

RESILIENT CEDAR KEY

VULNERABILITY ASSESSMENT REPORT

UF Florida Institute for Built Environment Resilience
Florida Resilient Cities Program

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September 2024

Disclaimer:

This work was funded in part through a grant agreement from the Florida Department of Environmental Protection's Office of Resilience and Coastal Protection Resilient Florida Program. The views, statements, findings, conclusions, and recommendations expressed herein are those of the author(s) and do not necessarily reflect the views of the State of Florida or any of its subagencies.

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OVERVIEW

CEDAR KEY

The City of Cedar Key is a small municipality (population < 700) on Florida's Gulf of Mexico coast. Despite the small size of Cedar Key, the geographic location holds immense importance for business and livelihoods and is heavily relied upon by many living outside the City limits. In fact, Cedar Key has been a significant economic and cultural hub since before European contact, when the Timucua people lived and traded there. By the 1800s, Cedar Key housed a military base and hospital, an international shipping port, and the western terminus of the Florida Railroad, which delivered products such as lumber and seafood to the entire eastern seaboard. In the late 1880s, Cedar Key was forever changed by natural hazards (earthquake, two major hurricanes) that forced residents and businesses to adapt by abandoning their community (formerly located on an island offshore of present-day Cedar Key) and retreating closer to the mainland.

In recent decades, Cedar Key has developed an outsized influence on Florida's \$14 million hard clam aquaculture industry. With low population density and conservation lands buffering the coastline, water quality has been ideal for clam production. Cedar Key's clam production accounts for ~80% of Florida's total shellfish (clams and oysters) aquaculture industry (434 jobs, \$11.3 million in labor income, \$17.5 million in state GDP, and \$29.4 million in total output)¹. Cedar Key is also home to a thriving tourism industry due to its verdant marshes, numerous boating, fishing, and watersports opportunities, as well as its relaxed, small-town feel with mostly single-family homes, quaint cottages, and no towering high rises that have been built along many of Florida's beachfront communities.

Furthermore, Cedar Key's emergency/fire department serves the surrounding region, the Cedar Key food pantry services more than 100 families, and shorelines in Cedar Key represent some of the few suitable access points for recreational anglers, and Cedar Key boat ramps are the only economically feasible access points for shellfish growers. Cedar Key houses labs and offices for five state and federal agencies conducting research and management of regional natural resources. Cedar Key is therefore a critical and valuable regional hub for economic, cultural, and scientific activity.

Even so, Cedar Key's government is extremely understaffed, lacking budget and capacity to address complex challenges related to future flooding risk. Cedar Key's census block is financially disadvantaged and includes many underserved individuals, with up to 13% of families living in poverty².

¹ Botta, R., Court, C. D., Ropicki, A., & Camp, E. V., 2021. Evaluating the regional economic contributions of US aquaculture: Case study of Florida's shellfish aquaculture industry. *Aquaculture Economics & Management*, 25(2), 223-244.

² Headwaters Economics, 2022. Neighborhoods at Risk Report for Tract 9704, Levy County, FL. URL: <https://headwaterseconomics.org/apps/neighborhoods-at-risk/1200011225/explore/map>.

FLOODING + SEA LEVEL RISE

Florida's Gulf of Mexico coast experiences disproportionate exposure to climate risks such as sea level rise (SLR) and intensifying storms. The City of Cedar Key has particularly high exposure to climate hazards because it is just out three miles into open Gulf waters. In 2020, the NOAA tide gauge in Cedar Key recorded the 4th highest rate of SLR acceleration in the nation, and the local sea level has risen nearly six inches since 1992³. The low-lying topography, aging infrastructure, high exposure of Cedar Key to the open Gulf, and the accelerating rate of SLR combine to create extensive vulnerabilities to flooding by seawater. These, in turn, drive rapidly accelerating shoreline erosion rates and increasing inadequacies in drainage, water/sewer, and transportation systems in Cedar Key.

There is no doubt that climate change will increasingly impact Cedar Key's homes and businesses and threaten aquaculture, a key economic engine. With approximately 90% of the state's clam production, Cedar Key is essential to Florida's overall shellfish aquaculture industry.

NEED FOR VULNERABILITY ASSESSMENT

Local government leaders and residents are aware of the flood risks facing the city and are increasingly concerned about the impacts of sea level rise. The University of Florida (UF) has served as a lead facilitating agency for [community discussions since 2012](#), and shoreline and infrastructure impacts associated with Hurricane Hermine in 2016 catalyzed a discussion among stakeholders about the immediate need for coastal protection. Collaborative efforts with the community have led to the creation of three [demonstration living shorelines](#) across Daughtry Bayou and a [Shoreline Management Master Plan](#) (SMMP). The SMMP was recently adopted into the Cedar Key Comprehensive Plan. Furthermore, Cedar Key and UF collaborated to produce a vulnerability assessment ([VA](#)) and [visioning tool for the historic downtown district, which highlighted many long-term challenges associated with local sea-level rise](#). To start discussions about these long-term challenges, the City partnered with the University of Florida on the Resilient Cedar Key project, aimed at completing a comprehensive VA and adaptation plan. Building on earlier work, the current VA will extend the exposure analysis and develop a new sensitivity analysis that encompasses the entire municipality and complies with other elements of the Resilient Florida Statute 380.093. The results will guide Cedar Key's adaptation efforts, provide input to help sustain long-term aquaculture production and support equitable enhancement to community assets and infrastructure.

Such project-based partnerships temporarily increase capacity within Cedar Key, and officials are eager to continue to participate in opportunities that help them address urgent threats.

³ Malmquist, D. 2021. Virginia Institute of Marine Science, College of William and Mary. URL: https://www.vims.edu/newsandevents/topstories/2021/slr_2020.php. Virginia Institute of Marine Science. 2022. Cedar Key, Florida: Sea-Level Report Card. <https://www.vims.edu/research/products/slr/localities/ckfl/index.php>.

DEFINITIONS

Resilience: Resilience is the ability to adapt to changing conditions and withstand—and rapidly recover from—disruption due to emergencies.⁴

Coastal Resilience: Coastal resilience means building the ability of a community to "bounce back" after hazardous events such as hurricanes, coastal storms, and flooding – reducing negative human health, environmental, and economic impacts rather than simply reacting to them.⁵

Exposure Analysis: In the context of a flood vulnerability assessment, an exposure analysis aims to identify the depth of flood caused by tidal, rainfall, sea level rise, and compound flood scenarios.⁶

Risk: Risk is the potential for negative impacts as a result of a natural hazard.⁷

Sea Level Rise (SLR): The gradual increase in the average level of the world's oceans, influencing vulnerability assessments by posing long-term risks to coastal communities and infrastructure.

Sensitivity Analysis: In the context of a flood vulnerability assessment, a sensitivity analysis is to measure the impact of flooding (from exposure analysis) on inventoried assets (from background data).⁸

Vulnerability: Vulnerability is the propensity or predisposition of assets to be adversely affected by hazards. Vulnerability encompasses exposure, sensitivity, potential impacts, and adaptive capacity.⁹

Extreme Water Level: – the result of the combination of the astronomical tide, storm surge, and limited wave setup, excluding wave runup.

⁴ National Oceanic and Atmospheric Administration NOAA, "What is coastal resilience?". URL: <https://oceanservice.noaa.gov/ecosystems/resilience/>

⁵ National Oceanic and Atmospheric Administration NOAA, "What is resilience?" URL: <https://oceanservice.noaa.gov/facts/resilience.html>

⁶ Florida Department of Environmental Protection FDEP, "Standardized Vulnerability Assessment: Scope of Work Guidance,"¹² URL: <https://floridadep.gov/rcp/resilient-florida-program/documents/standard-vulnerability-assessment-scope-work-guidance>

⁷ Federal Emergency Management Agency FEMA, National Risk Index, "Determining Risk," URL: <https://hazards.fema.gov/nri/determining-risk>

⁸ FDEP, 13.

⁹ U.S. Climate Resilience Toolkit, "Glossary," URL: <https://origin-climate-toolkit.woc.noaa.gov/content/glossary#Vulnerability>

DATA ACQUISITION

ACQUIRE DATA

To conduct the VA for Cedar Key, the team first collected GIS data based on the Vulnerability Assessment requirements as defined in Section 380.093, Florida Statute (F.S.). The following data was collected and reviewed for inclusion in the vulnerability assessment:

1. *Topography*
2. *Flood scenario-related data*
3. *Critical and regionally significant assets*
4. *Miscellaneous data*

All analyses were performed using the North American Vertical Datum of 1988 (NAVD88) and NAD 1983 (2011) State Plane Florida West 0902 (US Feet) horizontal datum.

1. Topography

A digital elevation model (DEM) was obtained for Cedar Key from the United States Geological Survey's (USGS) 1-meter National Elevation Dataset, published in October 2022. The team used the most recently available topography data at the time the flood modeling process was performed to ensure that the flood depth models most accurately represented current conditions.

2. Flood scenario related data

2.1. Tidal Flooding

2.1.1. Mean High Higher Water

Tidal flooding predictions are based on the "Inundation Mapping Tidal Surface - Mean Higher High Water" (MHHW) provided by NOAA, referenced to the NAVD88 datum. Complementary, the University of Florida, Nature Coast Biological Station analyzed the differences between predicted tides and actual water levels measured at the NOAA tidal station in Cedar Key (Station ID: 8727520). This analysis provided an adjusted MHHW value for 2022 to account for present-day observed SLR, which is used for this study.

For the MHHW adjusted, the focus was primarily on analyzing the water levels during the months with the highest (August/September) and lowest (January) seasonal values in the years

2000, 2005, 2010, 2015, 2020, and 2022. The method calculates the variance between the predicted tide and the actual water level during these specific periods. It is important to note that the predicted tide demonstrated no overall trend, as the algorithm employed did not account for sea-level rise (SLR), and tidal datums such as MLW, MSL, and MHW were fixed and benchmarked based on the National Tidal Epoch from 1983 to 2001.

However, due to the impact of SLR, the actual water level increasingly diverged from the predicted values. By quantifying the difference between the predicted tide and the actual water level, the assessment essentially measured SLR. This difference was added to the benchmark tidal datums derived from the last tidal epoch to obtain a more precise estimation of true present-day MHHW.

Based on this analysis, the actual Mean High Water Level (MHHW) was found to be approximately 2.05 feet NAVD88, which is notably higher than the reported 1.54 feet. It should be acknowledged that analyzing only two extreme months may yield different results compared to assessing the entire year. Furthermore, the discrepancy observed in 2022 between August and September due to Hurricane Ian prompted the inclusion of all tidal data for that year, leading to an annual average difference of 0.5089 feet in 2020 and 0.5104 feet in 2022 (0.5299 feet in 2022 if September data is excluded).

The subsequent table applies these values as an SLR adjustment to various tidal datums in NAVD88.

Consequently, it is suggested to apply an SLR adjustment value of 0.51 feet and reference it to the year 2022. This indicates an increase by 0.51 feet since the last tidal epoch (1983-2001), when the previous set of benchmark datums (MHW, MHHW, etc.) was established.

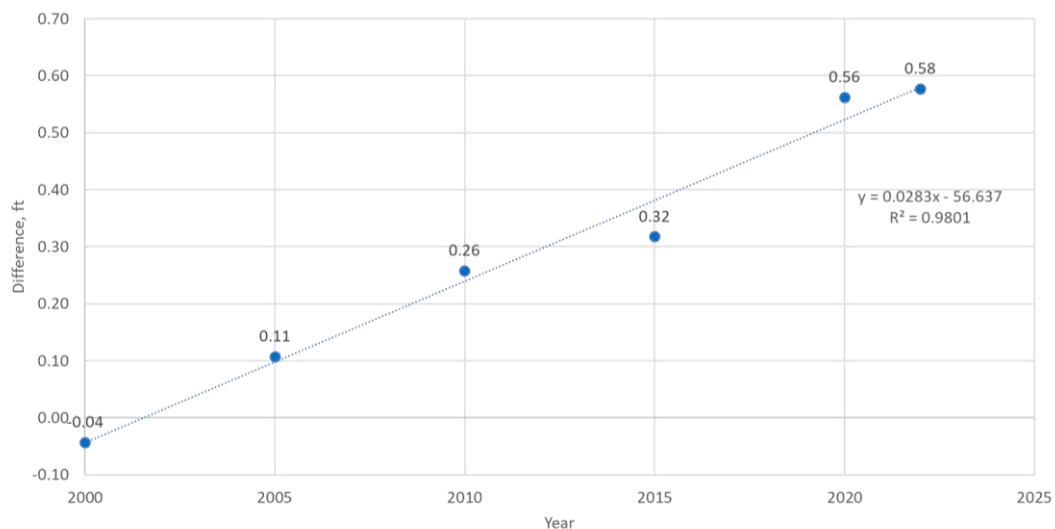


Figure 1. Cedar Key Tide Gauge. Annual Difference Between Predicted and Measured Water Level

Datums on NAVD88, ft	Cedar Key 8728520 Station	2020 SLR adjusted +0.5089ft.	2022 SLR adjusted +0.5104ft.	2020 SLR adjusted +0.5299ft. Sept. removed
MHHW	1.54	2.05	2.05	2.0699
MHW	1.21	1.72	1.72	1.7399
MSL	-0.22	0.29	0.29	0.3099
MLW	-1.62	-1.11	-1.11	-1.0901
MLLW	-2.26	-1.75	-1.75	-1.7301

Table 1. Adjusted values tidal datums for 2022 in feet, referenced to NAVD88.

It is important to recognize a particular assumption and potential limitation in this analysis, which warrants further examination. The assumption is that deviations in water level from the predicted tide are uniform across the tidal spectrum, allowing the average difference between predicted tide and actual water level to be applicable to any tidal datum. For instance, the average difference of 0.51 feet between predicted tide and actual water level can be equally applied to MLW and MHW. While this assumption appears logical and plausible, it requires thorough analysis for validation.

2.1.2. Sea Level Rise

Sea level rise (SLR) data were sourced from NOAA. The team used NOAA 2017 intermediate low and intermediate high projections for 2040 and 2070. The team used only the values SLR-predicted values sourced from the NOAA tidal station in Cedar Key (Station ID: 8727520). No interpolation with the other closest tide gauge was necessary. The most recently updated DEM was subtracted from projected MHHW values to create an accurate surface layer showing the extent and depth of flooding from SLR scenarios.

2.1.3. Extreme Water Levels

This study also considered extreme water levels at 1-, 2-, and 10-year return probabilities sourced from the NOAA tidal station in Cedar Key (Station ID: 8727520). Extreme water level products from NOAA provide Exceedance Probability Statistics, which refer to the likelihood that water will exceed a given elevation based on historical observations. These water level values were also compared to the DEM to create a surface layer showing the extent and depth of flooding from each EWL scenario.

2.2. Rainfall-Induced Flooding

Rainfall-induced flooding was modeled for 100-year/24-hour and 500-year/24-hour events using precipitation frequency data from the NOAA Precipitation Frequency Data Server, Atlas 14 Point. The flood simulation used shallow water equations to predict water flow over land, calculating water depth and flow velocity. However, due to data limitations, the model did not account for soil

infiltration rates or the existing stormwater system, potentially leading to overestimated flood extent and depth. Additionally, GIS software limitations required the model to be divided into two sections: one for the mainland influence area and another for the islands. For future flood scenarios, only sea level rise values were considered to define the starting water level depth.

2.3.Coastal Flooding, SFHA 100yr

The coastal flooding considered the flood elevations determined by the Special Flood Zone Hazard Area (SFHA) provided by FEMA. "SFHA is defined as the area that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. The 1-percent annual chance flood is also referred to as the base flood or 100-year flood" (NOAA, 2020). The team considered Zones AE and VE for flood modeling. AE flood zones are subject to a 1% annual chance of flooding. VE flood zones are coastal zones subject to 1% annual flooding with additional hazards from storm waves.

2.4.Storm Surge

Storm surge data was obtained from the NOAA's National Weather Service from the Sea, Lake and Overland Surges from Hurricanes (SLOSH) model in the form of a conical grid. This data provided storm surge heights at a mean and high tide for hurricane categories from 1 to 5, referenced as a height above NAVD88. The elevation data from the conical grid was interpolated in a raster surface to then subtract the DEM elevations to create a surface raster layer showing the extent and depth of flooding from storm surge in the region.

2.5.Compound Flooding

Recent changes in state legislation have mandated compound flooding, or the combination of tidal, storm surge, and rainfall-induced flooding, to be considered in vulnerability assessments. The team explored several options to address compound flooding scenarios but found that few reputable compound flooding models and methodologies that capture the full complexity of this issue currently exist. Because of this, the team was limited in the number of ways compound flooding could be represented. We adopted an approach that considered current scenarios compounded by future sea level rise. The team calculated this by adding values from 2040 and 2070 NOAA SLR projections to storm surge, EWL, and rainfall-induced flooding MHHW values. The DEM was then subtracted to create surface layers showing the extent and depth of flooding for all scenarios in 2040 and 2070.

3. Flood Scenarios

Flooding data was acquired from various sources and assembled to create a total of 40 scenarios depicting the extent and depth of flooding forecast to occur in 2022, 2040, and 2070 using the sea level rise projections available from NOAA (2017). This is summarized in the table below.

	Current scenarios	2040 scenarios	2070 scenarios
SLR (Sea Level Rise)	MHHW (Mean Higher High Water)	2040 SLR Intermediate Low	2070 SLR Intermediate Low
		2040 SLR Intermediate High	2070 SLR Intermediate High
EWL (Extreme Water Level)	2 yr. return EWL	2 yr. return EWL + 2040 SLR int. low	2 yr. return EWL + 2070 SLR int. low
		2 yr. return EWL + 2040 SLR int. high	2 yr. return EWL + 2070 SLR int. high
Rainfall Flooding	100 yr. / 24 h.	100 yr. / 24 h. + 2040 SLR int. low	100 yr. / 24 h. + 2070 SLR int. low
		100 yr. / 24 h. + 2040 SLR int. high	100 yr. / 24 h. + 2070 SLR int. high
	500 yr. / 24 h.	500 yr. / 24 h. + 2040 SLR int. low	500 yr. / 24 h. + 2070 SLR int. low
		500 yr. / 24 h. + 2040 SLR int. high	500 yr. / 24 h. + 2070 SLR int. high
Coastal Flooding SFHA 100yr. (Special Flood Hazard Area)	100 yr. SFHA	100 yr. SFHA + 2040 SLR int. low	100 yr. SFHA + 2070 SLR int. low
		100 yr. SFHA + 2040 SLR int. high	100 yr. SFHA + 2070 SLR int. high
Hurricane Storm Surge	Cat. 1 (high tide)	Cat. 1 (mean tide) + 2040 SLR int. low	Cat. 1 (high tide) + 2070 SLR int. low
		Cat. 1 (high tide) + 2040 SLR int. high	Cat. 1 (high tide) + 2070 SLR int. high
	Cat. 3 (high tide)	Cat. 3 (mean tide) + 2040 SLR int. low	Cat. 3 (mean tide) + 2070 SLR int. low
		Cat. 3 (high tide) + 2040 SLR int. high	Cat. 3 (high tide) + 2070 SLR int. high
	Cat. 5 (high tide)	Cat. 5 (mean tide) + 2040 SLR int. low	Cat. 5 (mean tide) + 2070 SLR int. low
		Cat. 5 (high tide) + 2040 SLR int. high	Cat. 5 (high tide) + 2070 SLR int. high

Table 2. List of calculated flood scenarios and planned horizons

4. Critical and regionally significant assets data source inventory

Using local and statewide data sources, the team assembled an inventory of locally and regionally significant assets relating to transportation, critical infrastructure, critical community and emergency facilities, and natural, cultural, and historic resources, consistent with FDEP guidelines. Assets were gathered for both Cedar Key proper and for the surrounding region (hereafter termed the “influence area”) as several assets of critical importance exist outside of the City limits and because of the inextricable links between Cedar Key and the immediate inland areas adjacent to State Road 24 and southern portions of County Road 347 and 345 (Sumner and Rosewood). After discussing the asset list with the project task force and the community during the first round of outreach meetings, the team incorporated additional categories for housing assets and significant assets contributing to Cedar Key’s economy and tourism industry in the inventory. These complementary additions were

necessary to incorporate community values and concerns, making the VA more responsive and relevant to local needs. GIS data for building footprints and the Levy County parcel database were used to depict the location of these assets and to describe their attributes. All assets were reviewed through a QA/QC process to ensure their accuracy, completeness, and relevance to the study. This Critical Assets Inventory data is summarized below.

Cedar Key Critical Assets: GIS Data			
Category	Type	Source	Date
Housing	Assisted Housing Inventory	Shimberg Center University of Florida	2019
	Building footprints	Microsoft Building Footprints. Update manual digitization imagery 2022.	2022
Transportation	Airports	FGDL, Task Force Input	2020, 2022
	Bridges	FDOT	2022
	Boat ramps	FWC, FGDL, Task Force input	2022
	Major roads	U.S. Census Bureau	2019
	Evacuation routes	FGDL	2020
	Rail network	FGDL	2021
	Recreational trails	FGDL	2021
Critical Infrastructure	Communication facilities (FM towers, AM towers, cell towers, registered wireless antenna structures, registered television broadcast structures)	FGDL, Task Force input	2019-2021, 2022
	Drinking water and sewer facilities	CK Water MGMT Asset Survey Map	2023
	Electric substations	FGDL, Task Force input	2020, 2022
	Lift stations	Vulnerability Assessment Team Survey (Bradley Ennis)	2023
	Hazardous waste facilities	FGDL	2022
	Public water supply facilities (tanks, plants, wells, source areas)	FDEP, Task Force Input	2021, 2022
	Solid waste facilities	FGDL, Task Force input	2022
	Stormwater facilities	CK Water MGMT Asset Survey Map, In-house survey	2023
	Wastewater facilities	FGDL, Task Force input	2022
Community and Emergency Facilities	Cemeteries	FGDL	2019
	Community centers	Task Force input	2022
	Emergency medical services facilities	Task Force input	2022

	Fire stations	FGDL, Task Force input	2018, 2022
	Government facilities	FGDL, Task Force input	2013, 2022
	Law enforcement facilities	FGDL	2018
	Logistical staging areas	Task Force input	2022
	Public housing	Shimberg Center, HUD CHAS	2019, 2015-2019
	Schools	FGDL, Task Force input	2021,2022
Natural, cultural, and historical resources	Culture centers	FGDL	2015
	Eligible historic structures/areas	FGDL	2022
	Parks/recreational facilities	FGDL, Task Force input	2021, 2022
	Religious centers	FGDL	2022
	Conservation lands	FNAI, Parcels	2021, 2022
	State parks	Task Force input	2022
	Shorelines	NOAA/GNU	2017
	Surface waters	FGDL	2022
	Wetlands	FGDL	2022
	FFBOT projects	FNAI	2022
	Florida wildlife corridor	FEGN	2021
	Florida managed areas	FNAI	-
	Watershed boundaries	FGDL	2017
Tourism/ Economy	Aquaculture facilities	Task Force Input	2022
	(food stores, financial institutions, hotels/motels)	FGDL (parcels)	2021

Table 3. Asset types by category (with data sources and publication dates) included in the vulnerability assessment.

