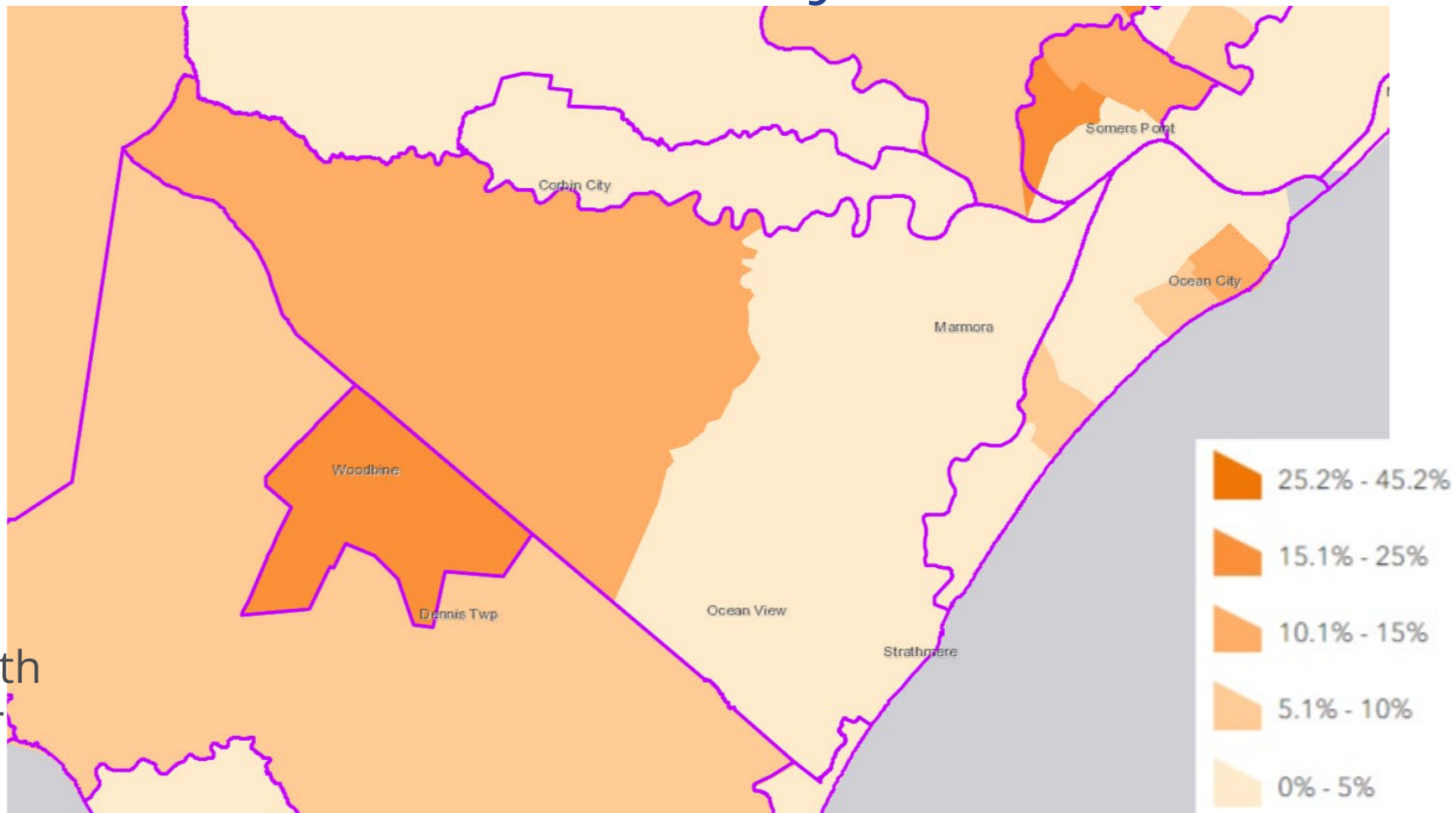
Household Composition and Disability (overall)

Social Vulnerability: Household Composition & Disability



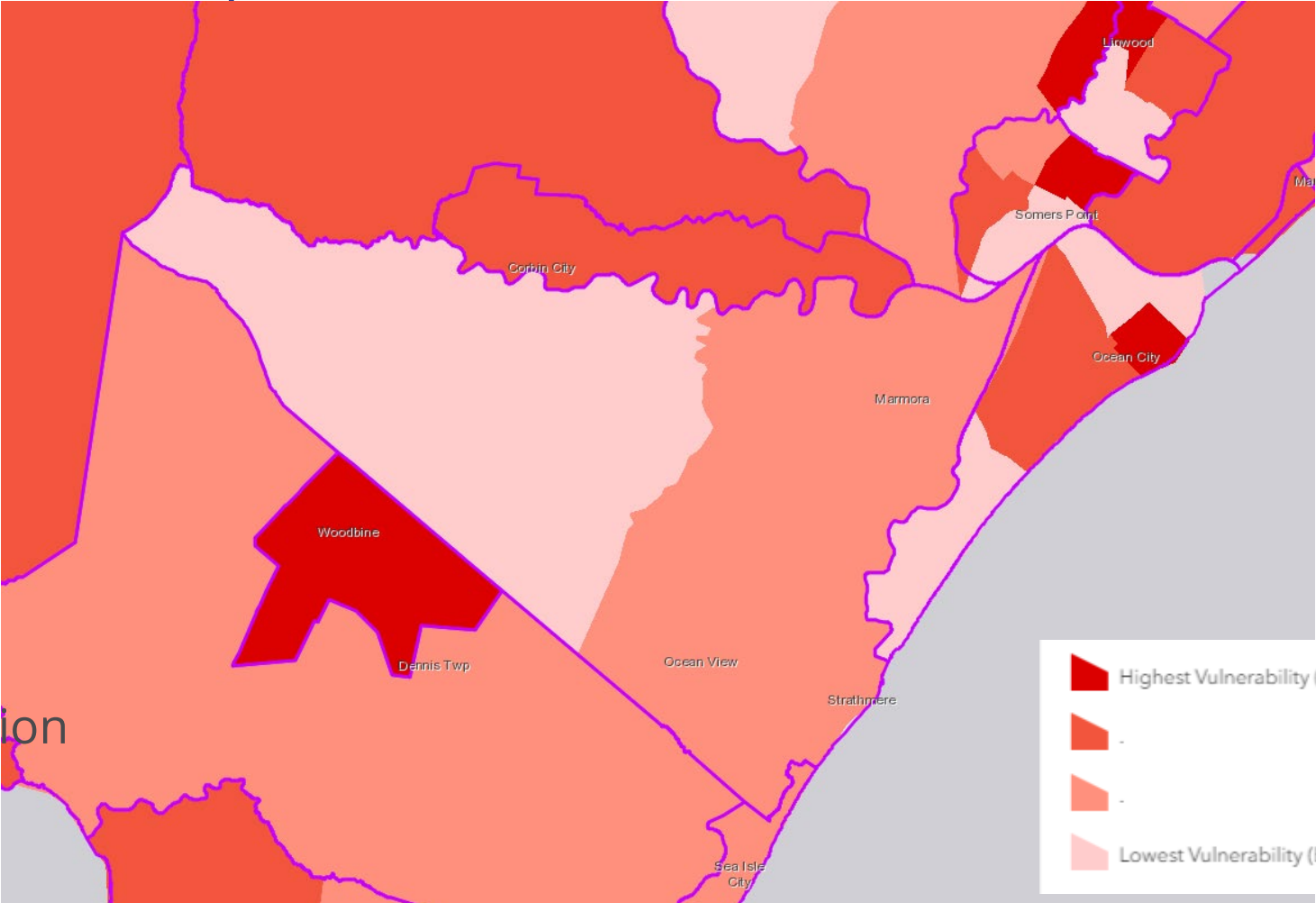
Percent with disability

Social Vulnerability: Household Composition & Disability



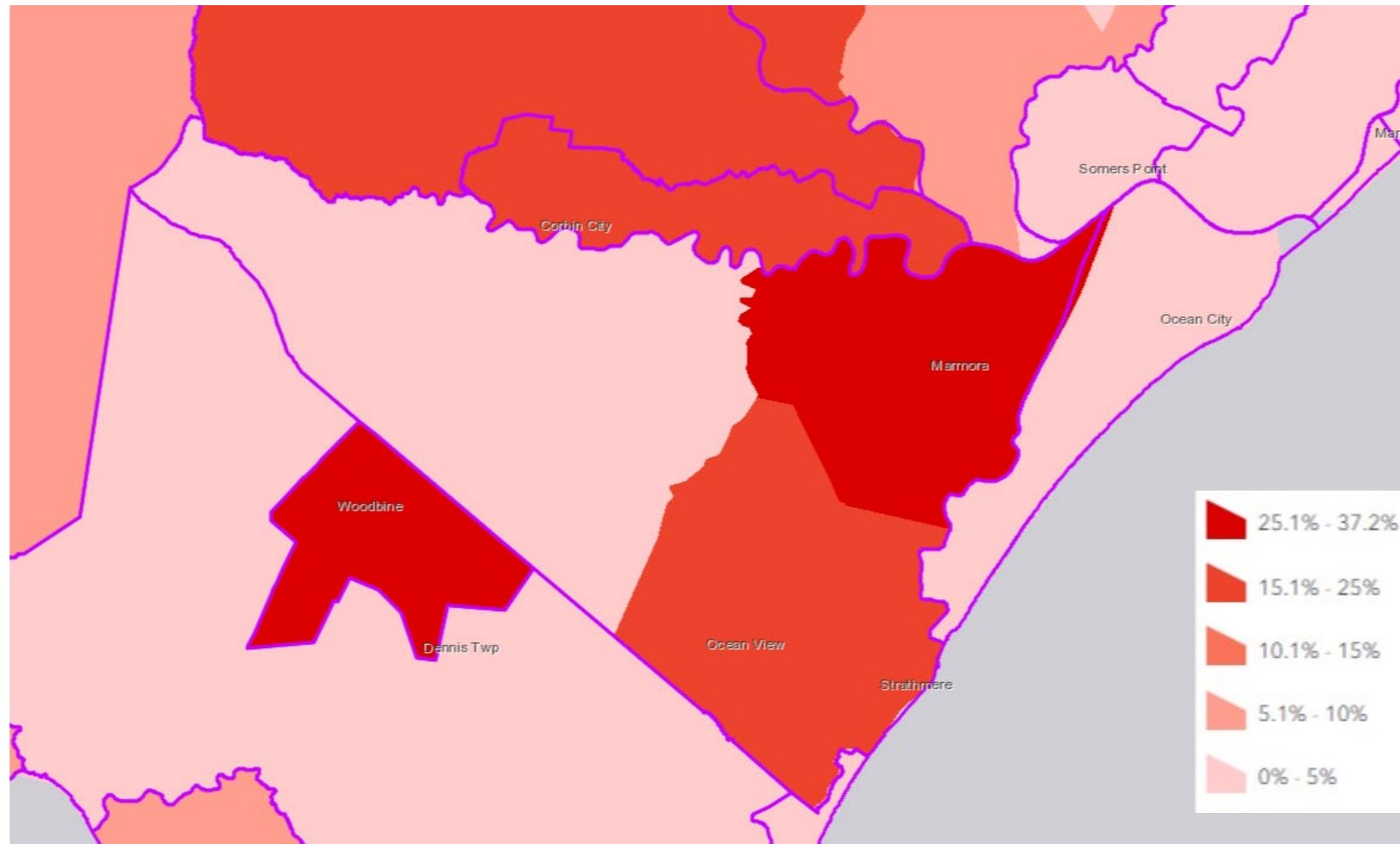
Single parent households with children under 18

Social Vulnerability: Housing Type/Transportation



Housing Type/Transportation (overall)