5. Miscellaneous Data

Miscellaneous data was acquired to support data analysis, mapping, and visualization. City boundary data was obtained from the Florida Geographic Data Library (FGDL). First-floor elevation (FFE) estimations were acquired from True Flood Risk, a third-party provider. The survey method involves machine learning algorithms and computer vision to calculate first-floor elevation for individual properties and entire communities using licensed street view images and digital photos uploaded by users. Based on the TrueFloodRisk ground truth evaluation of their methodology, 90% of FFE output falls within +/- 1 foot of ground truth and 95% fall within +/- 2 feet of ground truth. When images are not available for a specific location, the average for neighboring properties can be referenced if

available and requested. 2021 parcel data obtained from FGDL was used to consolidate the housing inventory and tourism/economic assets inventory.

DATA GAP ANALYSIS

After gathering publicly available online data sources and verifying asset lists with the task force and local government officials, the asset inventory and flood-related data were compared with the requirements set by FDEP to identify any data gaps. If asset types had no data or lacked existing features within the city limits and the influence area, they were categorized as absent. The summarized details for these cases are presented in the following table.

Data gaps		
Asset Category	Asset Type	Rectification
Transportation	Street centerlines	TIGER line dataset was manually adjusted to match the roads
	Road crest elevations	The adjusted TIGER lines were converted into 300 ft. which was considered as an analysis unit (methodology described in exposure analysis section)
Critical Infrastructure	Water utility conveyance systems (lift stations, pump stations, water lines, main valves)	Acquired through Task Force input, digitized Cedar Key Stormwater Master Plan
	Disaster debris management sites	Task Force confirmed no existing facilities in the city and the influence area
Community and Emergency Facilities	Disaster recovery centers	Task Force confirmed no existing facilities in the city and the influence area
	Emergency medical service facilities	Task Force input provided 1 feature
	Emergency operation centers	Task Force confirmed no existing facilities in the city and the influence area
	Risk shelters	Task Force confirmed no existing facilities in the city and the influence area
Miscellaneous	First floor elevations	Downtown FFE data acquired from Envision Cedar Key Project (2021); 1143 FFE properties survey were contracted with True Flood Risk
	Building footprints	Microsoft Building Footprints. Update manually digitized missing features and modified existing features using satellite imagery

Table 4. Datasets and sources to fill initial gaps in data collection process.

Certain datasets corresponding to the requested asset types were found for Cedar Key but lacked existing features within the city perimeter or influence area. In such cases, the rectification process involved reviewing the dataset with the task force to either confirm the absence of features or add new ones to the inventory according to the asset type.

Datasets available with no existing assets in Cedar Key city perimeter or Influence Area Rectification process		
Asset Category	Asset Type	Rectification
Transportation	Rail facilities	Task Force confirmed no existing facilities in the city, and the influence area
	Railroad bridges	Task Force confirmed no existing facilities in the city, and the influence area
Critical Infrastructure	Stormwater treatment facilities	Acquired through Task Force input, CK Water Management Asset Survey Map (team survey)
	Military installations	Task Force confirmed no existing facilities in the city, and the influence area
Community and Emergency Facilities	Correctional facilities	Task Force confirmed no existing facilities in the city, and the influence area
	Hospitals	Task Force confirmed no existing facilities in the city, and the influence area
	Logistical staging areas	Task Force input provided 1 feature
	Community centers	Task Force input provided 3 features

Table 5. Rectification process for datasets available with no existing features in Cedar Key or Influence Area

Rectifying Data Gaps

The team rectified data gaps through meetings with the task force committee, third-party sources, and field surveys. Task force members were asked to provide data or information that could be digitized. Data received through this method included regional water waste facilities, solid waste facilities, electric substations, aquaculture facilities, community centers, fire stations, and retail facilities.

First-floor elevations for downtown properties (FFE) from grade were acquired through a previous UF project - Envision Cedar Key. This study measured and collected the first-floor levels of individual buildings in the study area using 3D terrestrial laser scanning from the streets.

The FFE data corresponding to the buildings of the rest of the city and influence area (1,143 properties) was generated by the company Think Geohazards Inc. It is essential to disclose that Think Geohazards Inc. data does not substitute licensed surveyor data.

Regarding control panel elevations for lift stations and control rooms for drinking- and waste-water infrastructure, elevations were measured through field surveys.

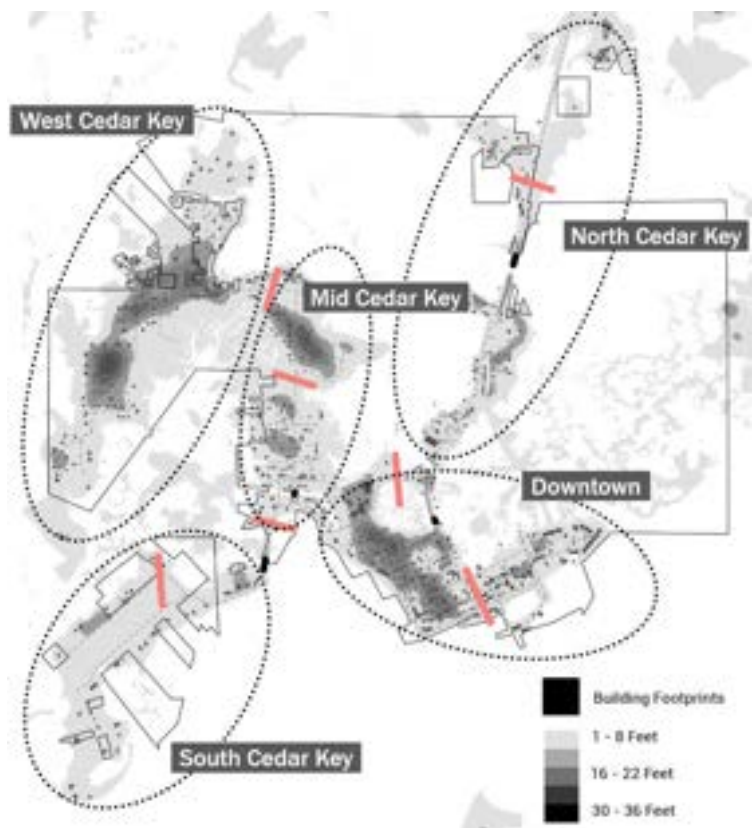
CRITICAL ASSETS OVERVIEW

ZONES OF ANALYSIS

Given the complex geography of Cedar Key, each area has singular characteristics in terms of geographic morphology, land use, density, and elevation. Therefore structuring the city into zones will facilitate addressing the specific needs of each of them.

According to the hydrologic disconnections between the islands, the city was divided into five zones. This proposed structure corresponds with the infrastructure management zones of the public works department.

- Zone 1 (Downtown Cedar Key), downtown and historical area
- Zone 2 (Mid Cedar Key), Cemetery Park and the surrounding residential areas of Gulf Boulevard and Hodges Avenue.
- Zone 3 (West Cedar Key), residential area at the end of Hodges Avenue on the west of Zone 2
- Zone 4 (South Cedar Key), Cedar Key Airport and its surrounding residential area
- Zone 5 (North Cedar Key), State Road 24 access from Bridge #4 to the beginning of D Street.
- Zone 6 (Influence area)



CRITICAL ASSETS OVERVIEW PER ZONE AND CATEGORY

Transportation

Cedar Key is connected to the mainland along State Road 24 across a series of low bridges. The city contains approximately 18 miles of roadway. Important secondary roads include D Street, Whiddon Ave., Gulf Blvd., and Hodges Ave, which serve to connect the entire island. Many restaurants, shops,

tourist attractions, the public marina, and government buildings are also clustered in the downtown areas of D Street to A Street and 1st Street to 3rd Street. Other transportation infrastructure includes:

- Cedar Key Dock
- (6) boat ramps- Cedar Key Downtown Marina Gulf side / Basin side, Anchor Hole boat ramp, Cedar Key Marina boat ramp 1, Cedar Key Marina boat ramp 2 and Bridge #4 boat ramp.
- Cedar Key Airport's George T Lewis Runway

More broadly, the city's economy relies heavily on limited disruptions to the transportation system. This is true for the aquaculture industry, which relies on prompt conveyance of shellfish harvest to inland destinations, but also most workers in town, who live off the island and commute long distances to work. (See below for more on live-work data.)

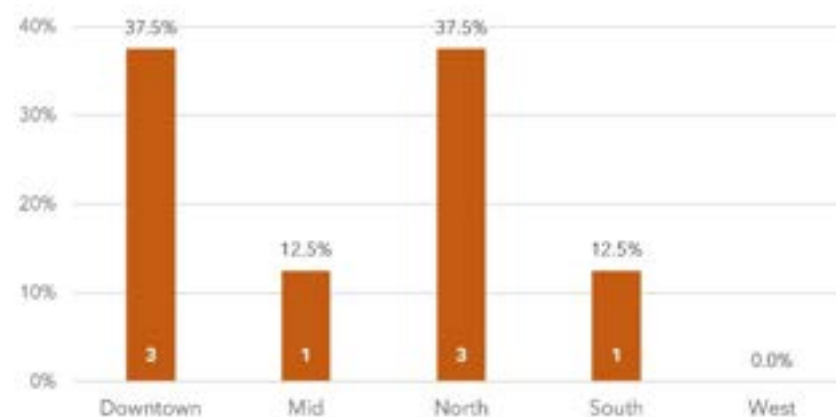


Figure 2. Percentage and count of Transportation assets per zone.

Housing

Cedar Key is a historic community with a range of housing stock, ages, construction types, and economic values. Cedar Key's housing stock has a little over 1,000 total housing units (1,016) according to the 2022 statewide Florida Department of Revenue parcel database. This housing stock has traditionally supported a diverse community across race, age, and economic status. Like many coastal communities in Florida, Cedar Key has seen property values rise substantially in recent years, making affordable housing a concern for many residents. Its homeownership rate is 66% (2021), which is a decline from 75% in 2010 (based on the ACS 5-year survey). Known for its small-town feel, the housing stock is comprised primarily of:

- Single-family homes- 516 units, 64% of total
- Small multifamily (duplex, triplex, apartments-) 13 units, 2% of total
- Condominiums- 238 units, 29% of total
- Mobile homes- 40 units, 5% of total units

In terms of owner-occupied versus rental properties, most units are non-homesteaded (69% or 705 units), which could include long-term rental properties, seasonal rental properties (AirBnBs, VRBOs,

etc.), or second homes. Conversely, almost a third of the dwelling units are homesteaded (29% or 293 units). There is a limited number of publicly subsidized properties (18, all duplexes), which also play a key role in the community's affordable housing stock. These publicly assisted properties are located on relatively high ground, which is a benefit.

Given the high rate of non-homesteaded properties, it is unsurprising that many individuals who work in Cedar Key live outside of the city limits. For those who work in Cedar Key, only 9% of the people live there; the other approximately 90% live in Chiefland or other unincorporated areas of Levy County and commute to work. Viewed another way, many people who live in Cedar Key work elsewhere. For all of those living in Cedar Key, approximately 84% have employment outside of the municipality. These live-work patterns are becoming increasingly common and make a resilient transportation system all the more critical.

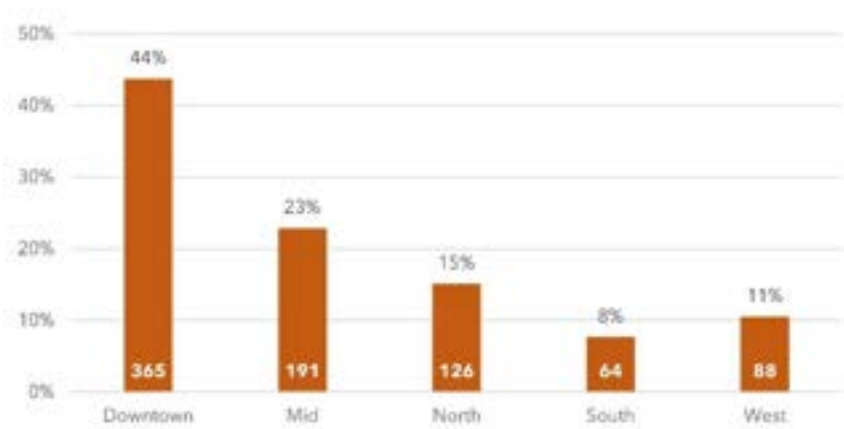


Figure 3. Percentage and count of Housing parcels per zone.

Critical Infrastructure

Cedar Key water management is done by separate entities; drinking and wastewater are managed by the Cedar Key Water & Sewer District, which is an independent elected body, and the stormwater system is managed by the City of Cedar Key.

Within the city limits, critical infrastructure includes:

- 6 lift stations
- 2 wastewater facilities (wastewater plant, wastewater sprayer)
- 1 water tower
- 2 communication facilities (cellphone network and cable TV infrastructure)
- 1 hazardous waste container (West Coast Auto Center)

More extensive networks, electrical substation, public water supply, communication infrastructure, and solid waste facilities maintained by the county, state, or other cooperating entities are located in the influence area; these provide essential connectivity to mainland services. There is concern that drinking water and sewage treatment facilities that service Cedar Key and septic tanks/private wells

that service unincorporated areas may be threatened by saltwater intrusion from storm surge and stormwater flooding. Contamination from these shallow wells and septic systems can then impact the surrounding ecosystems' health and the survival of the shellfish (clam, oyster, etc.) industries.

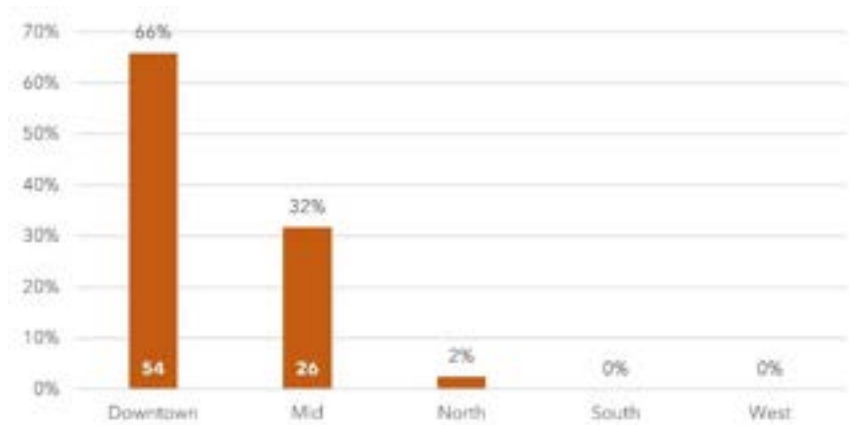


Figure 4. Percentage and count of Critical Infrastructure assets per zone.

Community and Emergency Facilities

Cedar Key derives strength from its identity and connectivity from the network of community services. The city has a historic walkable downtown, school, churches, library, and other amenities that contribute to the wellbeing of its residents. These elements contribute to the sense of place that attracts and retains a mix of long-term residents and visitors to the community. For example, the Cedar Key Community Center is a gathering space for public workshops, community fundraisers, retirement parties, and even weddings. Within the city limits, community services include:

- *Government services- Post Office and City Hall*
- *Community services- Chamber of Commerce, Cedar Key Community Center*
- *Educational services- Cedar Key High School, Nature Coast Biological Station, and the Senator George Kirkpatrick Marine Lab*
- *Emergency services- Fire Station, Cedar Key Police Department.*

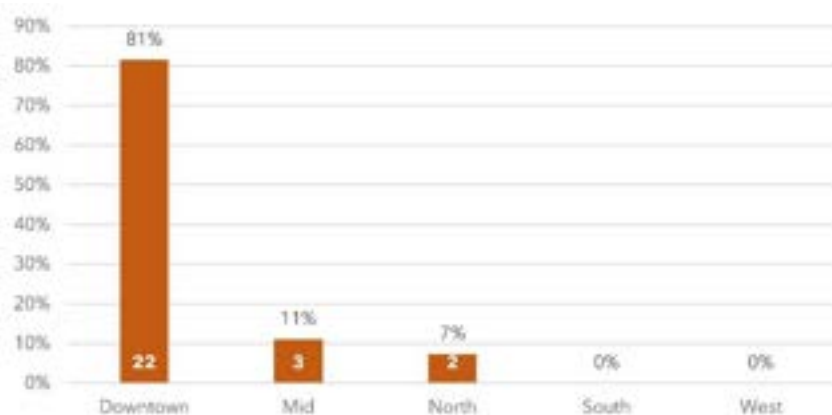


Figure 5. Percentage and count of Community and Emergency Facilities per zone.

Natural + Cultural Resources

Cedar Key is a community with much forestland and an active coastline. Whether for timber, fiber, fishing, clamming, or tourism, Cedar Key's ecosystem services are the reason for the City's prosperity over time. This environment has changed over time, and the City of Cedar Key has evolved alongside these changes.

- *Cultural resources- Cedar Key Historic District, Cedar Key Historical Society Museum, Cedar Key Historic State Museum*, Island Hotel* (*eligible historical structures)*
- *Religious- (4) Churches*
- *Parks- (3) City Park Beach/Little Shark Park, Cemetery Point Park, G Street shorefront*
- *Community Garden*
- *Cedar Key Arts Center*
- *Cedar Key Public Library*
- *Lil Shark Park Kayak Launch, Cemetery Point Park Kayak Launch, Cedar Key State Museum Kayak Launch*
- *Cemeteries- Bishop Point Cemetery and several others*

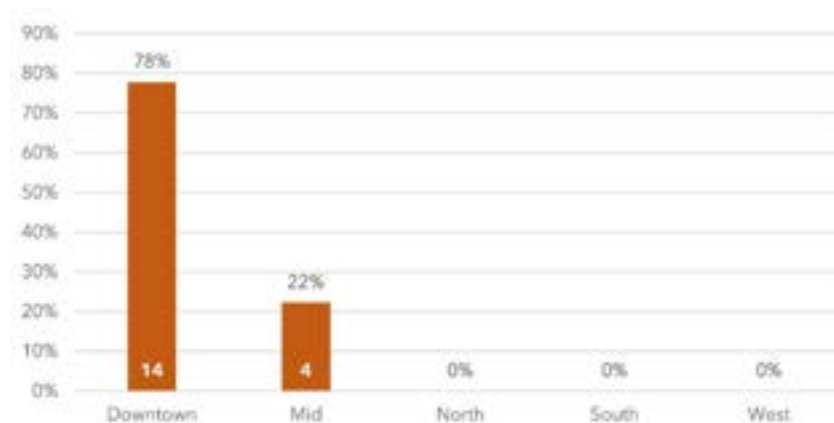


Figure 6. Percentage and count of Natural and Cultural resources per zone.

Local Economy

Cedar Key's mix of hard clam/oyster aquaculture, sport fishing, recreational boating, watersports, and coastal tourism provides the city's economic vitality and community character. From earlier times as a port, through years as a fishing area, to its current clam aquaculture industry, Cedar Key has also maintained a vibrant water-based economy that provides economic resilience to Cedar Key.

- *2nd Street, commerce and hospitality uses at the end of 2nd Street.*
- *Dock Street, concentration of restaurants and hospitality uses.*
- *State Road 24, aquaculture facilities and hospitality uses.*

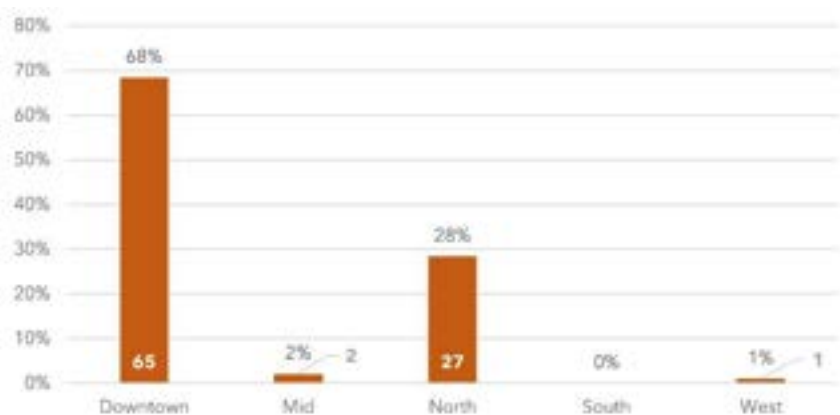


Figure 7. Percentage and count of Tourism and Economy parcel uses per zone.

EXPOSURE ANALYSIS

EXPOSURE ANALYSIS METHODOLOGY

Flood depths for the scenarios listed above have been calculated using the passive flood mapping (modified bathtub) approach. This method entails subtracting a region's elevation values (using a digital elevation model DEM) from a flood elevation surface (given by each scenario). However, in this study, this methodology was slightly modified depending on the three distinct types of flooding calculated (detailed below). For all calculations, the same USGS Digital Elevation Model (DEM) of Cedar Key was utilized (Geographic Coordinate System: NAD 1983 HARN, Projected Coordinate System: Albers, Vertical Datum: NAVD88 height (ft US)). All GIS data produced in this study have the same spatial reference.

Tidal Flooding

Tidal flooding scenarios were calculated using NOAA Mean Higher High-Water surface for the State of Florida and adjusting the elevation values to 2022. This resulting surface was resampled and masked to fit Cedar Key's DEM.

Current-day flood depths were then calculated by subtracting the DEM values from the MHHW values using the Raster Calculator tool. Subsequently, negative values were removed using the Null tool.

Flood depths for 2040 and 2070 were calculated by summing the projected sea-level rise to the MHHW values before subtracting the DEM values. Projected sea-level rise values were obtained from NOAA's Sea Level Rise Viewer tool.

Finally, the resulting surface from the previous step was intersected with Cedar Key's shoreline. Hydrologically disconnected areas were removed.