Social Vulnerability: Housing Type/Transportation



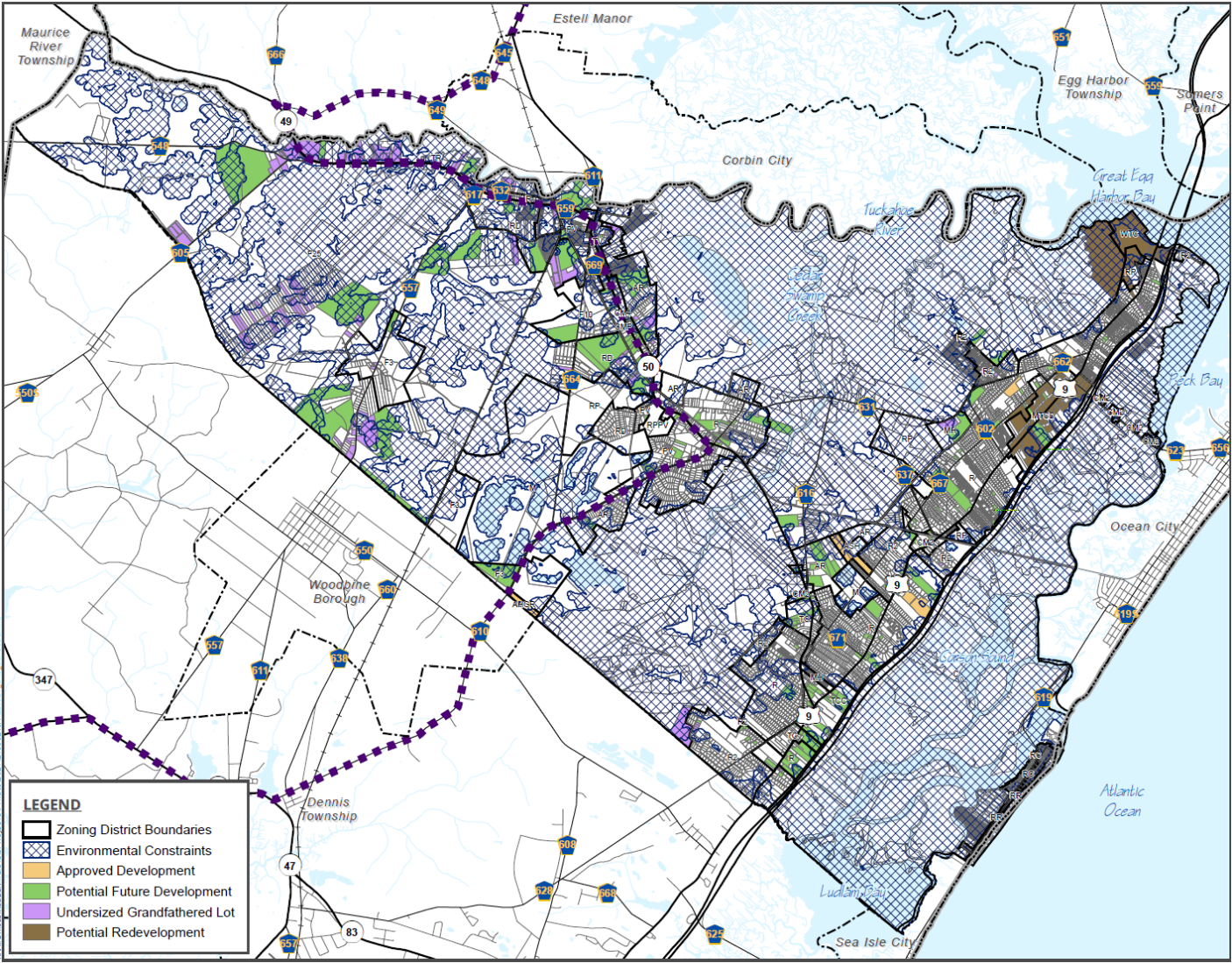
Percent Mobile Homes Estimate

Vulnerable Populations (Summary)

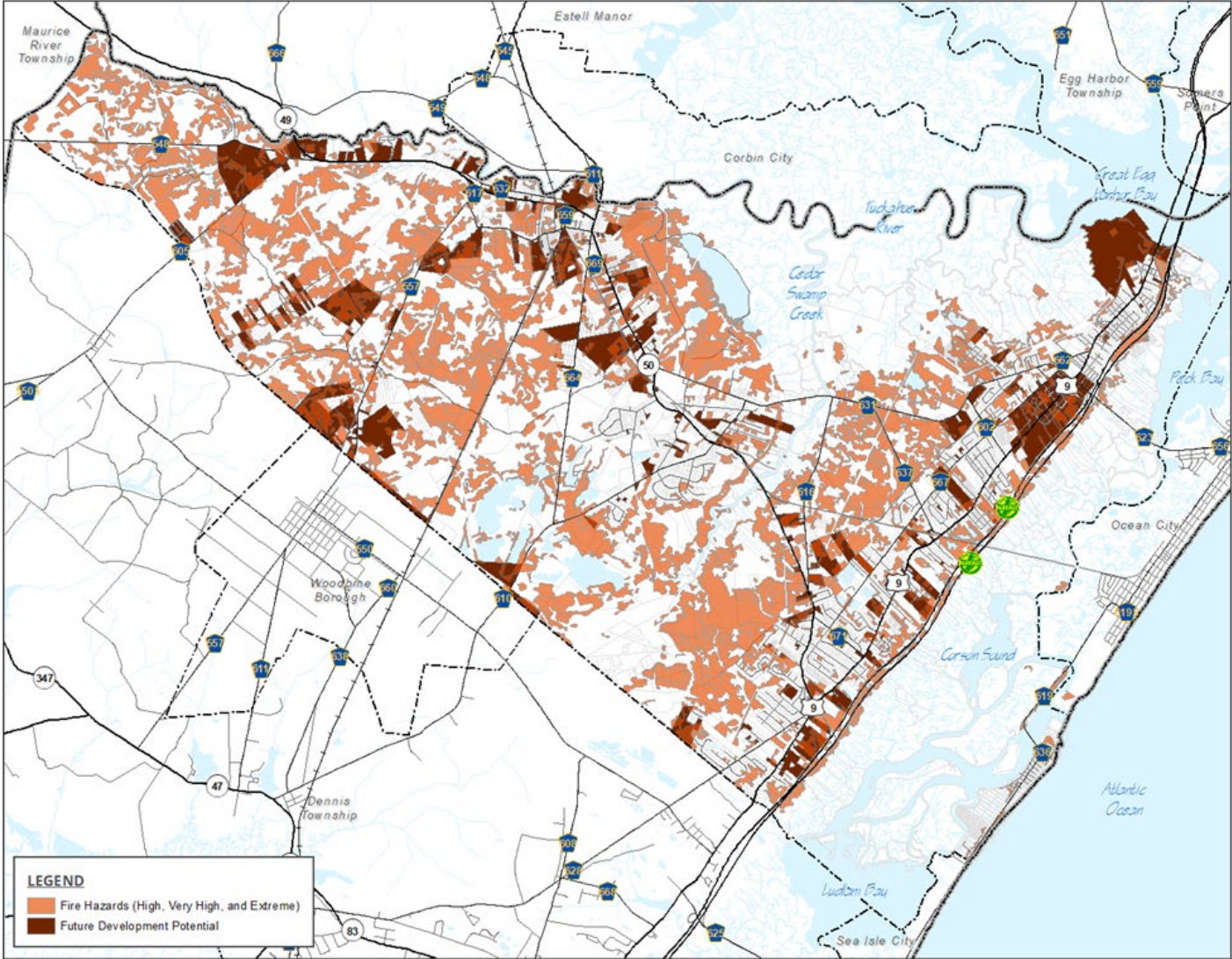
- Seasonal tourist population,
- Low income populations,
- Unemployed population,
- the concentrations of older and younger households,
- persons with disabilities,
- single parent households,
- and the high percentage of mobile homes