Scenario	Tidal elevation (NAVD88, ft.)
Mean High Higher Water MHHW 2022	2.05
MHHW 2022, SLR Int.-Low 2040	2.67
MHHW 2022, SLR Int.-High 2040	3.36
MHHW 2022, SLR Int.-Low 2070	3.23
MHHW 2022, SLR Int.-High 2070	5.23

Table 2. Tidal flooding elevation values in feet, referenced to NAVD88.

Scenario	Tidal elevation (NAVD88, ft.)
Extreme Water Level 2 yr. return	4.17
Extreme Water Level 2 yr. return, SLR Int.-Low 2040	5.48
Extreme Water Level 2 yr. return, SLR Int.-High 2040	4.79
Extreme Water Level 2 yr. return, SLR Int.-Low 2070	5.35
Extreme Water Level 2 yr. return, SLR Int.-High 2070	7.35

Table 3. Tidal flooding, extreme water levels elevation values in feet, referenced to NAVD88.

Rainfall Flooding

Rain-induced flooding was simulated using a shallow equations-based flood model for 100-year/24-hour and 500-year/24-hour events. Due to software limitations on the size of the analysis area, the simulation involved two parts: one for the city perimeter (islands) and another for the influence area (mainland). The model produced flood depths as raster grids, varying the grid size based on the analysis area. The two models were mosaicked together and resampled to match the raster grids of the other flood scenarios.

In the simulation, 3D buildings caused a lack of flood depth values in the areas corresponding to their footprints. To resolve this issue, a zonal statistics process was used to calculate the median value of the surrounding cells, which was then assigned as the flood depth for each building footprint.

Scenario	Precipitation Estimate (inches)
100-year, 24-hour rainfall	13.7
500-year, 24-hour rainfall	19.9

Table 4. Rainfall, precipitation frequency estimates in inches.

Coastal Flooding, Special Flood Hazard Area SFHA 100-year

Coastal flooding scenarios were calculated using FEMA's Flood Hazard Zones (FLDHAZ) of the Digital Flood Insurance Rate Map (AV & VE zones).

Current-day flood depths were calculated by subtracting the DEM values from the FLDHAZ values using the Raster Calculator tool. Subsequently, negative values were removed using the Null tool.

Flood depths for 2040 and 2070 were calculated by performing a zonal statistics analysis of the FLDHAZ surface, so that it may cover the entire extent of the DEM. The projected sea-level rise was then summed to the resulting surface from the previous step before subtracting the DEM values. Projected sea-level rise values were obtained from NOAA's Sea Level Rise Viewer tool.

Scenario	Mean Base Flood Elevation (NAVD88, ft.)
100 year SFHA	14.81
100 year SFHA , SLR Int.-Low 2040	15.43
100 year SFHA , SLR Int.-High 2040	16.12
100 year SFHA , SLR Int.-Low 2070	15.99
100 year SFHA , SLR Int.-High 2070	17.99

Table 5. Coastal flooding, Special Flood Hazard Area SFHA 100yr. flood elevation values in feet, referenced to NAVD88.

Storm Surge Flooding

Storm surge flooding scenarios were calculated using NOAA's Sea, Lake, and Overland Surges from Hurricanes (SLOSH) models. The original SLOSH grid was converted into points; these points were interpolated using the Natural Neighbor tool to have a continuous surface. Once this surface was obtained, it was masked to fit Cedar Key's DEM.

Current-day flood depths were then calculated by subtracting the DEM values from the SLOSH values using the Raster Calculator tool. Subsequently, negative values were removed using the Null tool.

Flood depths for 2040 and 2070 were calculated by summing the projected sea-level rise to the SLOSH values before subtracting the DEM values. Projected sea-level rise values were obtained from NOAA's Sea Level Rise Viewer tool.

Finally, the resulting surface from the previous step was intersected with Cedar Key's shoreline. Hydrologically disconnected areas were removed.

Scenario	Mean Surge Elevation (NAVD88, ft.)
Cat.1 Hurricane at high tide	7.89
Cat.3 Hurricane at high tide	18.35
Cat.5 Hurricane at high tide	27.91
Cat. 1 Hurricane at high tide, SLR Int.-Low 2040	8.51
Cat. 1 Hurricane at high tide, SLR Int.-High 2040	9.20
Cat. 3 Hurricane at high tide, SLR Int.-Low 2040	18.97
Cat. 3 Hurricane at high tide, SLR Int.-High 2040	19.66
Cat. 5 Hurricane at high tide, SLR Int.-Low 2040	28.53
Cat. 5 Hurricane at high tide, SLR Int.-High 2040	29.22
Cat. 1 Hurricane at high tide, SLR Int.-Low 2070	9.07
Cat. 1 Hurricane at high tide, SLR Int.-High 2070	11.07
Cat. 3 Hurricane at high tide, SLR Int.-Low 2070	19.53
Cat. 3 Hurricane at high tide, SLR Int.-High 2070	21.53
Cat. 5 Hurricane at high tide, SLR Int.-Low 2070	29.09
Cat. 5 Hurricane at high tide, SLR Int.-High 2070	31.09

Table 6. Storm surge, mean surge elevation values in feet, referenced to NAVD88.

Road Network Exposure Methodology

Cedar Key and its surrounding area lack street centerline data; therefore, a methodology was developed to treat road segments as individual units to determine flood depth. The analysis of road network exposure utilized TIGER/Line data from the US Census Bureau as a basis. The line geometry of the data was adjusted to approximately align with the street centerline, and the roads were segmented into 300-ft sections. This segmentation enabled to create analysis units that are comparable.

A 10-foot buffer was applied to each segment to transform them into polygons that are approximate to the street surface area. Using zonal statistics, mean flood depths for each polygon were then computed across all flood scenarios, and these values were subsequently attributed to their respective line segments.

Flood Depth and Asset Exposure

The results of flood depth models were assigned to each asset. In the case of buildings and structures with reduced footprints, the flood depth values were attributed to the asset footprint centroid. In the case of the assets corresponding to large surfaces (parks, cemeteries, airport runway), a mean flood depth of the surface was calculated. The resulting value was attributed to the centroid of the surface.

Depending on the type of assets, three types of relevant elevation were considered to determine the exposure level:

- *Buildings, FFE first-floor elevation*
- *Equipment, electrical panel elevation*
- *Roads and large surfaces (parks, cemeteries, airport runway), ground elevation*

The following table describes the flood depth that defines the exposure level for each asset category. These criteria were used to assign an exposure level to assets across each scenario.

Asset Category	Asset Type	Low	Medium	High
Critical Infrastructure	Waste Water Facility	FD up to 12" below FFE	FD up to 6" below FFE	FD exceeds control room FFE
	Lift station	Above wet well top slab elevation (ground)		FD exceeds electrical panel elevation
	Water supply infrastructure	FD up to 12" below FFE	FD up to 6" below FFE	FD exceeds control room FFE
	Supply well	FD up to 12" below FFE	FD up to 6" below FFE	FD exceeds control room FFE
	Antenna structures	FD exceeds ground elevation up to 6"	FD exceeds ground elevation from 6" up to 18"	FD exceeds ground elevation
	Electric substation	FD exceeds ground elevation up to 6"	FD exceeds ground elevation from 6" up to 18"	FD exceeds ground elevation
Transportation	Boat ramps	FD below 6"	FD below 12"	FD more than 12"
	Docks	FD below 6"	FD below 12"	FD more than 12"
	Roads	FD below 6"	FD below 12"	FD more than 12"
	Bridges	FD below 6"	FD below 12"	FD more than 12"
	Airport runway		FD below 0.125"	FD exceeds 0.125"
Natural/Cultural	Assets w/ FFH	FD up to 12" below FFE	FD up to 18" above FFE	FD more than 18" above FFE
	Assets w/o FFH, ground elevation	FD exceeds ground elevation up to 6"	FD exceeds ground elevation from 6" up to 18"	FD exceeds ground elevation more than 18"
	Assets w/ ground elevation	FD exceeds ground elevation up to 6"	FD exceeds ground elevation from 6" up to 18"	FD exceeds ground elevation more than 18"
Emergency and Community	Assets w/ FFH	FD up to 12" below FFE	FD up to 18" above FFE	FD more than 18" above FFE
	Assets w/ ground elevation	FD exceeds ground elevation up to 6"	FD exceeds ground elevation from 6" up to 18"	FD exceeds ground elevation more than 18"
Economy	Assets w/ FFH	FD up to 12" below FFE	FD up to 18" above FFE	FD more than 18" above FFE
	Assets w/ ground elevation	FD exceeds ground elevation up to 6"	FD exceeds ground elevation from 6" up to 18"	FD exceeds ground elevation more than 18"
Housing	Assets w/ FFH	FD up to 12" below FFE	FD up to 18" above FFE	FD more than 18" above FFE
	Assets w/o FFH, ground elevation	FD exceeds ground elevation up to 6"	FD exceeds ground elevation from 6" up to 18"	FD exceeds ground elevation more than 18"

CITY-WIDE EXPOSURE RESULTS

The following section summarizes the overall exposure of assets within the city perimeter and surrounding influence area. It breaks down asset exposure by category, showing the percentage of assets expected to be flooded under different 2022, 2040, and 2070 scenarios. The flood percentages mentioned for 2040 and 2070 in the descriptions below refer to the intermediate-high sea level rise scenarios.

Transportation

Cedar Key's transportation system already is, and will continue to be, increasingly vulnerable to even smaller storms and tidal flooding. Many roadways and transportation assets (which include boat ramps and docks) are important assets that are on the front lines of exposure to flood hazards. Areas of State Road 24 and internal feeder roads are at risk from nuisance flooding and completely impassable during storms. Residents and visitors may face travel disruptions, lack of reliable municipal services, and significant damage to vehicles and other property that come into contact with salty floodwaters.

Projections indicate a significant increase in flooding risks over the next few decades. Currently, nuisance flooding at mean higher high water (MHHW) levels impacts boat ramps and docks, but this is expected to triple within 20 years. By 2040, sea level rise will affect 29% of transportation assets, increasing to 52% by 2070. Additionally, extreme high tides with a 2-year return period in 2040 are projected to flood 52% of assets and 30% of roads within the city perimeter. In the event of a Category 1 hurricane, 61% of the road network within city limits would be flooded, with 39% of roads experiencing over 2 feet of water, making them impassable for vehicles.

The flooding of roadways has impacts on the connectivity across the city, where homes are disconnected from businesses, community facilities, and other important assets. The impacts of roadway inundation can be quantified (in part) by how many homes in various neighborhoods are disconnected. For instance:

- *Florida State Road 24 - Disconnects 930 housing units*
- *D Street Whiddon Ave - Disconnects 322 housing units*
- *Hodges Ave - Disconnects 130 housing units (West Cedar Key)*
- *Airport Road - Disconnects 52 housing units (South Cedar Key)*

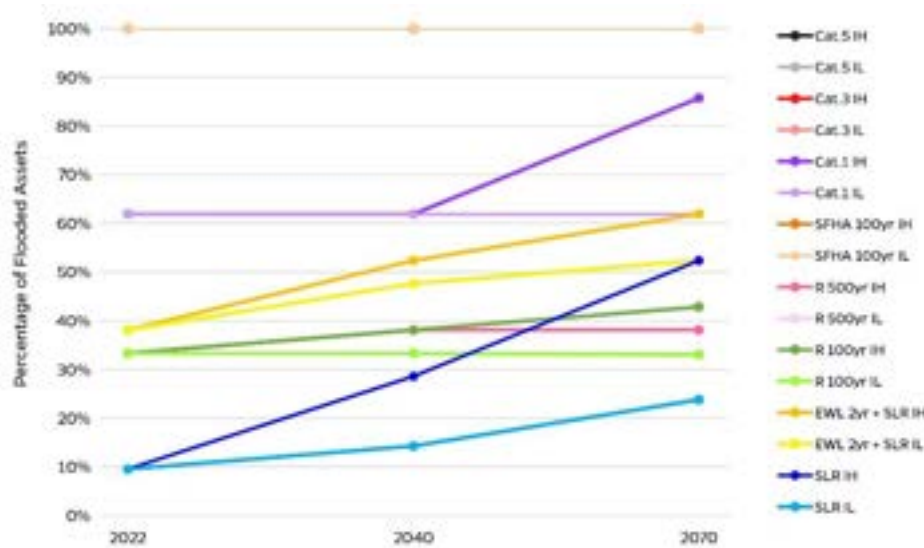


Figure 8. Transportation assets flood scenario analysis. Percentage of flooded assets per scenario and year (road network not considered)

Housing

Data suggests that a critical increase in vulnerability over the next 50 years will be from Cat 1 hurricanes. While affecting 18% of residential structures today, this will impact close to 32% of residential structures in 2040, and close to 49% in 2070. Mitigating structures for a Category 1 hurricane in 2070 would reduce exposure substantially.

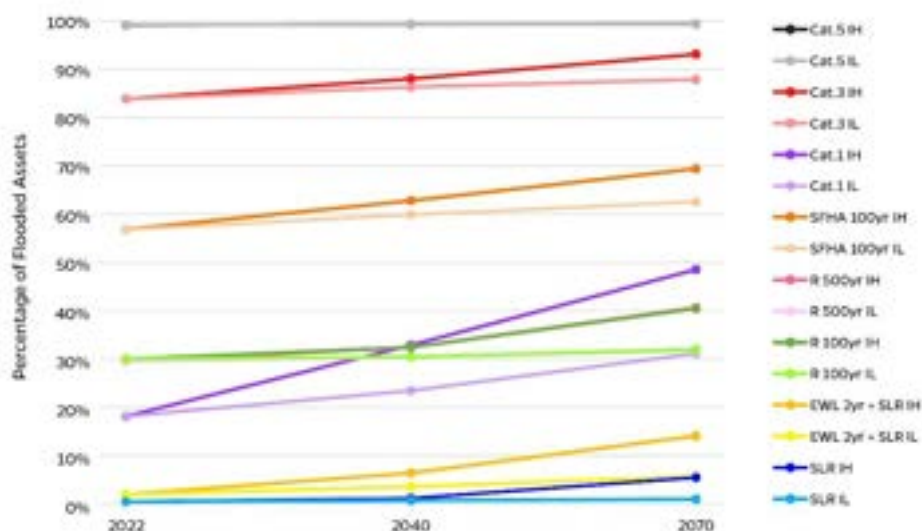


Figure 9. Housing assets flood scenario analysis. Percentage of flooded assets per scenario and year

Critical Infrastructure

By 2040, tidal flooding from a 2-year extreme tide event is projected to flood 22% of critical infrastructure within Cedar Key. All lift stations within the city perimeter will be affected, along with essential assets of the influence area, including the electrical substation and the solid waste facility, which are crucial to the city's functioning.

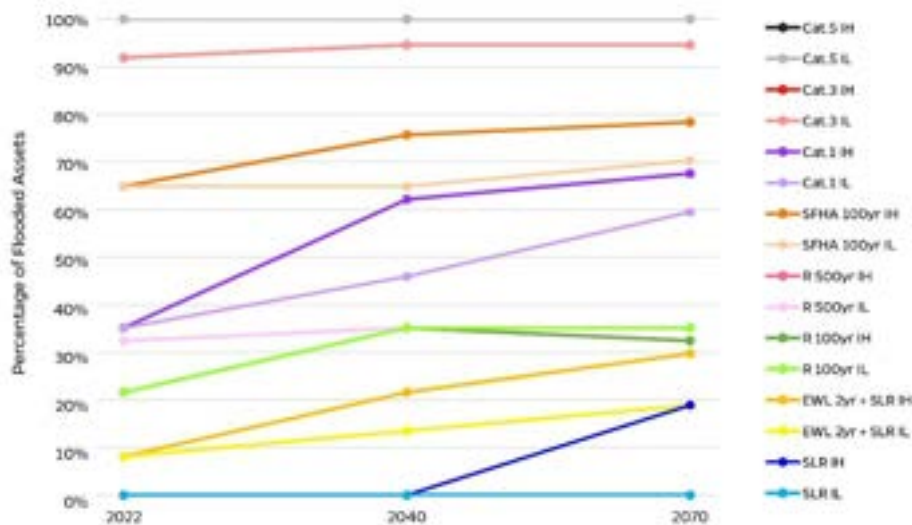


Figure 10. Critical Infrastructure assets flood scenario analysis. Percentage of flooded assets per scenario and year

Critical Community and Emergency Facilities

Mitigating structures for a Category 1 hurricane in 2070 would reduce exposure substantially to tidal and severe rainfall flooding. Assets at risk include the school's western access, main pedestrian tourist and restaurant areas, post office, library, city hall, fire station, and food pantry.

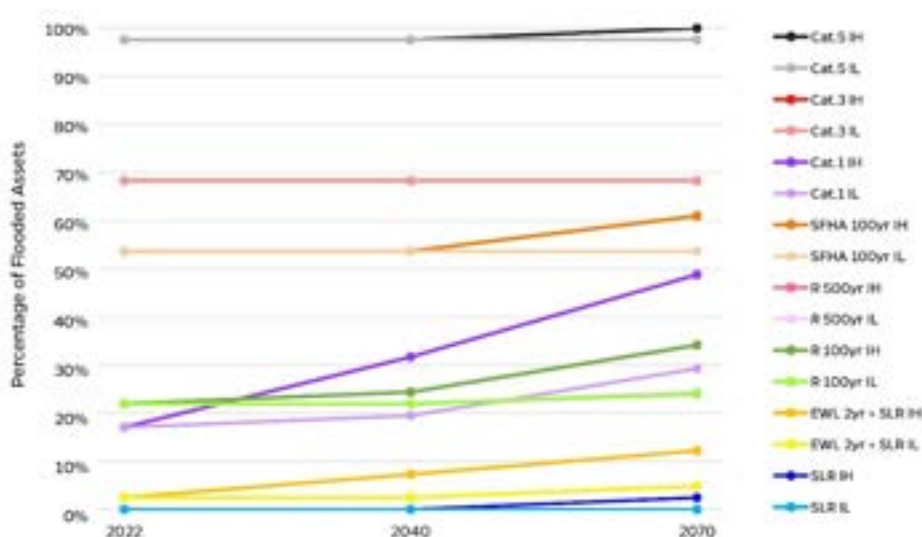


Figure 11. Community and Emergency Facilities flood scenario analysis. Percentage of flooded assets per scenario and year

Natural and Cultural Resources

Erosion of shorelines has led to the loss of recreational areas and increased exposure of assets to flooding. Aquaculture leases are at risk due to rising temperatures, and sport fisheries share concerns as habitat mosaics and fish species continue to change. Increasing salinization of groundwater is stressing urban trees and upland vegetation, leading to die-offs and accelerated erosion of exposed soils in certain areas.

Natural and cultural resources see a stark increase in flood exposure over time, with any extreme water level event affecting all the parks or recreational areas. For example, tidal flooding from a 2-year return event affects 28% of these resources today, which increases to 32% in 2040 and 52% in 2070.

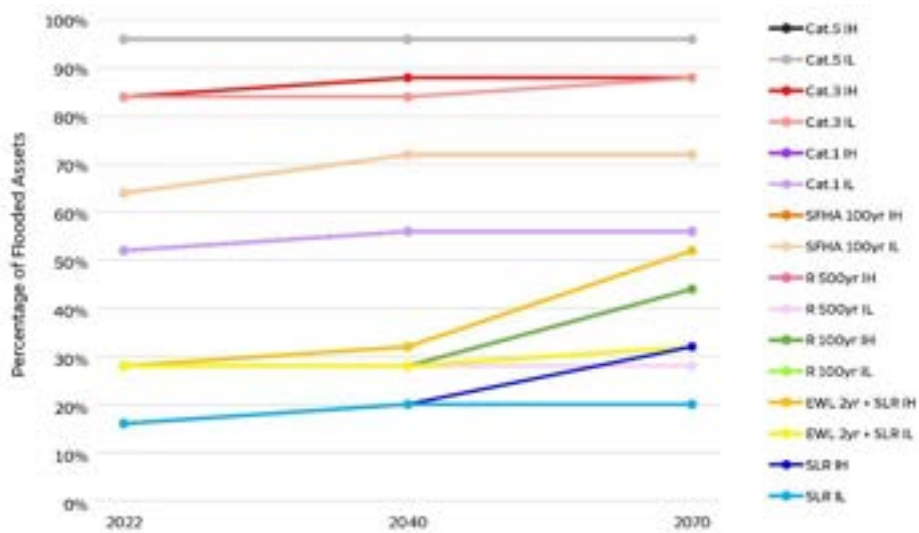


Figure 12. Natural and Cultural Resources flood scenario analysis. Percentage of flooded assets per scenario and year

Local Economy

As tidal flooding and storm impacts increase, critical assets at risk in Cedar Key include the shops at the historic core, restaurants and tourist areas along the downtown waterfront, and infrastructure vital to the clamming industry. A 2-year return tidal flooding event exposes 17% of local economy assets, but this is projected to rise to 28% by 2040. The impact of a Category 1 hurricane is even more severe, affecting over 63% of assets today and increasing to 80% by 2070. Implementing mitigation structures for a Category 1 hurricane could significantly reduce this exposure, including severe rainfall flooding.

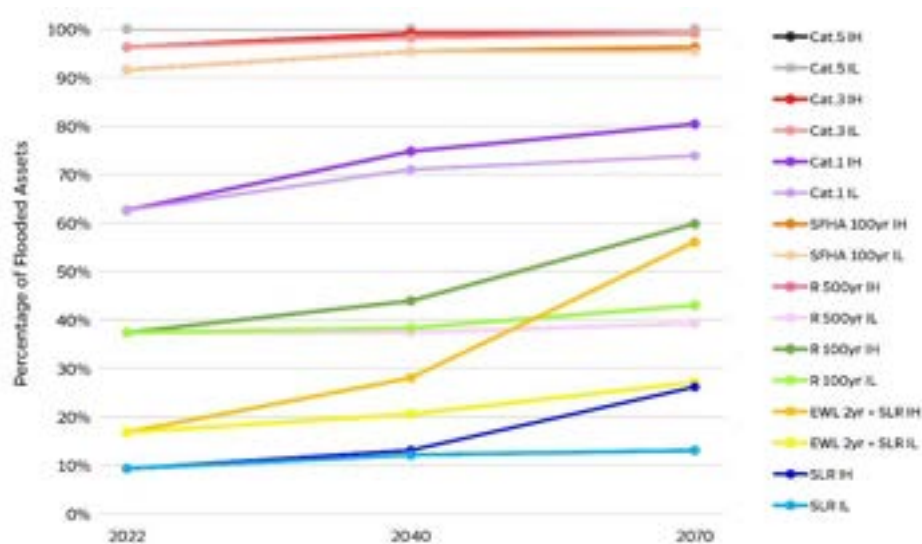


Figure 13. Local Economy flood scenario analysis. Percentage of flooded assets per scenario and year

SENSITIVITY ANALYSIS

SYNTHESIS OF RESULTS PER ZONE

ZONE 1, DOWNTOWN CEDAR KEY

Housing

Downtown Cedar Key has the highest number of housing units of all subareas (448). While most of these homes are not owner-occupied (primary) residences, it has a higher proportion of owner-occupied units than in other zones, with homestead housing accounting for 23% of all units. Additionally, Downtown is the only area with publicly assisted housing units (18), consisting of duplexes and smaller apartments built in the 1970s.