Future Build Out and Vulnerability Impact to Future Development

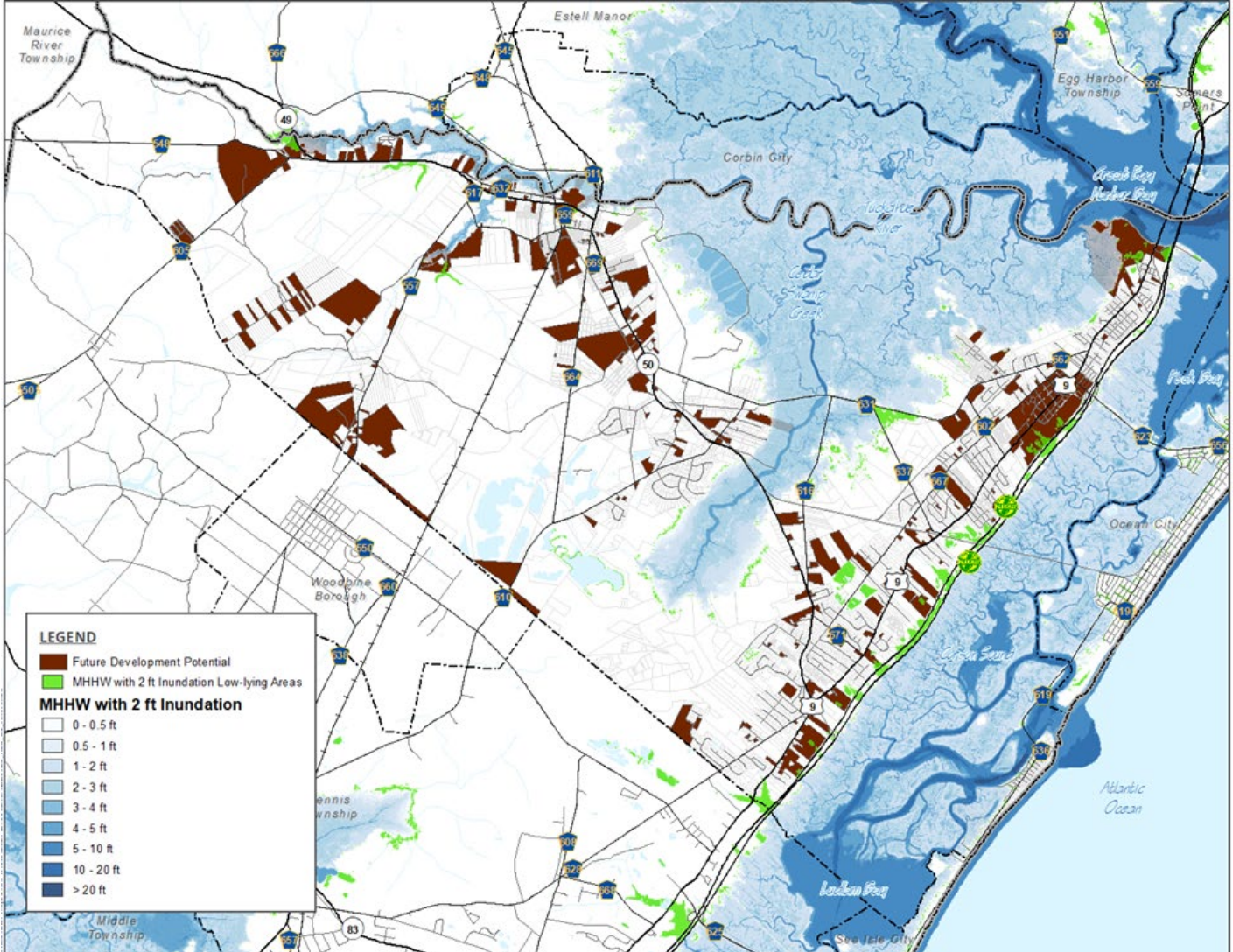
Zone	Residential (Dwelling Units)	Non-Residential (Sq. Ft.)
AHGR	8	0
AR	33	0
ASH	60	0
C	7	0
CM2	0	43,112
CM4	0	11,808
CMP	0	117,952
F10	5	0
F25	77	0
F3	20	0
MH	153	0
MTCD	1,317	1,652,659
PV	38	0
R	427	0
R2	24	38,979
RD	64	0
TC	415	532,907
TCC	633	575,260
TR	38	0
TV	6	0
WTC	TBD	TBD



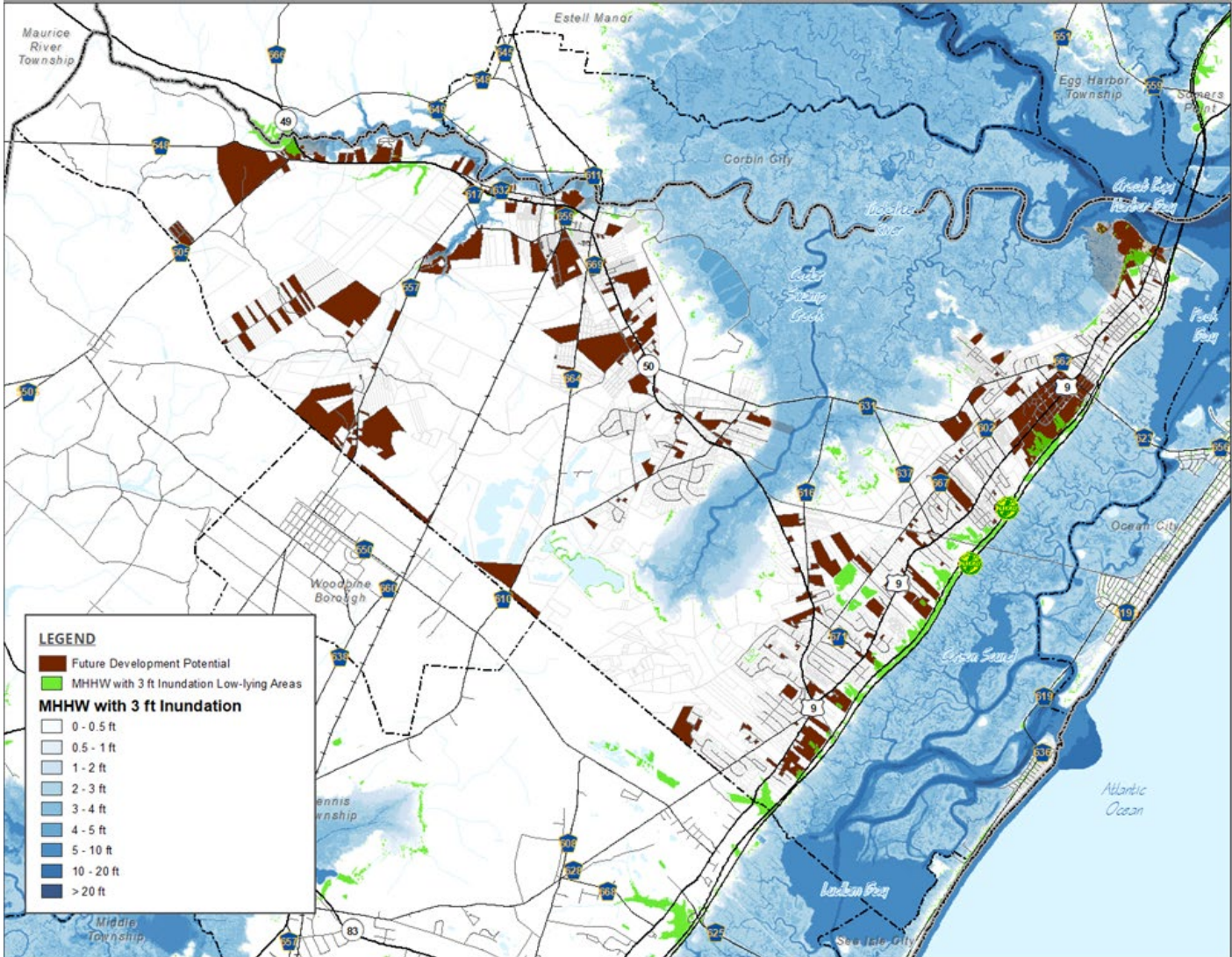
Future Build Out and Vulnerability Impact to Future Development