Extreme high tide in a 2-year return in 2040 will create a high exposure level on 6% of the housing units; the most sensitive area is along G Street, 1st Street, and D Street (between 1st and 2nd Street). A 100-year flood event will increase the percentage to 65%, adding high exposure to the buildings along the canal between Palmetto Drive and Whiddon Avenue and to the condominiums on the east side of downtown.

A 500-year, 24-hour precipitation event would cause significant flooding in the historic downtown area, particularly along 2nd Street between D and C Streets. Additionally, the intersection of 4th and E Streets is prone to forming a pond, which could lead to flooding in nearby homes. However, the model does not account for the stormwater pipe that drains to the eastern shoreline in this area. Accurate flood depth estimations for such events will require detailed modeling.

A Category 1 hurricane will similarly affect downtown as a 100-year flood event with slightly less impact in the east downtown area.

Transportation

A 2-year return high tide scenario in 2040 will significantly impact (48%) of downtown Cedar Key's road network. This flooding scenario will specifically affect D Street and its intersections from 1st to 3rd Street, hindering access to the east side of downtown (hospitality area and Dock Street). Additionally, Whiddon Avenue, near Cedar Key School, will experience flooding under this scenario, restricting access to zones 2, 3, and 5.

Rainfall flooding corresponding to a 500-year, 24-hour precipitation event would similarly affect the downtown as an extreme tide event described before. However, Whiddon Avenue would remain drivable.

In the context of a 100-year flood event, 84% of the road network will be flooded more than 1 ft., rendering roads in the Historic District and Whiddon Avenue near Cedar Key School impassable.

Similar conditions will occur in the event of a Category 1 hurricane, with the same implications for road accessibility.

Critical Infrastructure

Tidal flooding is not expected to impact critical infrastructure significantly. However, in a 2-year return extreme water level scenario, flooding on D, 1st, and 3rd streets in the historical area, as well as on G and 1st streets in the beachfront area, could lead to the intrusion of salty water into the wastewater manholes, potentially causing damage to the wastewater plant.

A 500-year, 24-hour precipitation event would only affect the hazardous waste container of the auto workshop at D and 3rd street.

During a 100-year flood event, electrical equipment within the wastewater plant is susceptible to flooding, and the lift station at the intersection of D and 1st Street may also be affected.

Regarding storm surge flooding, a Category 1 hurricane will similarly impact the mentioned lift station. Additionally, more wastewater manholes along 1st Street may be affected, along with potential flooding of the office and work areas in the wastewater plant building.

Community + Emergency Facilities

Tidal flooding is not expected to affect community and emergency facilities substantially. However, in the event of a 2-year extreme water level scenario in 2040, the Nature Coast Biological Station will experience flooding of approximately 1 foot, while the Post Office will have around 1 inch of water.

A 500yr. 24-hour rainfall event would affect the social housing units at E and 5th streets, but this needs to be confirmed with a detailed model including the stormwater system, as mentioned before.

During a 100-year flood event, various key facilities will have a notable impact. Specifically, the City Hall, Police Department, Chamber of Commerce, and Health Care facility located on 2nd Street will face a high level of exposure to flooding. Additionally, the public housing buildings on 5th and E Street will be similarly affected.

In the event of storm surge flooding from a Category 1 hurricane, the Post Office is expected to experience a significant impact, with flood depths exceeding 18 inches. The City Hall and Police Department will face a medium level of flood exposure under these conditions.

Natural + Cultural Assets

Beaches and living shorelines will be increasingly inundated. All the recreational facilities along 1st Street, G Street, Cedar Key Public Beach, and the Historic District around 2nd and D Street will be flooded in all the evaluated scenarios.

Tourism + Economy

Downtown Cedar Key concentrates most of the tourism and economy uses in town, including restaurants, cafes, hotels, bed and breakfasts, vacation rentals, and gift shops. Tidal flooding is not expected to impact these types of assets significantly. However, under extreme water level scenarios, approximately 17% of these assets will be affected, increasing to 36% by 2040, with a notable concentration among the aquaculture facilities along D Street. In the context of a 100-year flood event, the majority of these assets could face inundation exceeding 6 feet.

Regarding storm surge flooding, in a Category 1 hurricane, several businesses may face flooding levels ranging from 1 to 3 ft., particularly for businesses situated on 2nd Street between C and D Street and along Dock Street. On the eastern side of downtown, the Cedar Cove hotel is also expected to have similar flood depths.

Critical assets inventory, flood depth current and future intermediate-low scenarios

Critical assets inventory, flood depth current and future intermediate-high scenarios

Transportation Street Network, Housing, and Economy & Tourism assets are displayed only as summary in the critical assets categories table.

[illegible]

	Current								2040 Scenario								2070 Scenario							
	Mean Higher High Water	Extreme Water Level Top Return	100 yr 24 hour flood	500 yr 24 hour flood	Special Flood Hazard Area 100 yr	Category 1 Hurricane	Category 3 Hurricane	Category 5 Hurricane	Sea Level Rise 100yr	Extreme Water Level Top Return 100yr	100 yr 24 hour flood	500 yr 24 hour flood	Special Flood Hazard Area 100yr	Category 1 Hurricane	Category 3 Hurricane	Category 5 Hurricane	Sea Level Rise 100yr	Extreme Water Level Top Return 100yr	100 yr 24 hour flood	500 yr 24 hour flood	Special Flood Hazard Area 100yr	Category 1 Hurricane	Category 3 Hurricane	Category 5 Hurricane
Residence																								
No Impact	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Low	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Medium	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
High	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Exceeds Insurance Rulings	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Transportation																								
No Impact	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Low	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Medium	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
High	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Exceeds Transportation Assets (as built)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Transportation Road Network																								
No Impact	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Low	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Medium	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
High	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Exceeds Road Network	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Critical Infrastructure																								
No Impact	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Low	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Medium	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
High	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Exceeds Critical Infrastructure	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Command and Emergency Facilities																								
No Impact	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Low	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Medium	2%	2%	2%	2%	2																			

ZONE 2, MID CEDAR KEY

Housing

Housing structures within the Mid Cedar Key area are generally at low risk of exposure to tidal flooding. However, Rye Key will be flooded in any extreme water level scenario in 2040. During a 100-year flood event, approximately 70% of the housing units will be flooded, with 59% experiencing high exposure levels. In the event of a Category 1 hurricane, 29% of buildings are at risk of high flood exposure. The most vulnerable areas to these conditions include the shorelines along Gulf Boulevard, Andrews Circle, and Rye Key.

Transportation

Gulf Boulevard and Hodges Avenue are crucial road connections in Mid Cedar Key, serving a significant number of housing units in their vicinity and providing access to the western part of the town. In the projected 2-year extreme water level scenario for 2040, Gulf Boulevard is expected to experience flooding of 2 inches, while Hodges Avenue will be inundated with a depth of 1 foot.

In a 500-year, 24-hour precipitation event, the street network would experience flooding in relevant areas. Gulf Blvd would be inundated with water depths exceeding one foot at the intersection with Hodges Avenue, while other sections would see water levels just under half a foot. Additionally, standing water issues are prevalent on Hodges Avenue, particularly at the intersection with SW 166th Ct, where flooding would likely surpass one foot.

Furthermore, the situation becomes much more severe during a 100-year flood event and a Category 1 hurricane storm surge, where flood depths on both roads are projected to exceed 2 feet, making them impassable for cars.

Critical Infrastructure

Tidal flooding is not expected to impact critical infrastructure significantly in Mid Cedar Key. However, in a 2-year return extreme water level scenario projected for 2040, the main impacts will be on some manholes along Gulf Boulevard and the lift station at West Shell Crest Avenue.

In the case of a 100-year flood event, all electrical equipment of the lift stations is expected to be flooded, along with most wastewater manholes.

Storm surge flooding caused by a Category 1 hurricane will primarily impact the lift station at West Shell Crest Avenue and all wastewater manholes.

Critical Community and Emergency Facilities

There are no critical community or emergency facilities in this zone.

Natural + Cultural Assets

Tidal flooding will not significantly affect Cedar Key Cemetery and Cemetery Point Park. However, in a 2-year extreme water level scenario projected for 2040, 59% of Cemetery Point Park will be flooded.

During a 100-year flood and a category 1 hurricane events, the Cemetery access will be inundated by more than 2 feet of water, making both areas inaccessible, and flooding completely the Cemetery Point Park.

Tourism and Economy

All the focus scenarios will flood the two aquaculture facilities located in Zone 2. This includes a boat launch and boat/trailer storage area known as Anchor Hole. This is a critical facility for aquaculturists who farm in the lease areas to the west of Cedar Key, such as the Gulf Jackson lease area, as it allows faster and more economical access in comparison to the public boat launch on the east side of town.

Critical assets inventory, flood depth current and future intermediate-low scenarios

Critical assets inventory, flood depth current and future intermediate-high scenarios

Transportation Street Network, Housing, and Economic & Tourism assets are disclosed only as summary in the critical assets categories table.

Critical assets categories, percentage of flooded assets and exposure levels intermediate-low scenarios

Critical assets categories, percentage of flooded assets and exposure levels intermediate-high scenarios

	Current								2040 Scenario								2070 Scenario							
	Best-Case High-Density	Extreme Water Level (100 y. 24-hour return)	100 y. 24-hour return	500 y. 24-hour return	Annual Flood Return Area 100 y.	Category 1 Hurricane	Category 2 Hurricane	Category 3 Hurricane	Best-Case High-Density	Extreme Water Level (100 y. 24-hour return)	100 y. 24-hour return	500 y. 24-hour return	Annual Flood Return Area 100 y.	Category 1 Hurricane	Category 2 Hurricane	Category 3 Hurricane	Best-Case High-Density	Extreme Water Level (100 y. 24-hour return)	100 y. 24-hour return	500 y. 24-hour return	Annual Flood Return Area 100 y.	Category 1 Hurricane	Category 2 Hurricane	Category 3 Hurricane
Resilience																								
No Impact	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Low	95%	90%	85%	80%	75%	70%	65%	60%	95%	90%	85%	80%	75%	70%	65%	60%	95%	90%	85%	80%	75%	70%	65%	60%
Medium	90%	80%	70%	60%	50%	40%	30%	20%	90%	80%	70%	60%	50%	40%	30%	20%	90%	80%	70%	60%	50%	40%	30%	20%
High	85%	70%	55%	40%	25%	10%	0%	0%	85%	70%	55%	40%	25%	10%	0%	0%	85%	70%	55%	40%	25%	10%	0%	0%
Exceeds Resilience Building	75%	60%	45%	30%	15%	0%	0%	0%	75%	60%	45%	30%	15%	0%	0%	0%	75%	60%	45%	30%	15%	0%	0%	0%
Transportation																								
No Impact	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Low	98%	95%	92%	88%	85%	82%	78%	75%	98%	95%	92%	88%	85%	82%	78%	75%	98%	95%	92%	88%	85%	82%	78%	75%
Medium	95%	90%	85%	80%	75%	70%	65%	60%	95%	90%	85%	80%	75%	70%	65%	60%	95%	90%	85%	80%	75%	70%	65%	60%
High	90%	85%	80%	75%	70%	65%	60%	55%	90%	85%	80%	75%	70%	65%	60%	55%	90%	85%	80%	75%	70%	65%	60%	55%
Exceeds Transportation Assets	85%	80%	75%	70%	65%	60%	55%	50%	85%	80%	75%	70%	65%	60%	55%	50%	85%	80%	75%	70%	65%	60%	55%	50%
Communication and Network																								
No Impact	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Low	98%	95%	92%	88%	85%	82%	78%	75%	98%	95%	92%	88%	85%	82%	78%	75%	98%	95%	92%	88%	85%	82%	78%	75%
Medium	95%	90%	85%	80%	75%	70%	65%	60%	95%	90%	85%	80%	75%	70%	65%	60%	95%	90%	85%	80%	75%	70%	65%	60%
High	90%	85%	80%	75%	70%	65%	60%	55%	90%	85%	80%	75%	70%	65%	60%	55%	90%	85%	80%	75%	70%	65%	60%	55%
Exceeds Network	85%	80%	75%	70%	65%	60%	55%	50%	85%	80%	75%	70%	65%	60%	55%	50%	85%	80%	75%	70%	65%	60%	55%	50%
Critical Infrastructure																								
No Impact	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Low	98%	95%	92%	88%	85%	82%	78%	75%	98%	95%	92%	88%	85%	82%	78%	75%	98%	95%	92%	88%	85%	82%	78%	75%
Medium	95%	90%	85%	80%	75%	70%	65%	60%	95%	90%	85%	80%	75%	70%	65%	60%	95%	90%	85%	80%	75%	70%	65%	60%
High	90%	85%	80%	75%	70%	65%	60%	55%	90%	85%	80%	75%	70%	65%	60%	55%	90%	85%	80%	75%	70%	65%	60%	55%
Exceeds Critical Infrastructure	85%	80%	75%	70%	65%	60%	55%	50%	85%	80%	75%	70%	65%	60%	55%	50%	85%	80%	75%	70%	65%	60%	55%	50%
Community and Recreation Facilities																								
No Impact	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Low	98%	95%	92%	88%	85%	82%	78%	75%	98%	95%	92%	88%	85%	82%	78%	75%	98%	95%	92%	88%	85%	82%	78%	75%
Medium	95%	90%	85%	80%	75%	70%	65%	60%	95%	90%	85%	80%	75%	70%	65%	60%	95%	90%	85%	80%	75%	70%	65%	60%
High	90%	85%	80%	75%	70%	65%	60%	55%	90%	85%	80%	75%	70%	65%	60%	55%	90%	85%	80%	75%	70%	65%	60%	55%
Exceeds Community and Recreation Facilities	85%	80%	75%	70%	65%	60%	55%	50%	85%	80%	75%	70%	65%	60%	55%	50%	85%	80%	75%	70%	65%	60%	55%	50%
Natural and Cultural Resources																								
No Impact	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Low	98%	95%	92%	88%	85%	82%	78%	75%	98%	95%	92%	88%	85%	82%	78%	75%	98%	95%	92%	88%	85%	82%	78%	75%
Medium	95%	90%	85%	80%	75%	70%	65%	60%	95%	90%	85%	80%	75%	70%	65%	60%	95%	90%	85%	80%	75%	70%	65%	60%
High	90%	85%	80%	75%	70%	65%	60%	55%	90%	85%	80%	75%	70%	65%	60%	55%	90%	85%	80%	75%	70%	65%	60%	55%
Exceeds Natural and Cultural Resources	85%	80%	75%	70%	65%	60%	55%	50%	85%	80%	75%	70%	65%	60%	55%	50%	85%	80%	75%	70%	65%	60%	55%	50%
Economic and Economic																								
No Impact	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Low	98%	95%	92%	88%	85%	82%	78%	75%	98%	95%	92%	88%	85%	82%	78%	75%	98%	95%	92%	88%	85%	82%	78%	75%
Medium	95%	90%	85%	80%	75%	70%	65%	60%	95%	90%	85%	80%	75%	70%	65%	60%	95%	90%	85%	80%	75%	70%	65%	60%
High	90%	85%	80%	75%	70%	65%	60%	55%	90%	85%	80%	75%	70%	65%	60%	55%	90%	85%	80%	75%	70%	65%	60%	55%
Exceeds Economic and Economic	85%	80%	75%	70%	65%	60%	55%	50%	85%	80%	75%	70%	65%	60%	55%	50%	85%	80%	75%	70%	65%	60%	55%	50%

ZONE 3, WEST CEDAR KEY

Housing

Zone 3 is predominantly residential. While extreme high tides pose minimal threat to homes, flood risk is related to 100-year and Category 1 storm surge scenarios. Although most buildings are elevated in this area, lower areas of houses will be flooded. Particularly, the area along the canal shorefront near SW 121st Street Lane will face significant flood exposure, as well as the homes surrounding Hodgson Avenue.

Transportation

Zone 3 faces unique connectivity challenges, primarily relying on Watson Circle as the main access route for most parcels. A 2-year extreme water level and a 500-year 24-hour rainfall event will bring the water level close to 1 foot at Watson Circle. The southern area is even more susceptible, with a 15-inch inundation at the Margery Street - Hodgson Avenue intersection, which will disrupt access to homes at the zone's southern boundary. Furthermore, a 100-year flood and a Category 1 hurricane storm surge could entirely cut off access to residences on the south of Anna Street, isolating this area from the rest of the town.

Critical assets categories, percentage of flooded assets and exposure levels intermediate-low scenarios

Critical assets categories, percentage of flooded assets and exposure levels intermediate-high scenarios

Note: There are no critical infrastructure, critical community and emergency facilities, and natural and cultural resources inventoried in this zone.

ZONE 4, NORTH CEDAR KEY

Housing

Extreme water level and rainfall scenarios do not significantly impact the housing buildings in Zone 4. However, the situation changes drastically in a 100-year flood event, wherein 83% of homes will face a high flood exposure level. In the event of a Category 1 hurricane, 35% of the housing buildings, particularly those located at Sunset Point Drive and Franko Circle, will experience high flood exposure.

Transportation

State Road 24 serves as a critical link connecting Cedar Key to the mainland and as the town's sole emergency evacuation route. By 2040, a 2-year extreme water level scenario will flood the road by approximately 5 inches. A 500-year rainfall event would have similar effects, increasing the flood depth to more than 1 foot. The vulnerability escalates significantly during a 100-year and in a Category 1 hurricane, resulting in a flood depth exceeding 2 feet, rendering the road impassable. Bridge #4 and the Marina II boat ramps will be flooded across all three scenarios.

Critical Infrastructure

Tidal flooding and severe rainfall are not expected to impact the lift stations in the area. However, it is important to consider future storm surge risks, even associated with a Category 1 hurricane, which could compromise the operation of the lift station located at the food pantry.

Critical Community and Emergency Facilities

The food pantry is the only critical community asset in the zone. This facility will be under flood risk even in tide events such as extreme high tide for a 2-year return in 2040.

Tourism and Economy

Following the downtown area, Zone 4 is characterized by a significant concentration of non-housing uses, particularly numerous aquaculture facilities. These facilities, positioned along the shoreline, would experience a low flood exposure level in the event of a 2-year extreme water level and severe rainfall scenarios. However, the risk increases substantially during a 100-year flood scenario, affecting 85% of these assets, and in the case of a Category 1 hurricane, this exposure remains high for 52% of the facilities. Notably, the western shoreline is particularly vulnerable.

Critical assets inventory, flood depth current and future intermediate-low scenarios

Critical assets inventory, flood depth current and future intermediate-high scenarios

Transportation Street Network, Housing, and Economy & Tourism assets are displayed only as summary in the critical assets categories table.

Critical assets categories, percentage of flooded assets and exposure levels intermediate-low scenarios

Critical assets categories, percentage of flooded assets and exposure levels intermediate-high scenarios[illegible]

ZONE 5, SOUTH CEDAR KEY

Housing

Housing buildings in Zone 5 are minimally vulnerable to tidal flooding. Flood exposure increases substantially in a 100-year flood event, with 92% of flooded homes and 82% of them with high flood exposure levels. A Category 1 hurricane will flood 61% of homes, with 28% experiencing high flood exposure levels. Zone 5 is mostly a low-lying area.

Transportation

South Cedar Key relies solely on Airport Road for its connection to other areas in the city, and this link is vulnerable to all the focus scenarios. In a 2-year extreme water level scenario in 2040, Airport Road will have approximately 4 inches of flooding on its eastern sections and at the intersection with SW 166th Ct. This situation worsens in 500-year 24-hour rainfall events, which would flood more than 2ft the Airport Road, making this zone inaccessible.

Additionally, flooding on 166 Court Road will hinder access to homes located on the northern side of the runway. Under more severe circumstances, like a Category 1 hurricane or a 100-year extreme event, the entire road network would be flooded by over 2 feet, making the entire zone inaccessible.

Critical assets inventory, flood depth current and future intermediate-low scenarios

Critical assets inventory, flood depth current and future intermediate-high scenarios

Transportation Street Network, Housing, and Economic & Tourism assets are displayed only as summary in the critical assets categories table.