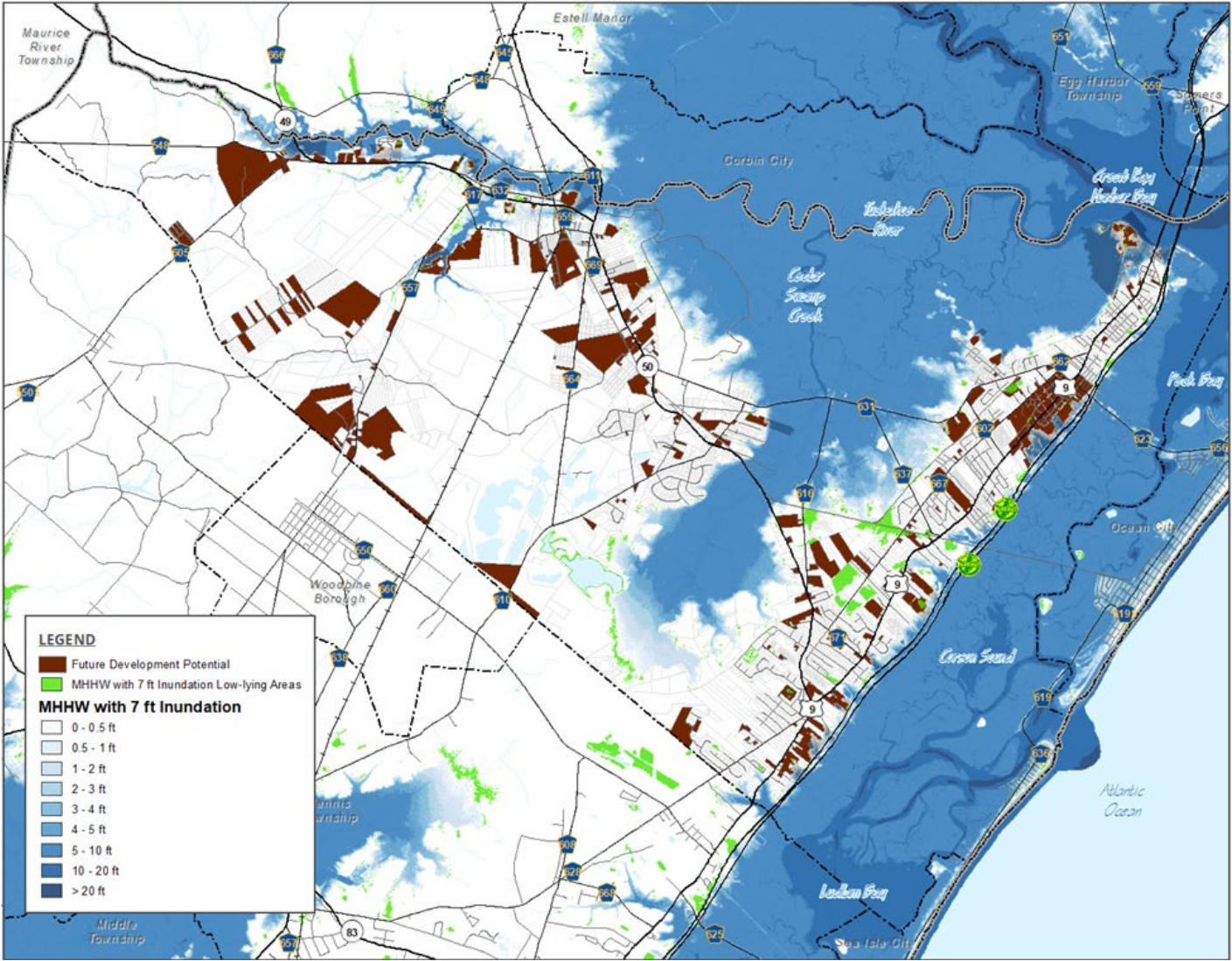
Future Build Out and Vulnerability Impact to Future Development