[illegible]

	Current						2040 Scenario						2070 Scenario											
	Mean Higher High Water	Extreme Water Level 2yr Return	100 yr 24-hour	Special Flood Hazard Area 100 yr	100 yr 24-hour	Category 1 Hurricane	Category 2 Hurricane	Category 3 Hurricane	Sea Level Rise 1m/1yr	Extreme Water Level 2yr Return 1m/1yr	100 yr 24-hour 1m/1yr	100 yr 24-hour 1m/1yr	Special Flood Hazard Area 1m/1yr	Category 1 Hurricane 1m/1yr	Category 2 Hurricane 1m/1yr	Category 3 Hurricane 1m/1yr	Sea Level Rise 1m/1yr	Extreme Water Level 2yr Return 1m/1yr	100 yr 24-hour 1m/1yr	100 yr 24-hour 1m/1yr	Special Flood Hazard Area 1m/1yr	Category 1 Hurricane 1m/1yr	Category 2 Hurricane 1m/1yr	Category 3 Hurricane 1m/1yr
Properties																								
No Impact	90%	80%	70%	54%	65%	50%	35%	25%	90%	80%	70%	54%	65%	50%	35%	25%	90%	80%	70%	54%	65%	50%	35%	25%
Low	75%	65%	55%	40%	50%	35%	20%	10%	75%	65%	55%	40%	50%	35%	20%	10%	75%	65%	55%	40%	50%	35%	20%	10%
Medium	70%	60%	50%	35%	45%	30%	15%	5%	70%	60%	50%	35%	45%	30%	15%	5%	70%	60%	50%	35%	45%	30%	15%	5%
High	65%	55%	45%	30%	40%	25%	10%	0%	65%	55%	45%	30%	40%	25%	10%	0%	65%	55%	45%	30%	40%	25%	10%	0%
Excluded Housing Facilities	85%	75%	65%	50%	60%	45%	30%	20%	85%	75%	65%	50%	60%	45%	30%	20%	85%	75%	65%	50%	60%	45%	30%	20%
Transportation																								
No Impact	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Low	95%	85%	75%	60%	70%	55%	40%	25%	95%	85%	75%	60%	70%	55%	40%	25%	95%	85%	75%	60%	70%	55%	40%	25%
Medium	90%	80%	70%	55%	65%	50%	35%	20%	90%	80%	70%	55%	65%	50%	35%	20%	90%	80%	70%	55%	65%	50%	35%	20%
High	85%	75%	65%	50%	60%	45%	30%	15%	85%	75%	65%	50%	60%	45%	30%	15%	85%	75%	65%	50%	60%	45%	30%	15%
Excluded Transportation Assets	95%	85%	75%	60%	70%	55%	40%	25%	95%	85%	75%	60%	70%	55%	40%	25%	95%	85%	75%	60%	70%	55%	40%	25%
Transportation - Road Network																								
No Impact	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Low	95%	85%	75%	60%	70%	55%	40%	25%	95%	85%	75%	60%	70%	55%	40%	25%	95%	85%	75%	60%	70%	55%	40%	25%
Medium	90%	80%	70%	55%	65%	50%	35%	20%	90%	80%	70%	55%	65%	50%	35%	20%	90%	80%	70%	55%	65%	50%	35%	20%
High	85%	75%	65%	50%	60%	45%	30%	15%	85%	75%	65%	50%	60%	45%	30%	15%	85%	75%	65%	50%	60%	45%	30%	15%
Excluded Roads	95%	85%	75%	60%	70%	55%	40%	25%	95%	85%	75%	60%	70%	55%	40%	25%	95%	85%	75%	60%	70%	55%	40%	25%

ZONE 6, INFLUENCE AREA

Housing

Housing within the influence area is vital for the people working in Cedar Key. Census data indicates that 68% of Cedar Key's workforce commutes from other parts of Levy County. The primary housing areas relevant to Cedar Key include those in the northwest near Road 347, associated with aquaculture facilities; Sumner; and Rosewood, located on both sides of State Road 24.

Tidal flooding is not expected to impact housing buildings in the influence area. However, a 500-year 24-hour rainfall event would flood 67% of homes. A similar situation occurs during a 100-year flood event, approximately 62% of housing buildings may be affected. The most impacted areas include the aquaculture facilities near Road 347 (with a flood depth of around 5 feet), Sumner (with a flood depth of approximately 7 feet), and, to a lesser extent, the southwest area of Rosewood.

Concerning storm surge, a Category 1 hurricane is projected to flood the aquaculture facilities area near Road 347 to a depth of 1', as well as homes in the southern area of State Road 24 around the Cedar Key High School Sports Complex.

Transportation

The influence area has two roads with vital importance for Cedar Key. The first is State Road 24, which is the only connection of the town to the mainland, and to other towns in Levy County that supply Cedar Key. The second one is County Road 347, which connects Cedar Key to aquaculture facilities, recreational areas, and a satellite solid waste facility to the north.

Tidal flooding will impact mostly secondary roads, some segments of the County Road 325 that connect to Shell Mound will be flooded around 2". Rainfall flooding would significantly affect the access to Cedar Key, flooding sections of the Florida State Road 24 more than 2 feet, making the road impassable.

Furthermore, flooding caused by a 100-year event will strongly impact the road network, creating also flood depths above 2' to County Road 347. Storm surge scenarios will have similar effects to Road 347 and flooding around 1' to some sections at Sumner. It is necessary to note a low-lying section of State Road 24, located southwest of the water supply wells. This area is susceptible to flooding exceeding 2', making it impassable for cars.

Critical Infrastructure

Cedar Key relies on vital distribution infrastructure in the influence area, including the electrical substation, water plant, and drinking water wells. Tidal flooding poses no immediate threat to these critical facilities for overland flooding. However, in a 500-year 24-hour rainfall event, the control room of the electrical substation would experience 6" of flooding.

The vulnerability situation changes significantly during a 100-year flood event, where flood depths can reach the control rooms of these infrastructure elements, potentially leading to an extended

supply disruption for the city. In the event of a Category 1 storm surge, the water level is expected to advance upon the surroundings of the control rooms but not reach the finished floor levels. Some considerations could be necessary for some outdoor equipment in this scenario as it may still be vulnerable to damage by encroaching saltwater.

Critical Community and Emergency Facilities

Tidal flooding will not affect the community and emergency facilities in the influence area. However, a 500-year 24-hour rainfall event would result in approximately one foot of flooding at the Levy County Rescue Station and 2 feet of water at the Rosewood Cemetery. The High School Sports Complex would also experience flooding, with water depths below 6 inches.

A 100-year flood event will impact most facilities situated on the east side of State Road 24, including the Women's Club, which, despite its elevation, will experience approximately 2 feet of water. Additionally, the Cedar Key High School Sports Complex sports fields will be inundated by around 4 to 5 feet of water, while Rosewood Cemetery and the King Family Monument Cemetery (private) will face flooding of 3 to 4 feet.

Regarding storm surge flooding, a Category 1 hurricane will not affect community and emergency facilities. Higher hurricane categories are expected to have a more significant impact than a 100-year flood event.

Natural + Cultural Assets

Tidal flooding will not significantly affect natural and cultural assets. A 2-year return extreme water level in 2040 will only affect the access to the Shell Mound observation deck among the natural and cultural assets. However, a 100-year event will inundate the Cedar Key Scrub State Reserve completely, both main entrances with flood depths reaching around 6 feet, making the area inaccessible by car. Regarding storm surge, a Category 1 hurricane will entirely flood the Shell Mound boardwalk and observation deck. Additionally, 91% of the Cedar Key Scrub State Reserve will face flooding, with water levels at approximately 1.5 feet, impacting both access points.

Critical assets inventory, flood depth current and future intermediate-low scenarios

Critical assets inventory, flood depth current and future intermediate-high scenarios

Transportation Street Network, Housing, and Economic & Tourism assets are displayed only as summary in the critical assets categories table.

Critical assets categories, percentage of flooded assets and exposure levels intermediate-low scenarios

Critical assets categories, percentage of flooded assets and exposure levels intermediate-high scenarios

	Current								2040 Scenario								2070 Scenario								
	Mean Higher High Water	Extreme Water Level for Return	100 yr. 24 hour	500 yr. 24 hour	Special Flood Hazard Area 100 yr.	Category 1 Hurricane	Category 2 Hurricane	Category 3 Hurricane	Sea Level Rise 100.00	Extreme Water Level for Return 100.00	100 yr. 24 hour 100.00	500 yr. 24 hour 100.00	Special Flood Hazard Area 100.00	Category 1 Hurricane 100.00	Category 2 Hurricane 100.00	Category 3 Hurricane 100.00	Sea Level Rise 100.00	Extreme Water Level for Return 100.00	100 yr. 24 hour 100.00	500 yr. 24 hour 100.00	Special Flood Hazard Area 100.00	Category 1 Hurricane 100.00	Category 2 Hurricane 100.00	Category 3 Hurricane 100.00	
Resilience																									
No Impact																									
Low	100%	100%	80%	50%	30%	60%	20%	10%	100%	100%	80%	50%	30%	60%	20%	10%	100%	100%	80%	50%	30%	60%	20%	10%	10%
Medium	75%	75%	50%	25%	15%	40%	10%	5%	75%	75%	50%	25%	15%	40%	10%	5%	75%	75%	50%	25%	15%	40%	10%	5%	5%
High	50%	50%	25%	10%	5%	20%	5%	2%	50%	50%	25%	10%	5%	20%	5%	2%	50%	50%	25%	10%	5%	20%	5%	2%	2%
Extreme Resilience Building	25%	25%	10%	5%	2%	10%	2%	1%	25%	25%	10%	5%	2%	10%	2%	1%	25%	25%	10%	5%	2%	10%	2%	1%	1%
Transportation																									
No Impact																									
Low	100%	95%	80%	60%	35%	50%	25%	10%	90%	90%	80%	60%	35%	50%	25%	10%	90%	90%	80%	60%	35%	50%	25%	10%	10%
Medium	75%	70%	55%	35%	20%	35%	15%	5%	70%	70%	55%	35%	20%	35%	15%	5%	70%	70%	55%	35%	20%	35%	15%	5%	5%
High	50%	45%	30%	15%	10%	20%	10%	2%	50%	50%	30%	15%	10%	20%	10%	2%	50%	50%	30%	15%	10%	20%	10%	2%	2%
Extreme Transportation Assets	25%	20%	10%	5%	2%	10%	5%	1%	25%	25%	10%	5%	2%	10%	5%	1%	25%	25%	10%	5%	2%	10%	5%	1%	1%
Transportation Road Network																									
No Impact																									
Low	100%	90%	70%	50%	30%	40%	20%	10%	90%	90%	70%	50%	30%	40%	20%	10%	90%	90%	70%	50%	30%	40%	20%	10%	10%
Medium	75%	65%	45%	25%	15%	25%	10%	5%	65%	65%	45%	25%	15%	25%	10%	5%	65%	65%	45%	25%	15%	25%	10%	5%	5%
High	50%	40%	20%	10%	5%	10%	5%	2%	50%	50%	20%	10%	5%	10%	5%	2%	50%	50%	20%	10%	5%	10%	5%	2%	2%
Extreme Roads	25%	20%	10%	5%	2%	5%	2%	1%	25%	25%	10%	5%	2%	5%	2%	1%	25%	25%	10%	5%	2%	5%	2%	1%	1%
Social Infrastructure																									
No Impact																									
Low	100%	95%	80%	60%	35%	50%	25%	10%	90%	90%	80%	60%	35%	50%	25%	10%	90%	90%	80%	60%	35%	50%	25%	10%	10%
Medium	75%	70%	55%	35%	20%	35%	15%	5%	70%	70%	55%	35%	20%	35%	15%	5%	70%	70%	55%	35%	20%	35%	15%	5%	5%
High	50%	45%	30%	15%	10%	20%	10%	2%	50%	50%	30%	15%	10%	20%	10%	2%	50%	50%	30%	15%	10%	20%	10%	2%	2%
Extreme Social Infrastructure	25%	20%	10%	5%	2%	10%	5%	1%	25%	25%	10%	5%	2%	10%	5%	1%	25%	25%	10%	5%	2%	10%	5%	1%	1%
Community and Emergency Facilities																									
No Impact																									
Low	100%	90%	70%	50%	30%	40%	20%	10%	90%	90%	70%	50%	30%	40%	20%	10%	90%	90%	70%	50%	30%	40%	20%	10%	10%
Medium	75%	65%	45%	25%	15%	25%	10%	5%	65%	65%	45%	25%	15%	25%	10%	5%	65%	65%	45%	25%	15%	25%	10%	5%	5%
High	50%	40%	20%	10%	5%	10%	5%	2%	50%	50%	20%	10%	5%	10%	5%	2%	50%	50%	20%	10%	5%	10%	5%	2%	2%
Extreme Community and Emergency Facilities	25%	20%	10%	5%	2%	10%	5%	1%	25%	25%	10%	5%	2%	10%	5%	1%	25%	25%	10%	5%	2%	10%	5%	1%	1%
Natural, Cultural and Historical Resources																									
No Impact																									
Low	80%	80%	50%	30%	20%	50%	30%	20%	80%	80%	50%	30%	20%	50%	30%	20%	80%	80%	50%	30%	20%	50%	30%	20%	10%
Medium	75%	75%	40%	20%	10%	40%	20%	10%	75%	75%	40%	20%	10%	40%	20%	10%	75%	75%	40%	20%	10%	40%	20%	10%	5%
High	50%	50%	20%	10%	5%	20%	10%	5%	50%	50%	20%	10%	5%	20%	10%	5%	50%	50%	20%	10%	5%	20%	10%	5%	2%
Extreme Cultural and Historical Resources	25%	25%	10%	5%	2%	10%	5%	2%	25%	25%	10%	5%	2%	10%	5%	2%	25%	25%	10%	5%	2%	10%	5%	2%	1%
Facilities and Resources																									
No Impact																									
Low	100%	100%	75%	50%	30%	60%	30%	20%	100%	100%	75%	50%	30%	60%	30%	20%	100%	100%	75%	50%	30%	60%	30%	20%	10%
Medium	75%	75%	50%	25%	15%	40%	10%	5%	75%	75%	50%	25%	15%	40%	10%	5%	75%	75%	50%	25%	15%	40%	10%	5%	5%
High	50%	50%	25%	10%	5%	20%	5%	2%	50%	50%	25%	10%	5%	20%	5%	2%	50%	50%	25%	10%	5%	20%	5%	2%	2%
Extreme Facilities and Resource Assets	25%	25%	10%	5%	2%	10%	2%	1%	25%	25%	10%	5%	2%	10%	2%	1%	25%	25%	10%	5%	2%	10%	2%	1%	1%

CRITICAL REGIONAL ASSETS

Critical Regional Assets, flood depth current and future intermediate-low scenarios

[illegible]

Critical Regional Assets, flood depth current and future intermediate-high scenarios

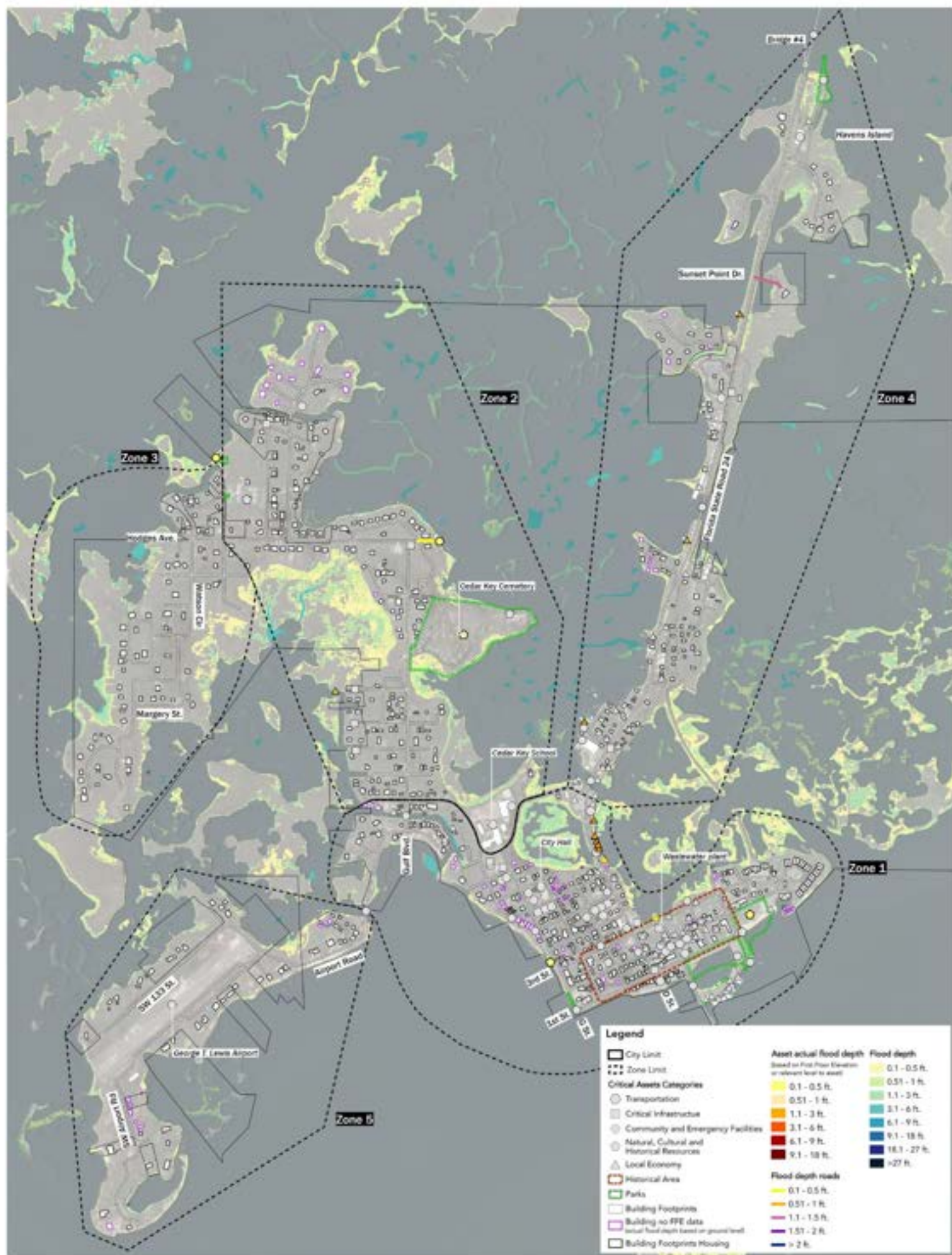
Asset Name	Date	Address	Asset Class	Asset Type	2019 Season										2020 Season																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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					Max Depth (ft)	Current Depth (ft)	Max Depth (ft)	Current Depth (ft)	Max Depth (ft)	Current Depth (ft)	Max Depth (ft)	Current Depth (ft)	Max Depth (ft)	Current Depth (ft)	Max Depth (ft)	Current Depth (ft)	Max Depth (ft)	Current Depth (ft)	Max Depth (ft)	Current Depth (ft)	Max Depth (ft)	Current Depth (ft)	Max Depth (ft)	Current Depth (ft)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
ALBANY, ALBANY COUNTY	2019	ALBANY, ALBANY COUNTY	ALBANY, ALBANY COUNTY	ALBANY, ALBANY COUNTY	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	2926	2927	2928	2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941	2942	2943	2944	2945	2946	2947	2948	2949	2950	2951	2952	2953	2954	2955	2956	2957	2958	2959	2960	2961	2962	2963	2964	2965	2966	2967	2968	2969	2970	2971	2972	2973	2974	2975	2976	2977	2978	2979	2980	2981	2982	2983	2984	2985	2986	2987	2988	2989	2990	2991	2992	2993	2994	2995	2996	2997	2998	2999	3000	3001	3002	3003	3004	3005	3006	3007	3008	3009	3010	3011	3012	3013	3014	3015	3016	301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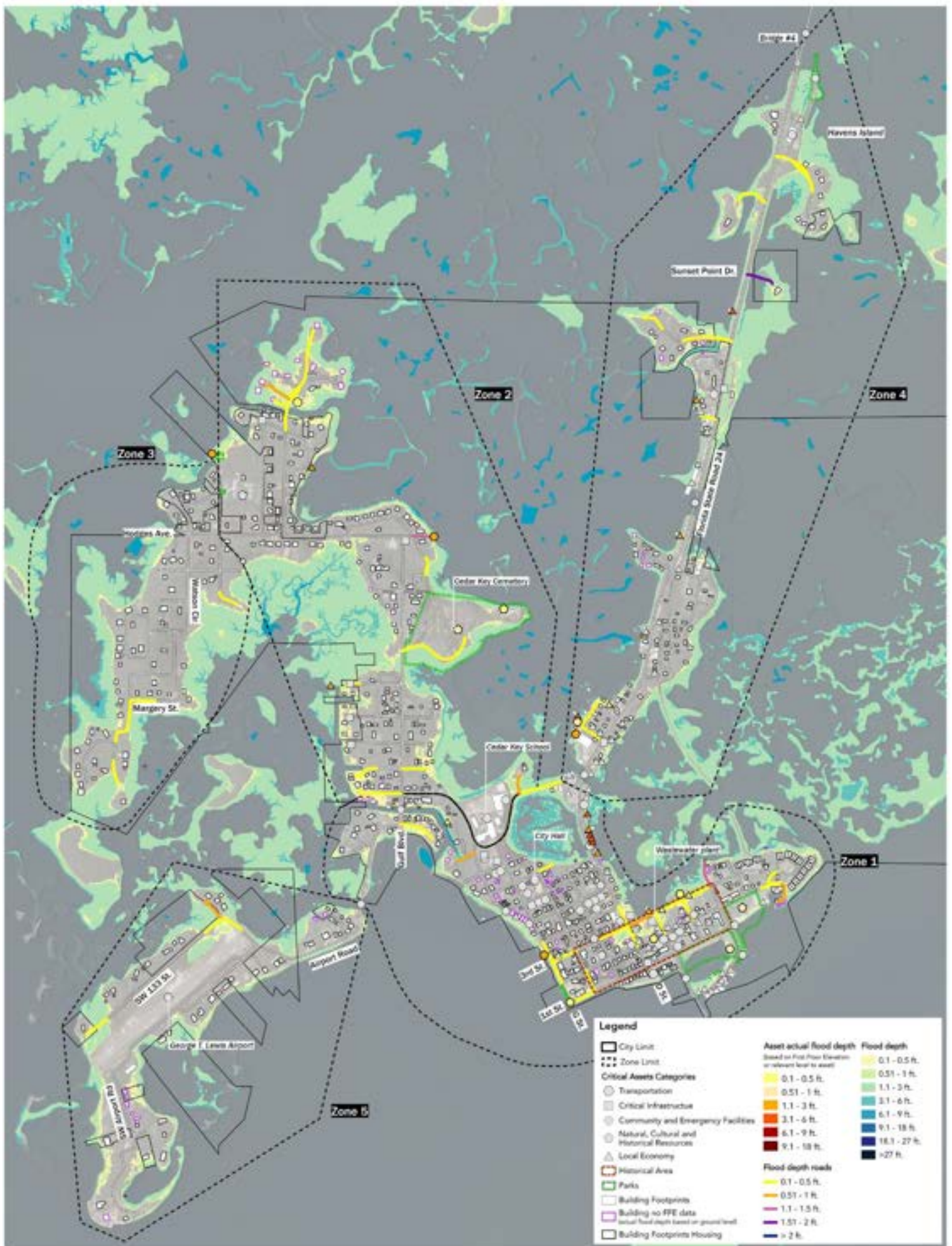
Critical Regional Assets Categories, percentage of flooded assets and exposure levels intermediate-low scenarios

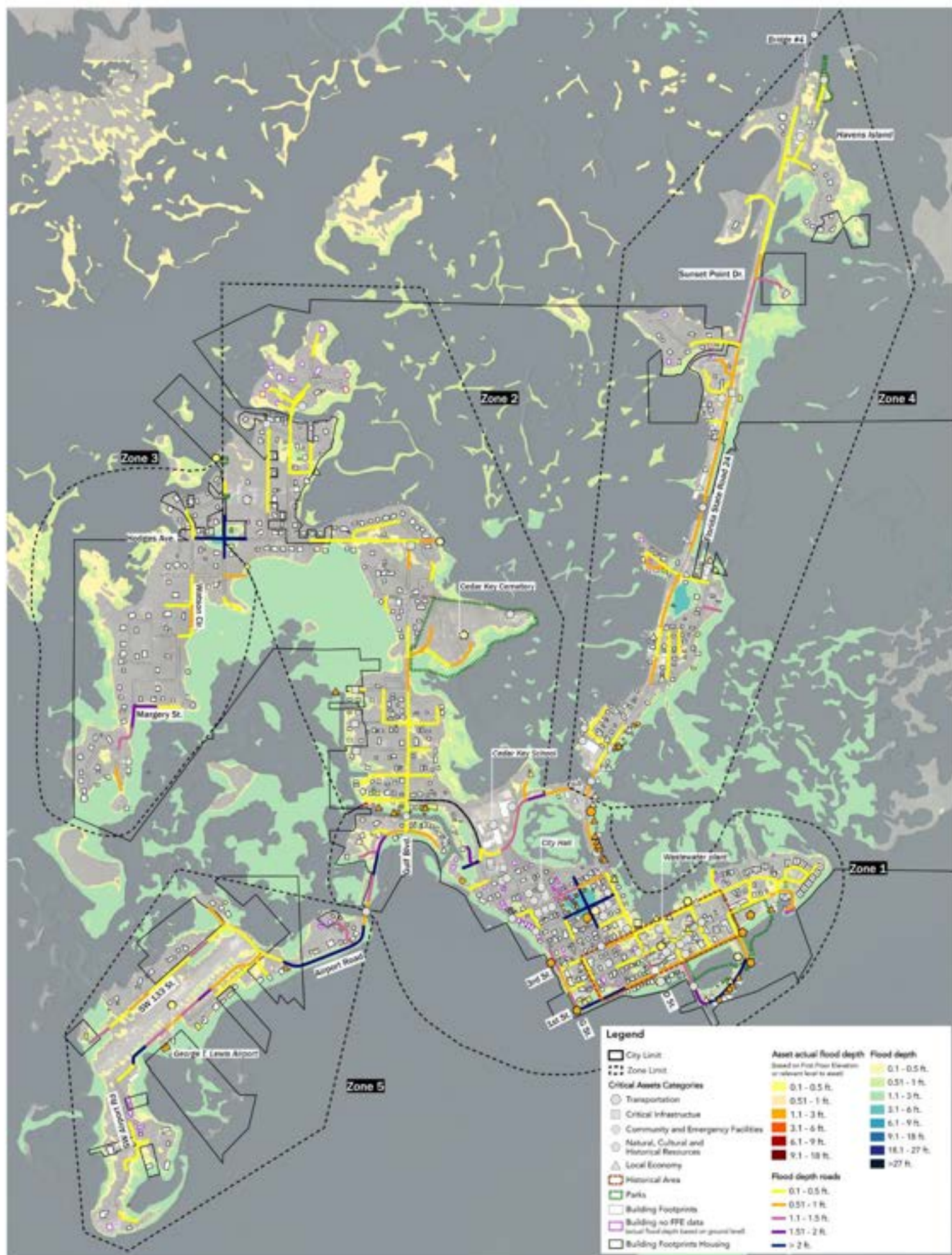
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Critical Regional Assets Categories, percentage of flooded assets and exposure levels intermediate-high scenarios

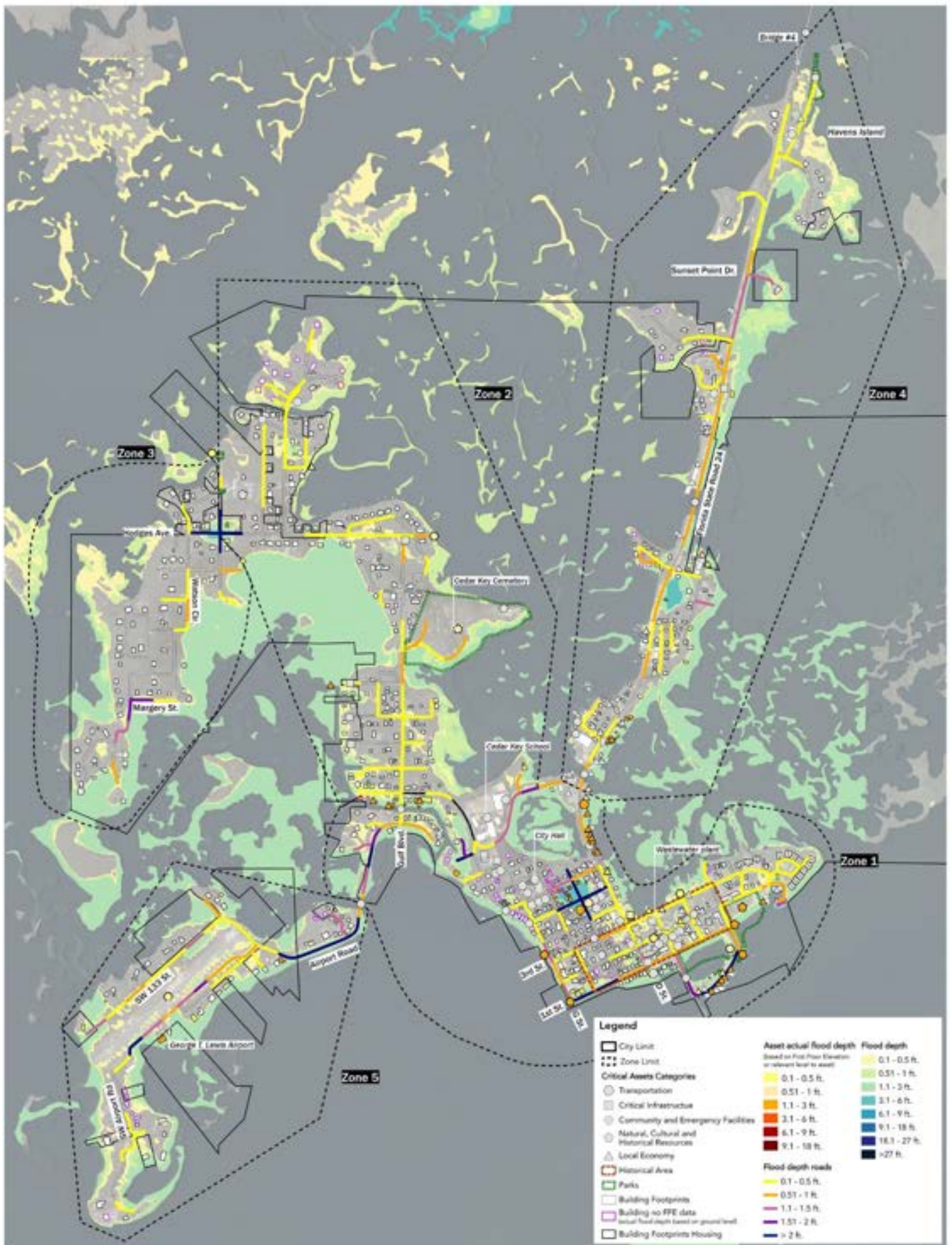
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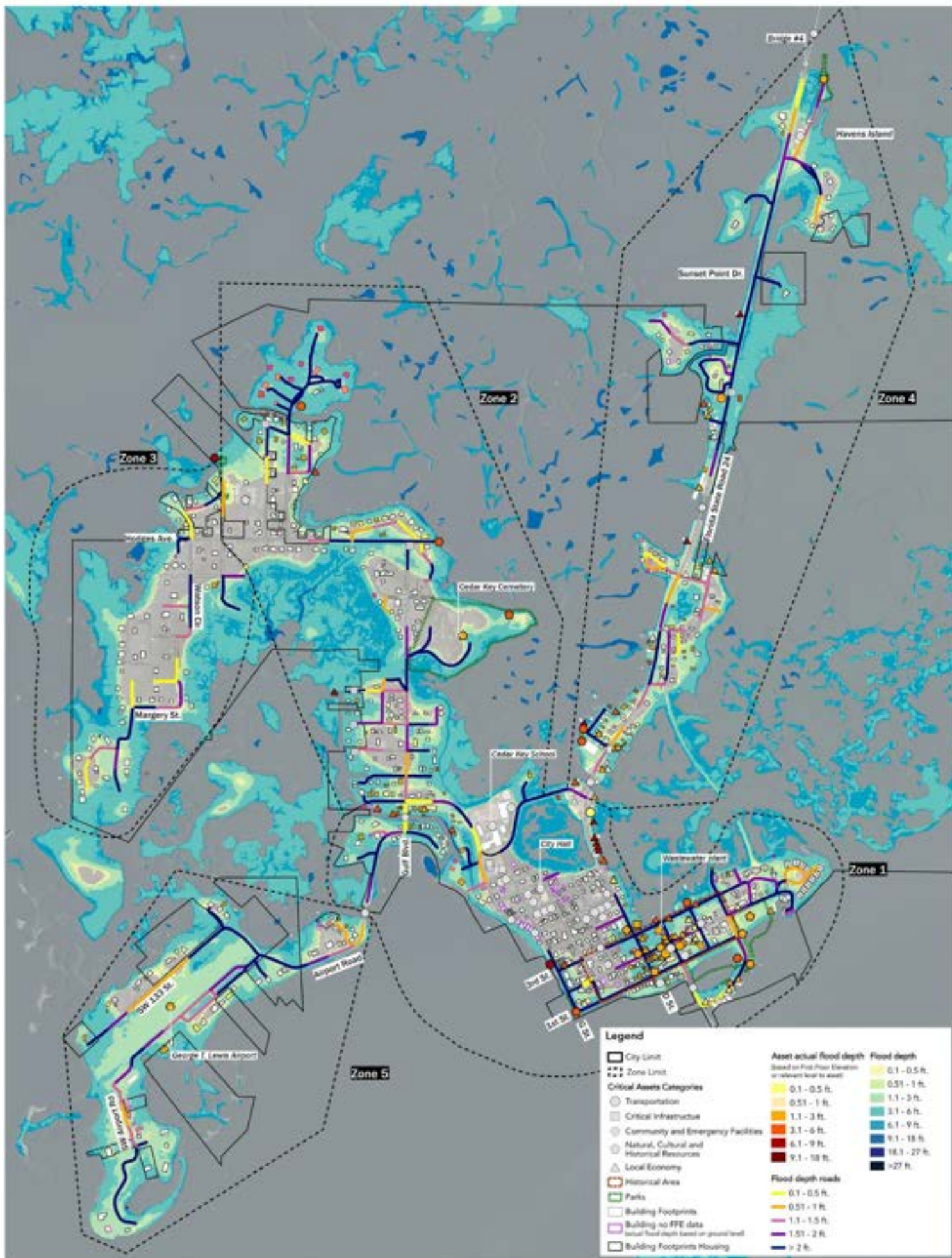
Cedar Key, Rainfall Induced Flooding, 100yr. 24hr.

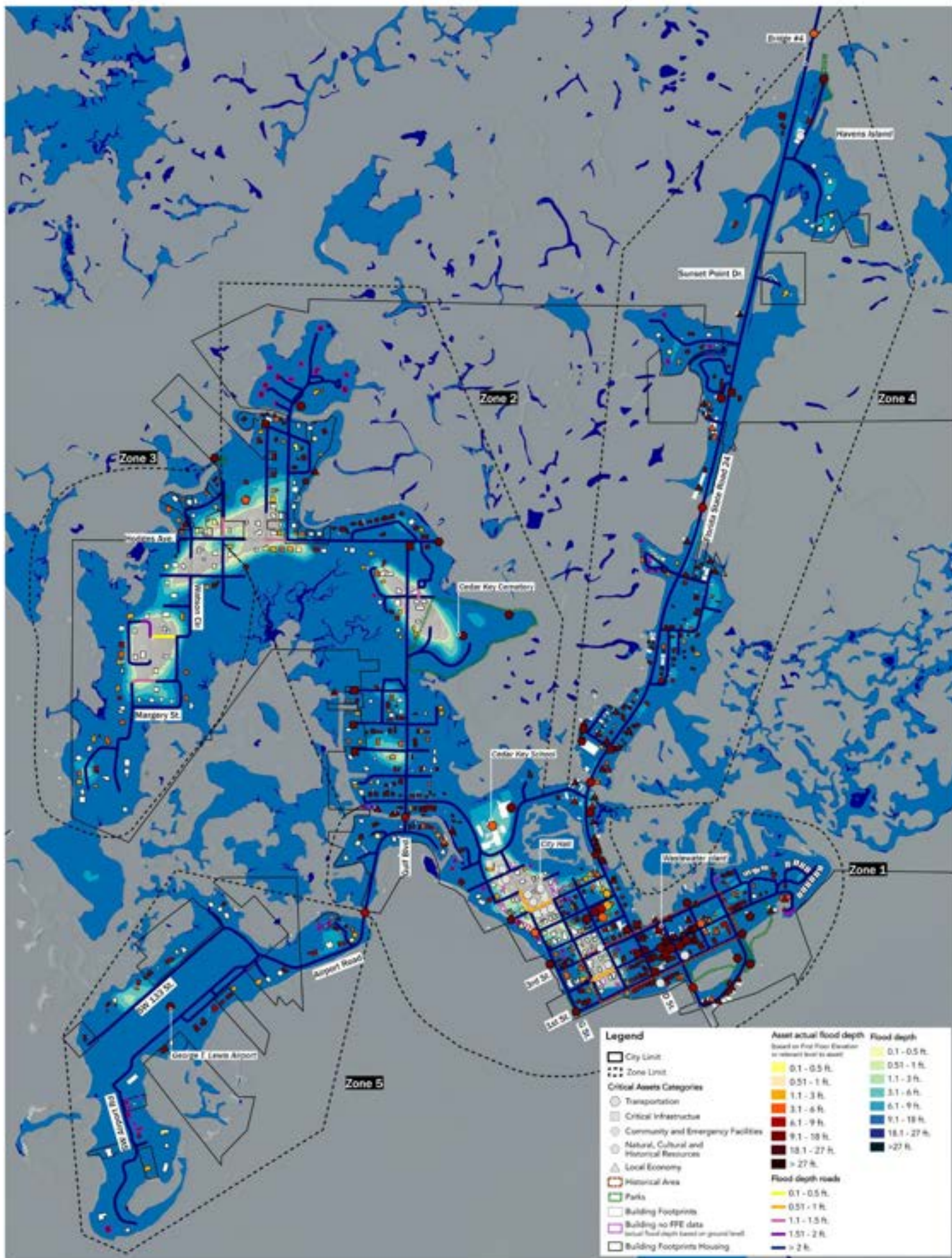


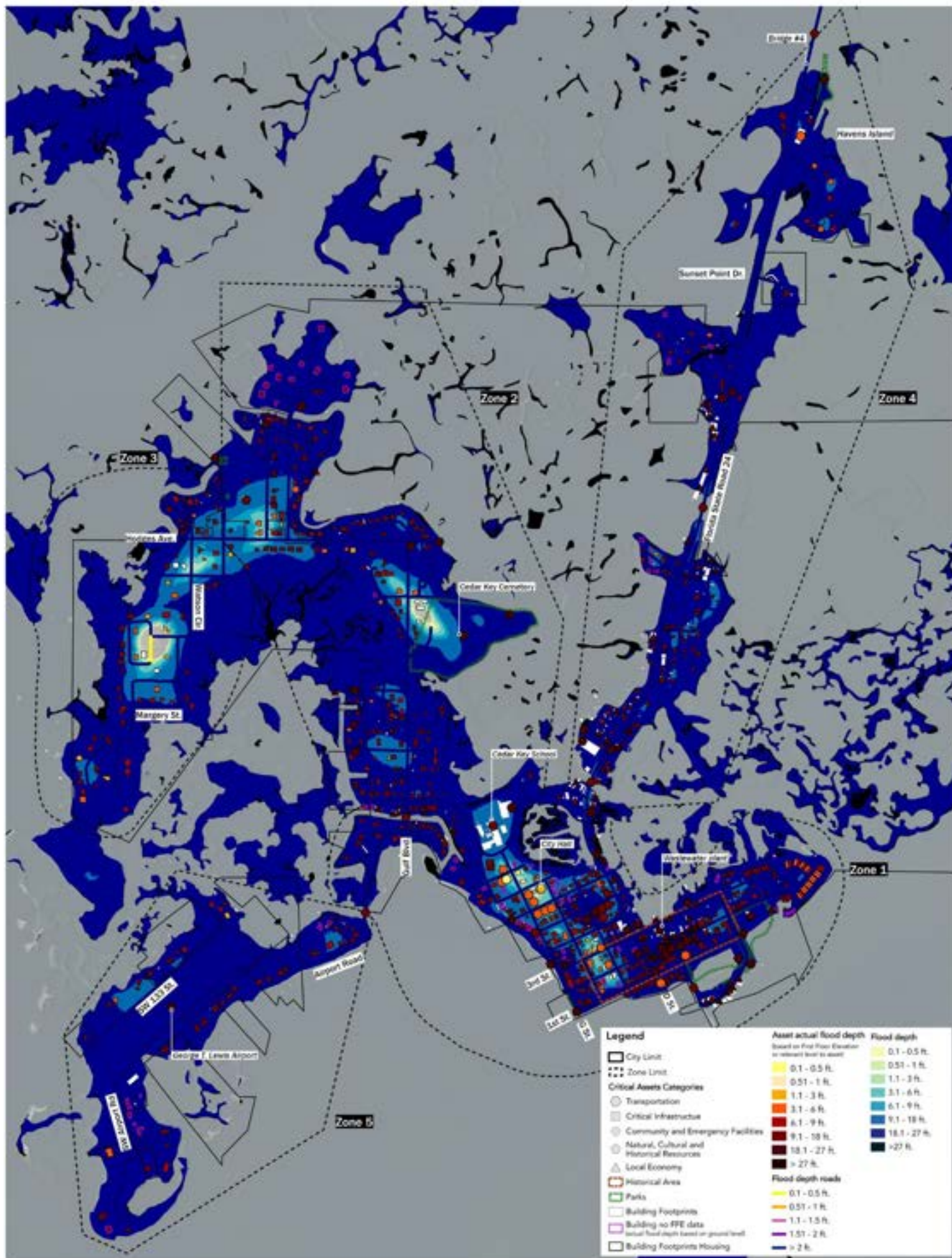
Cedar Key, Rainfall Induced Flooding, 500yr. 24hr.



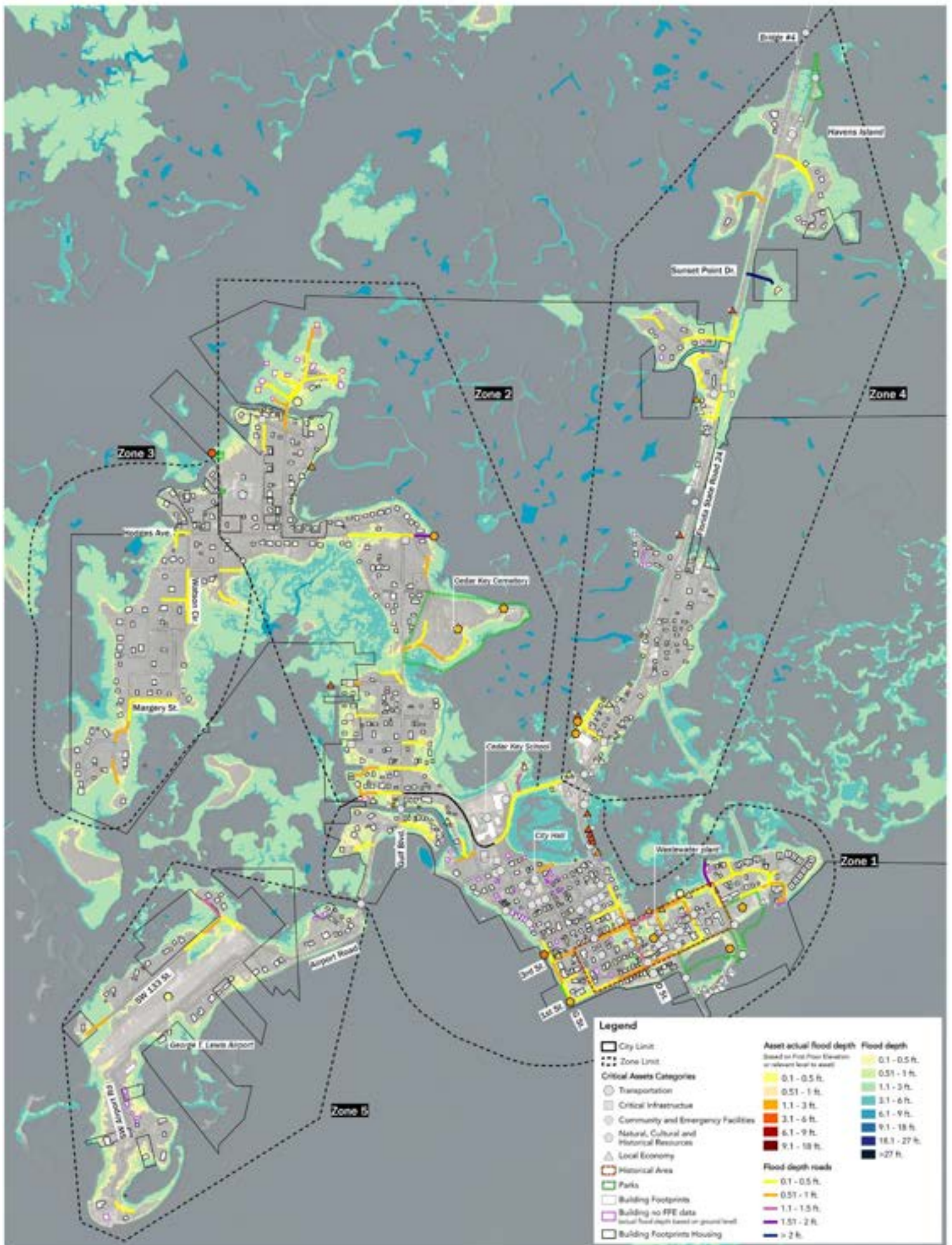
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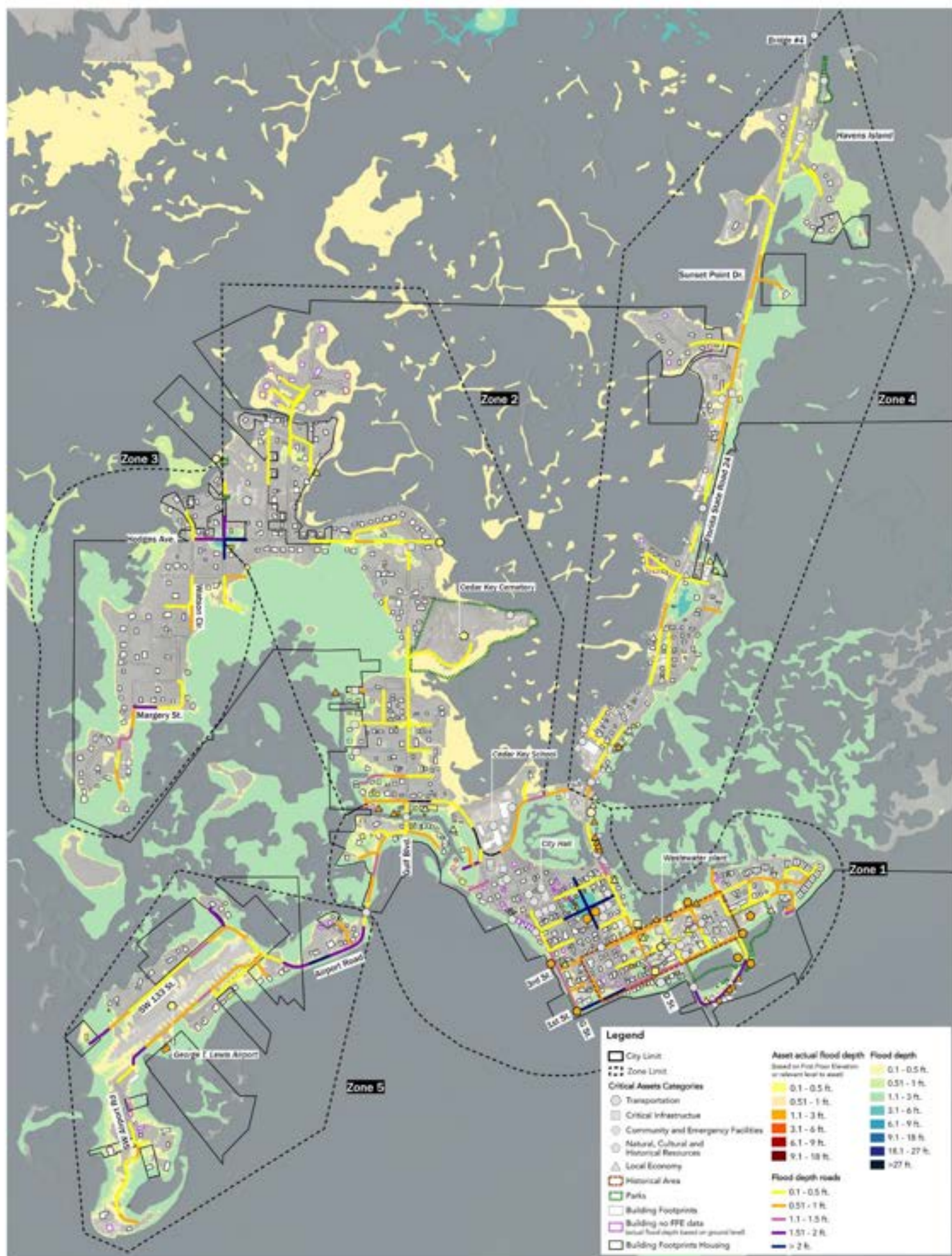