Future Build Out and Vulnerability Impact to Future Development



Future Build Out and Vulnerability Impact to Future Development

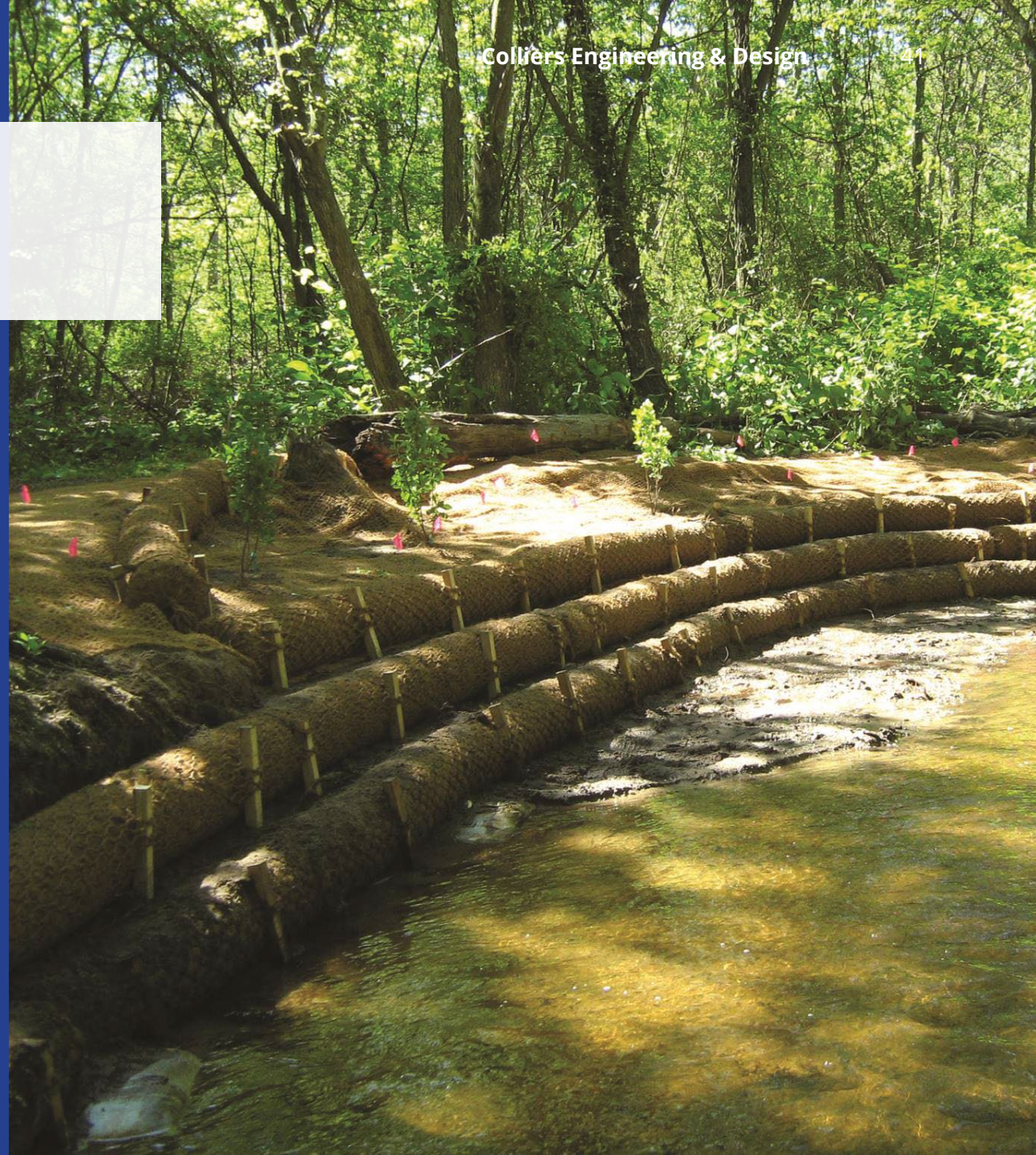


Action Items

Improve the Township's resilience through:

- Programming
- Development Regulations
- Planning
- Communications
- Engineering
- Master Plan

Add additional information here



Next Steps

- Information to be put into web-based story map for public consumption
- Survey to understand public concerns and local problems
- Final report to be sent to the Planning Board incorporating comments from tonight and the surveys



Questions?

A photograph of a turtle, likely a pond turtle, resting on a bed of moss and grass. The turtle has a dark, patterned shell and a head with orange and black markings. The background is a soft-focus natural setting with green grass and brown twigs.

Thank You

Contact

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