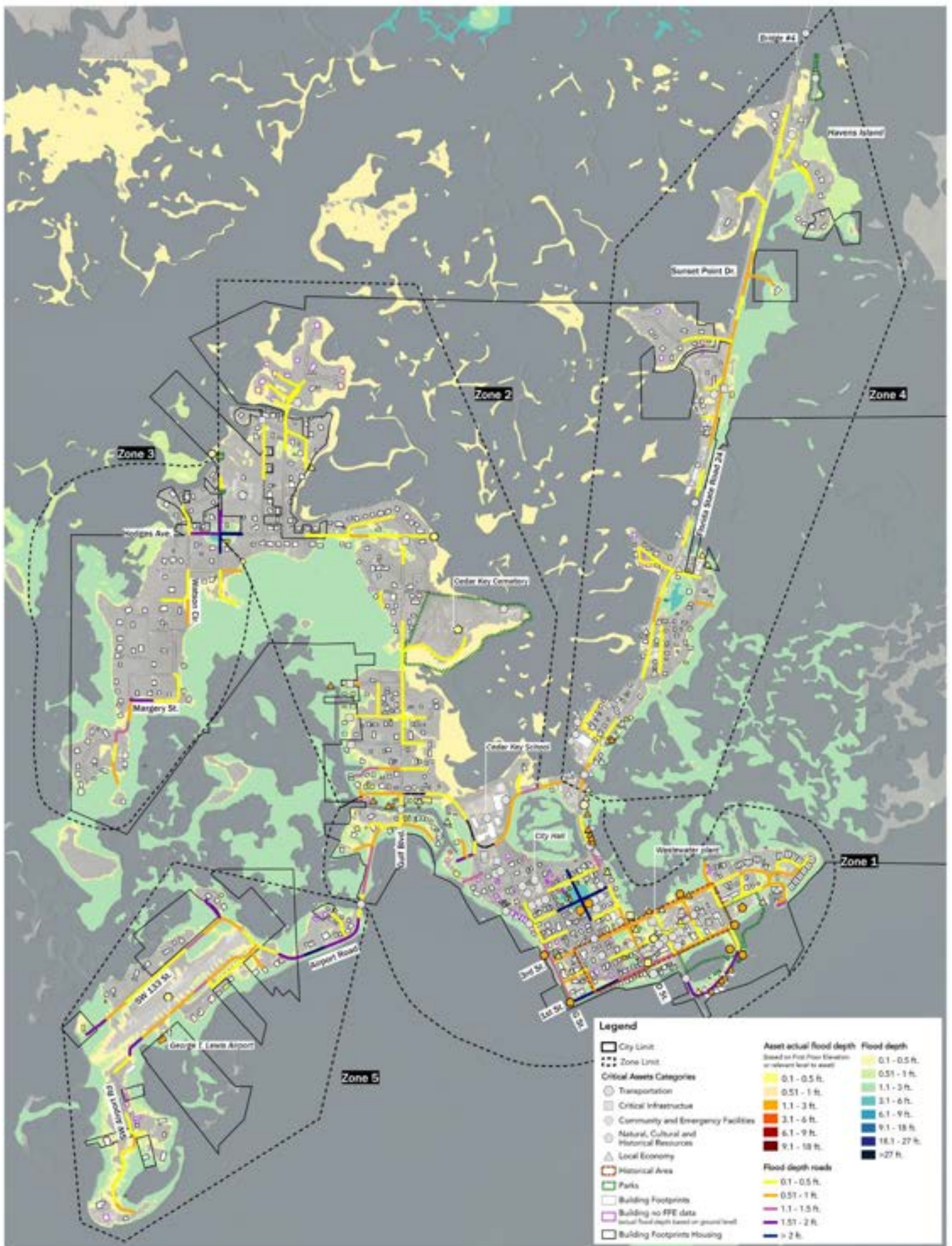






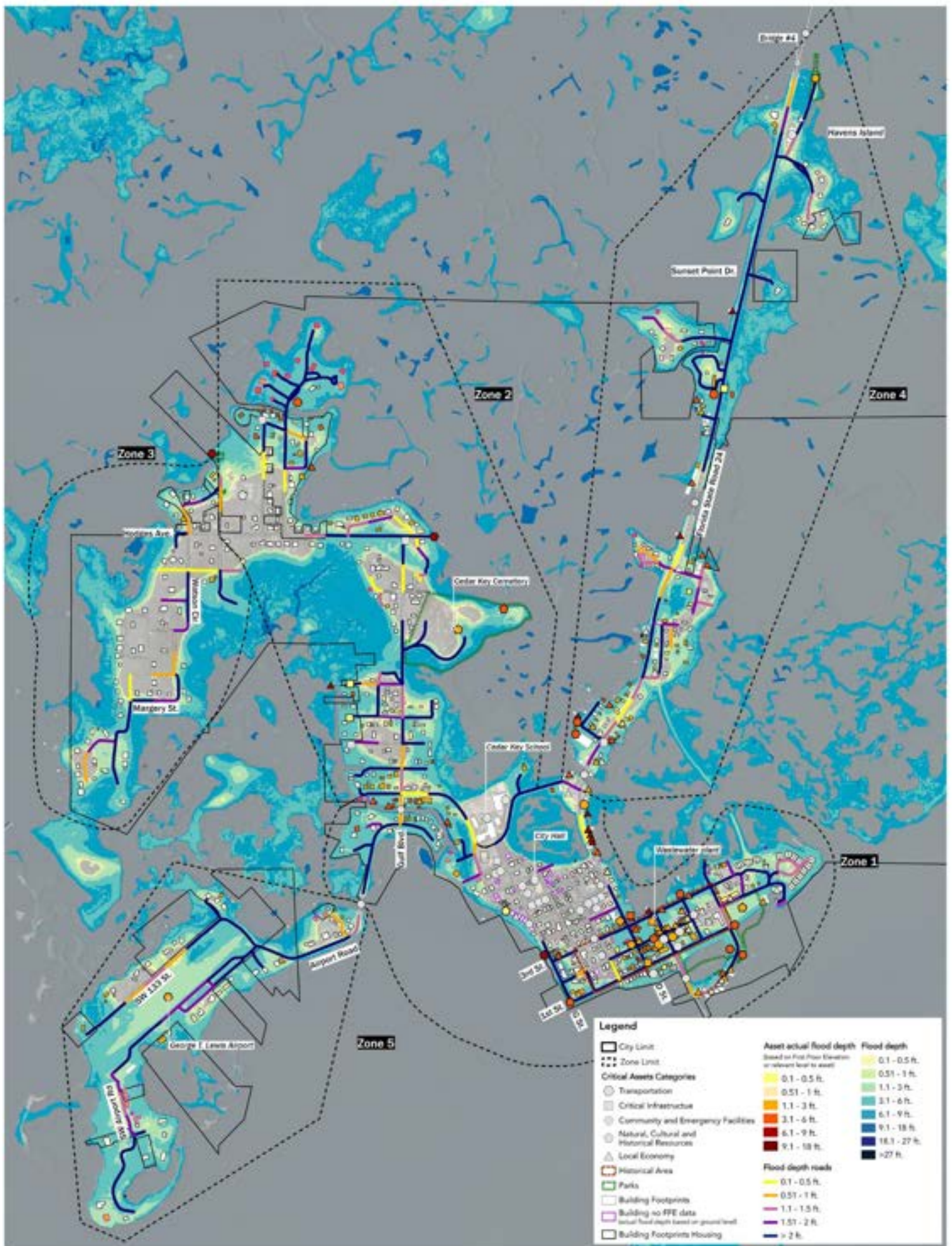


Cedar Key, Rainfall Induced Flooding, 100yr. 24hr.+ SLR 2040 Int-Low

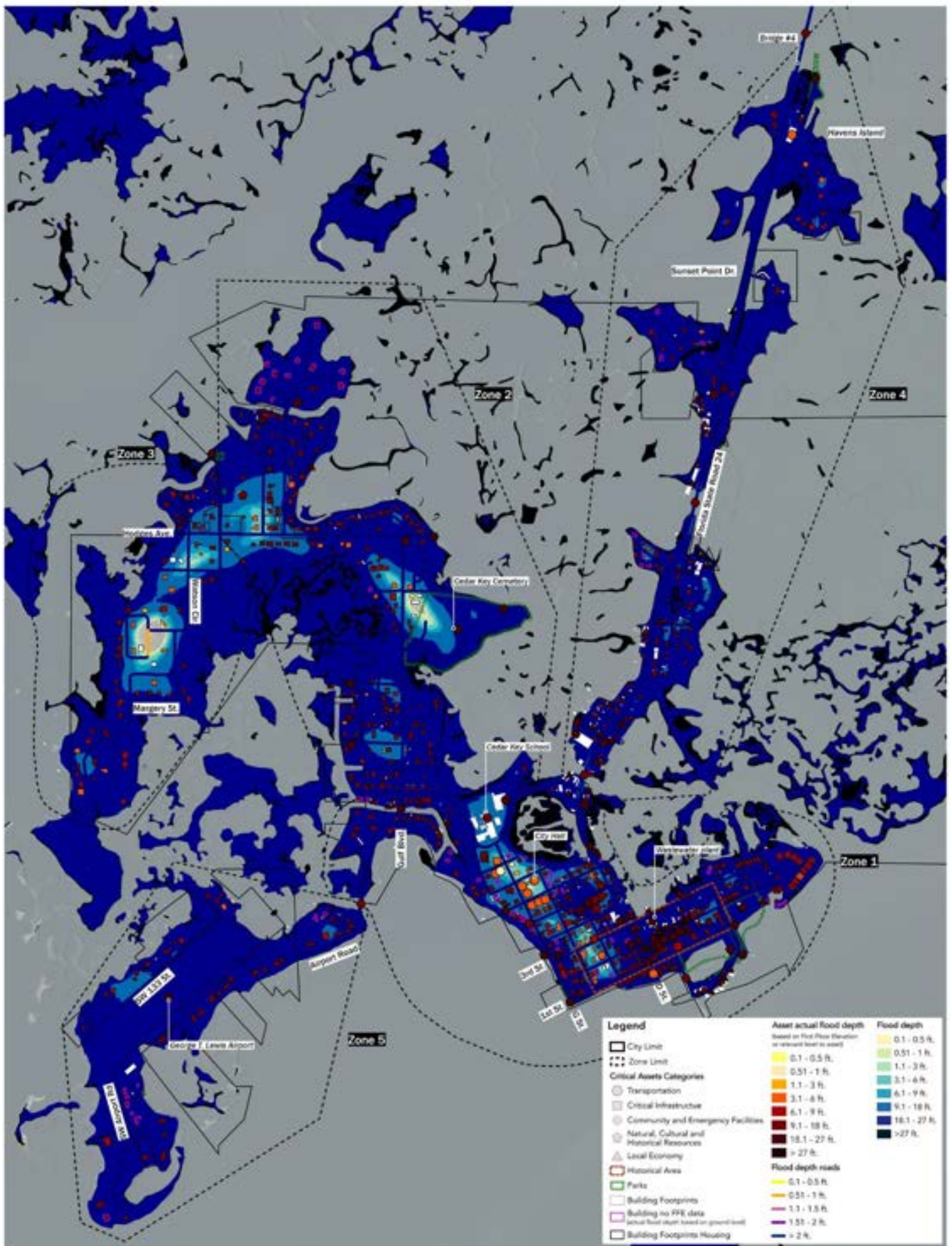


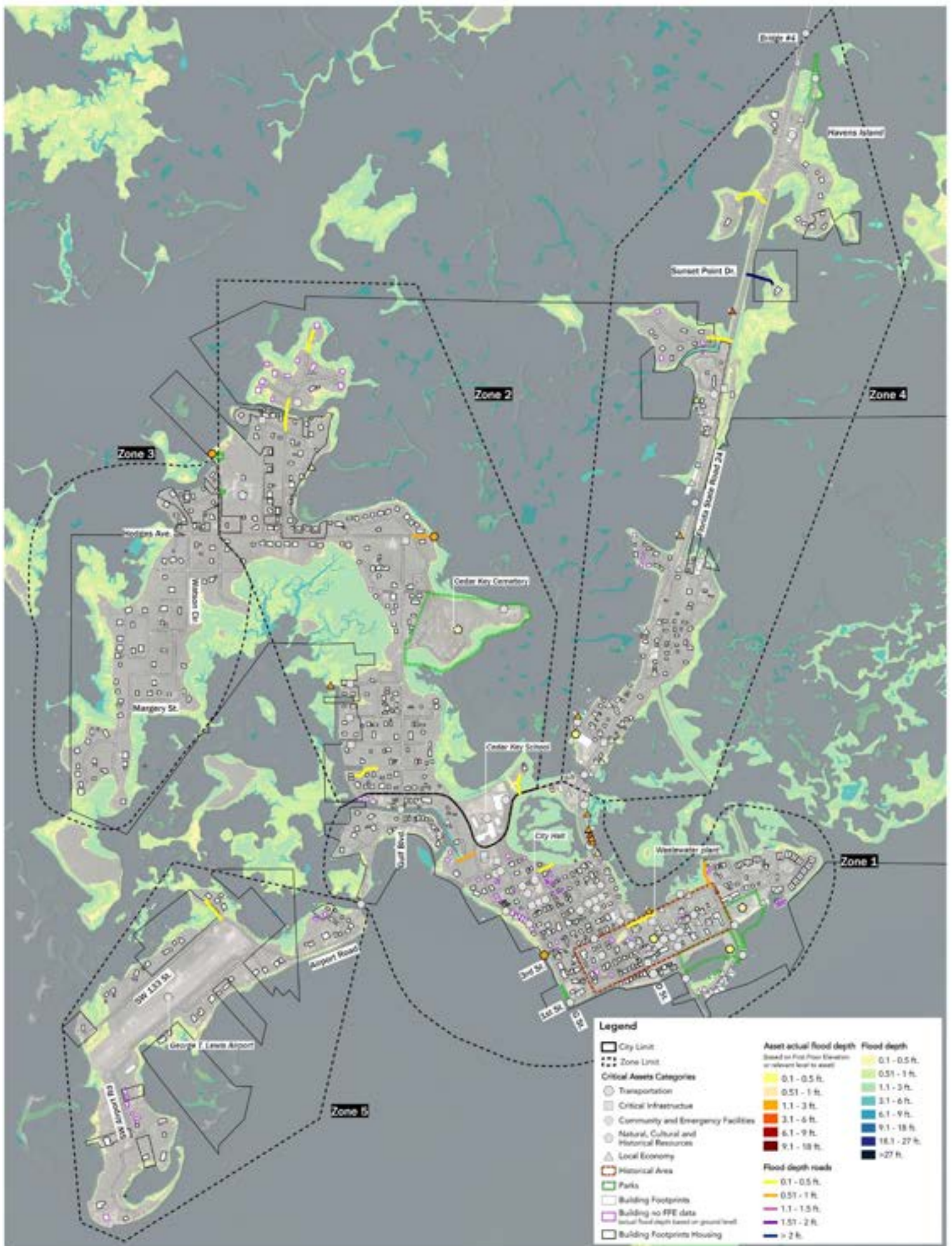
Cedar Key, Special Flood Hazard Area (SFHA) 100-yr + SLR 2040 Int-Low

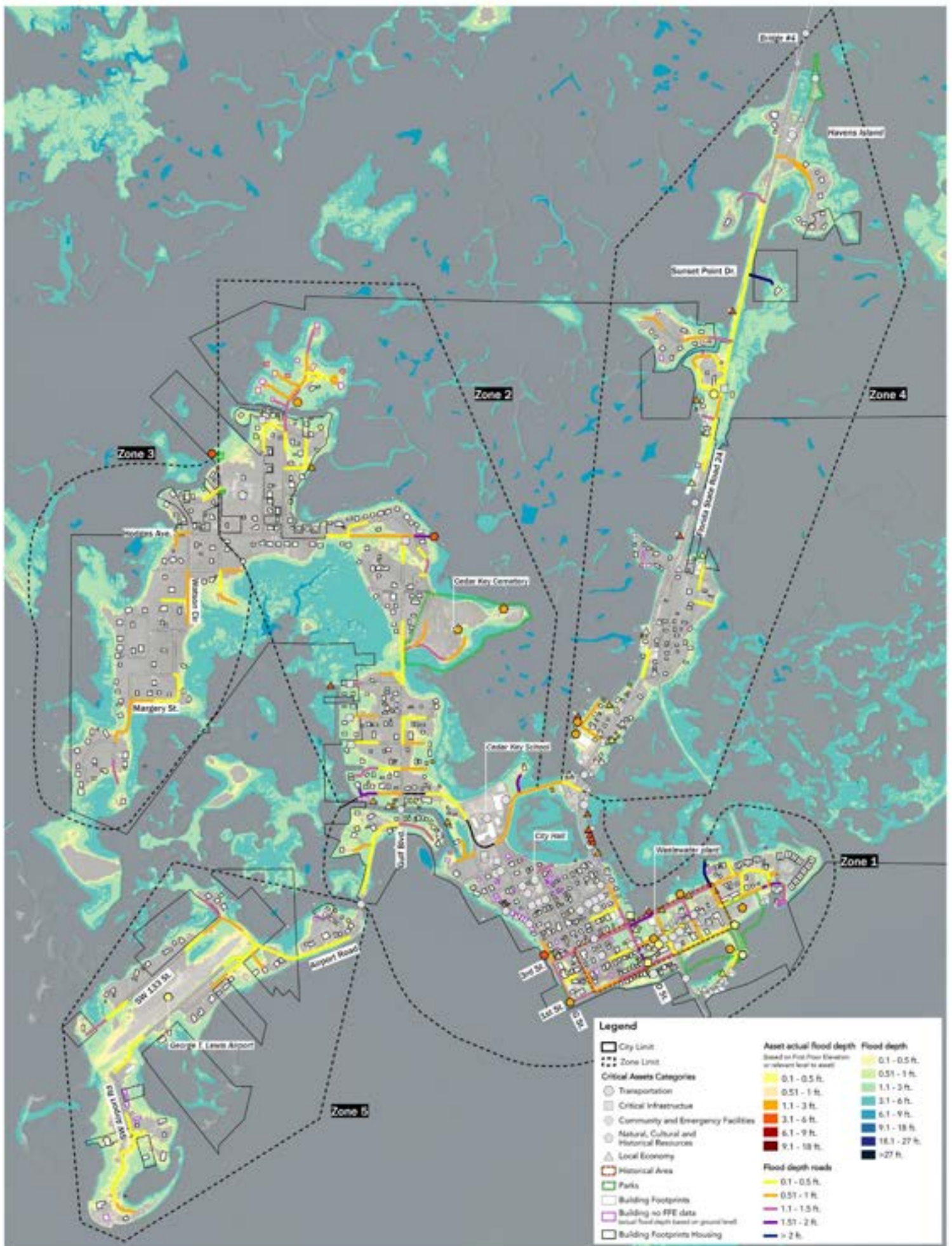


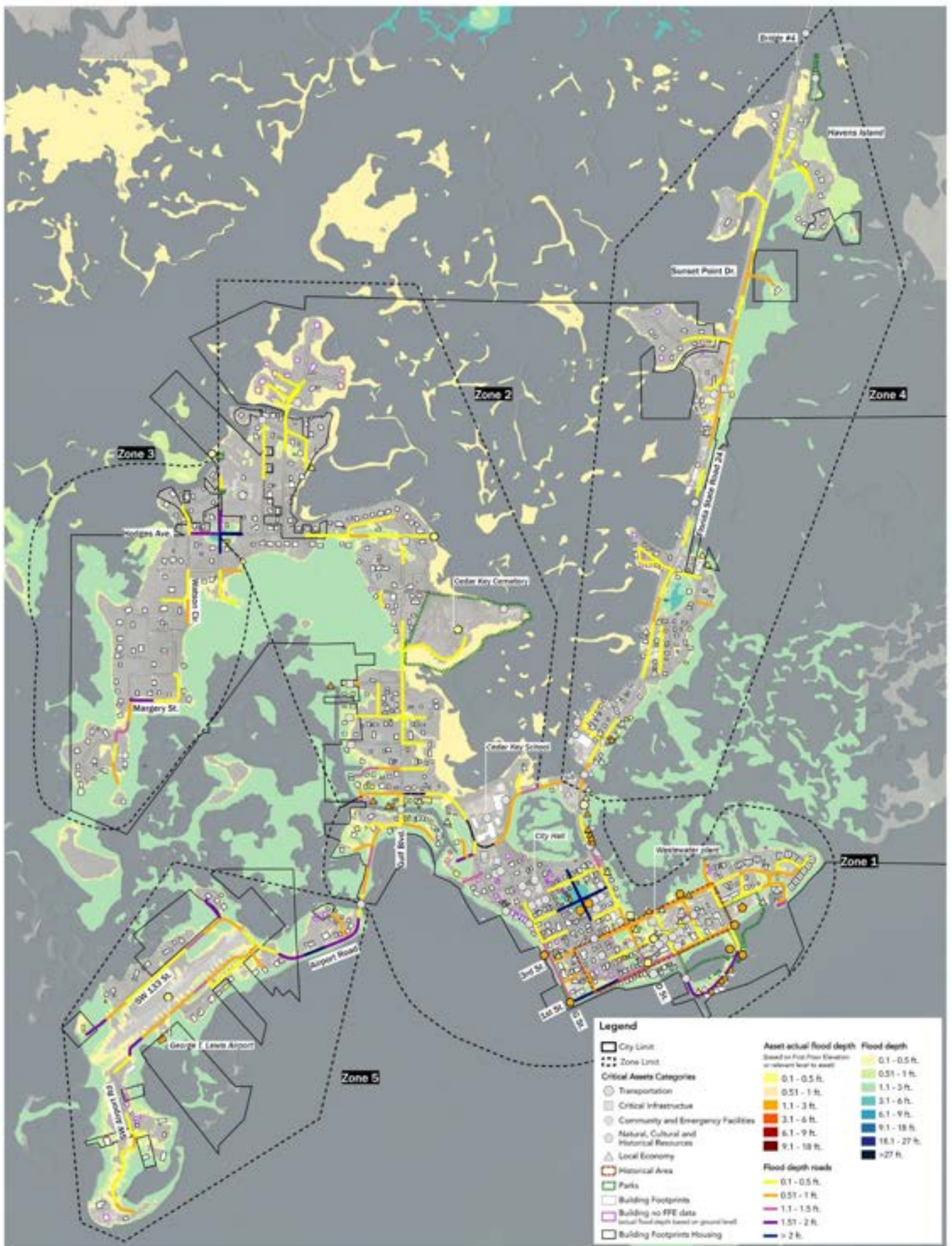




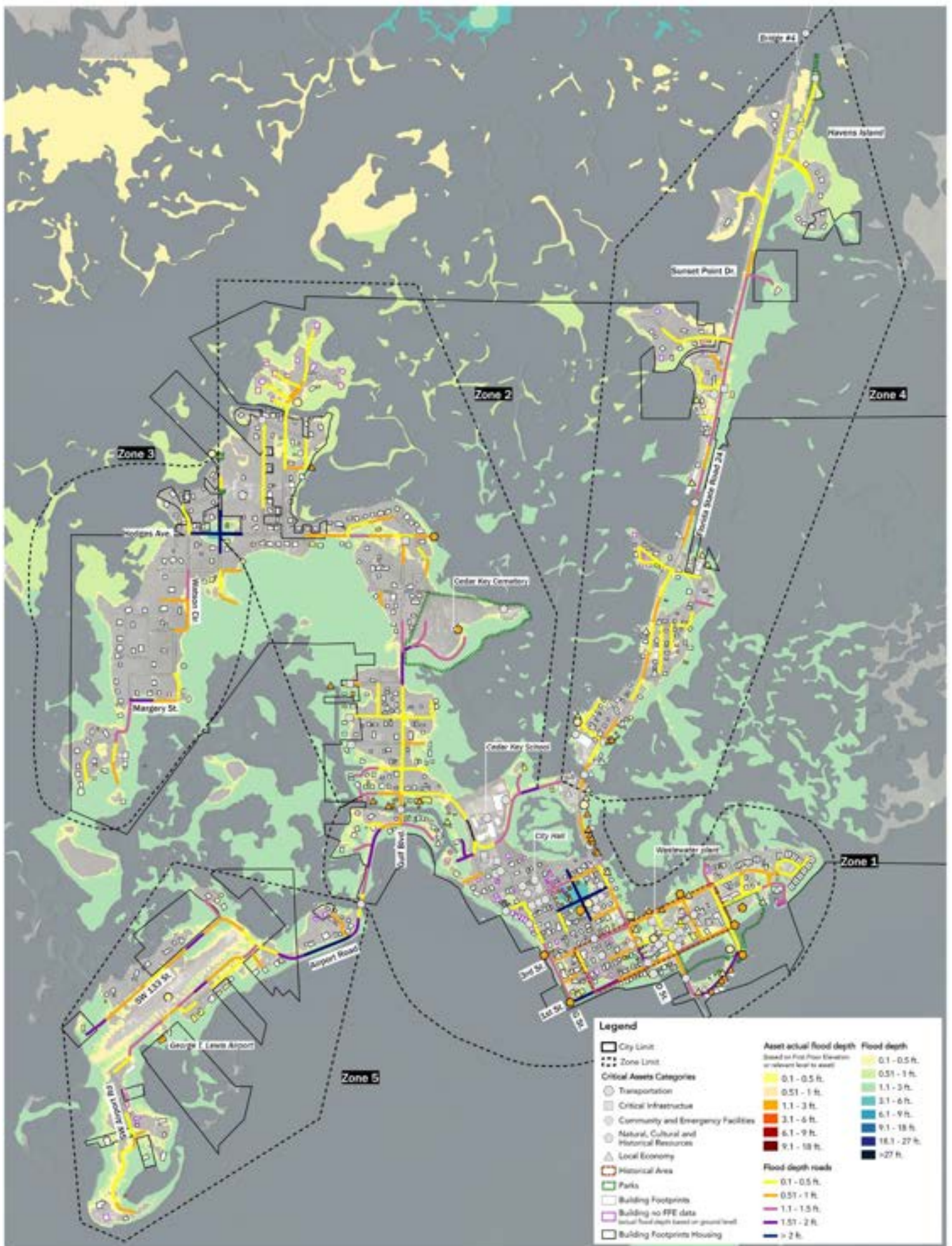


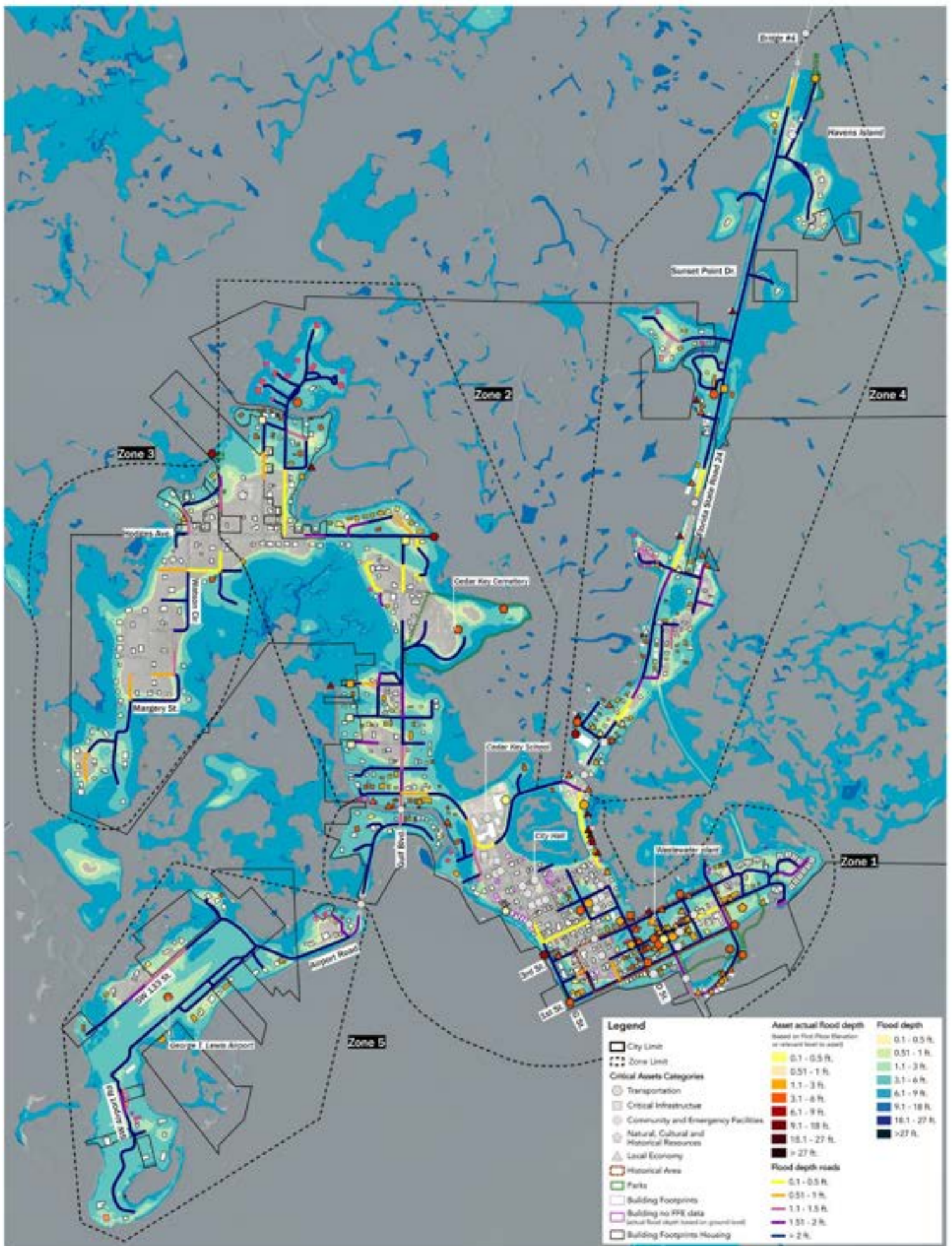




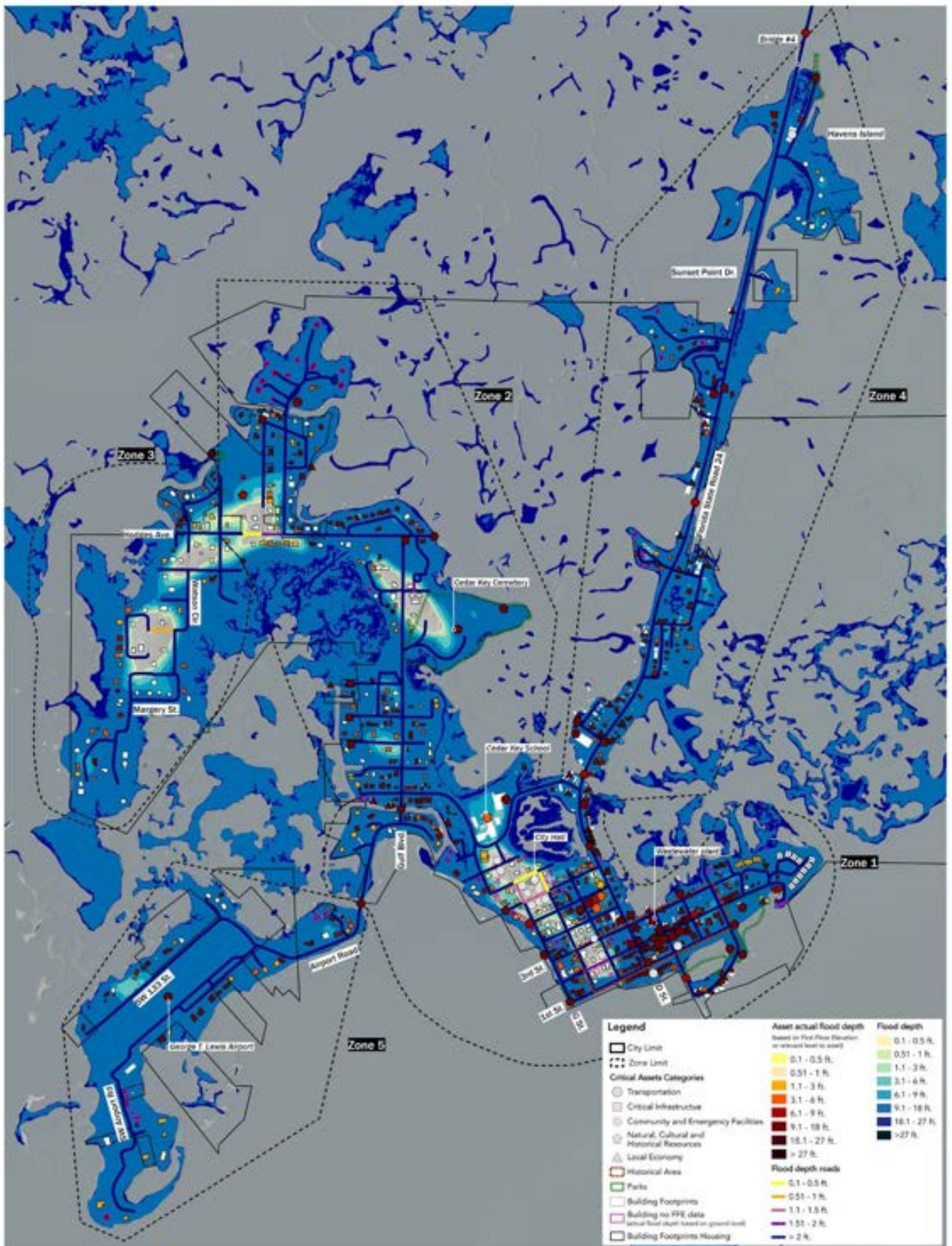


Cedar Key, Rainfall Induced Flooding, 100yr. 24hr.+ SLR 2040 Int-High

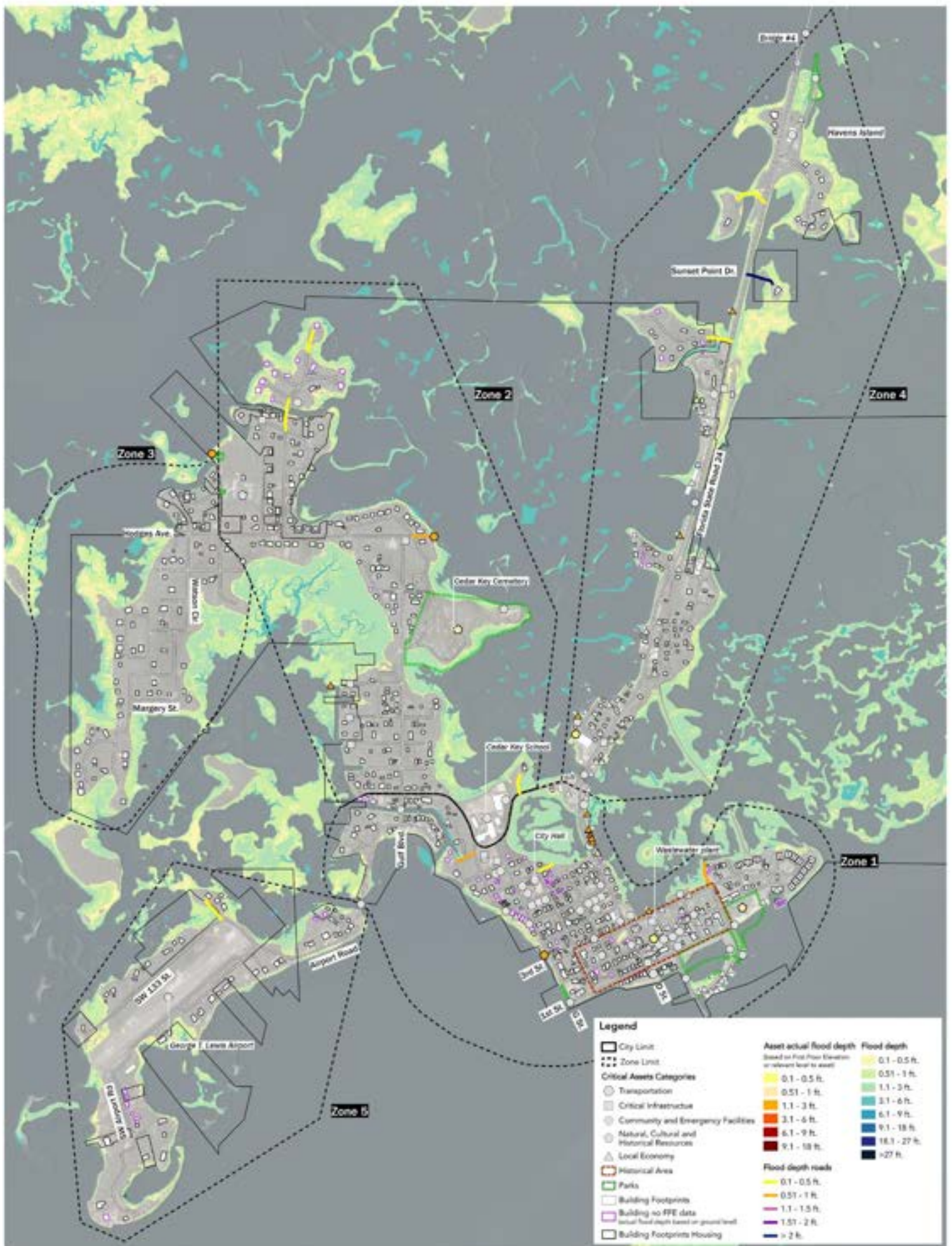




Cedar Key, Category 1 Hurricane + SLR 2040 Int-High

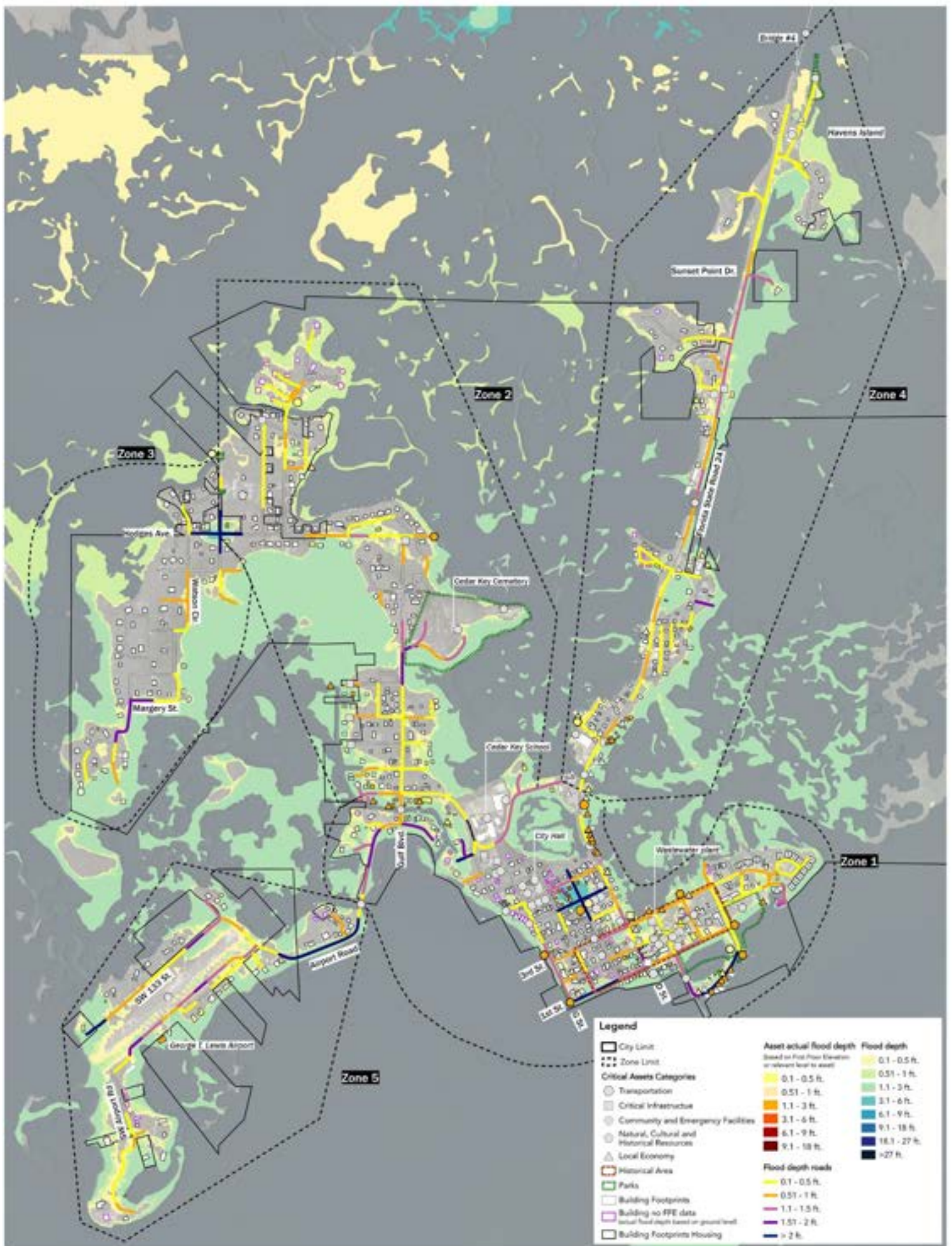


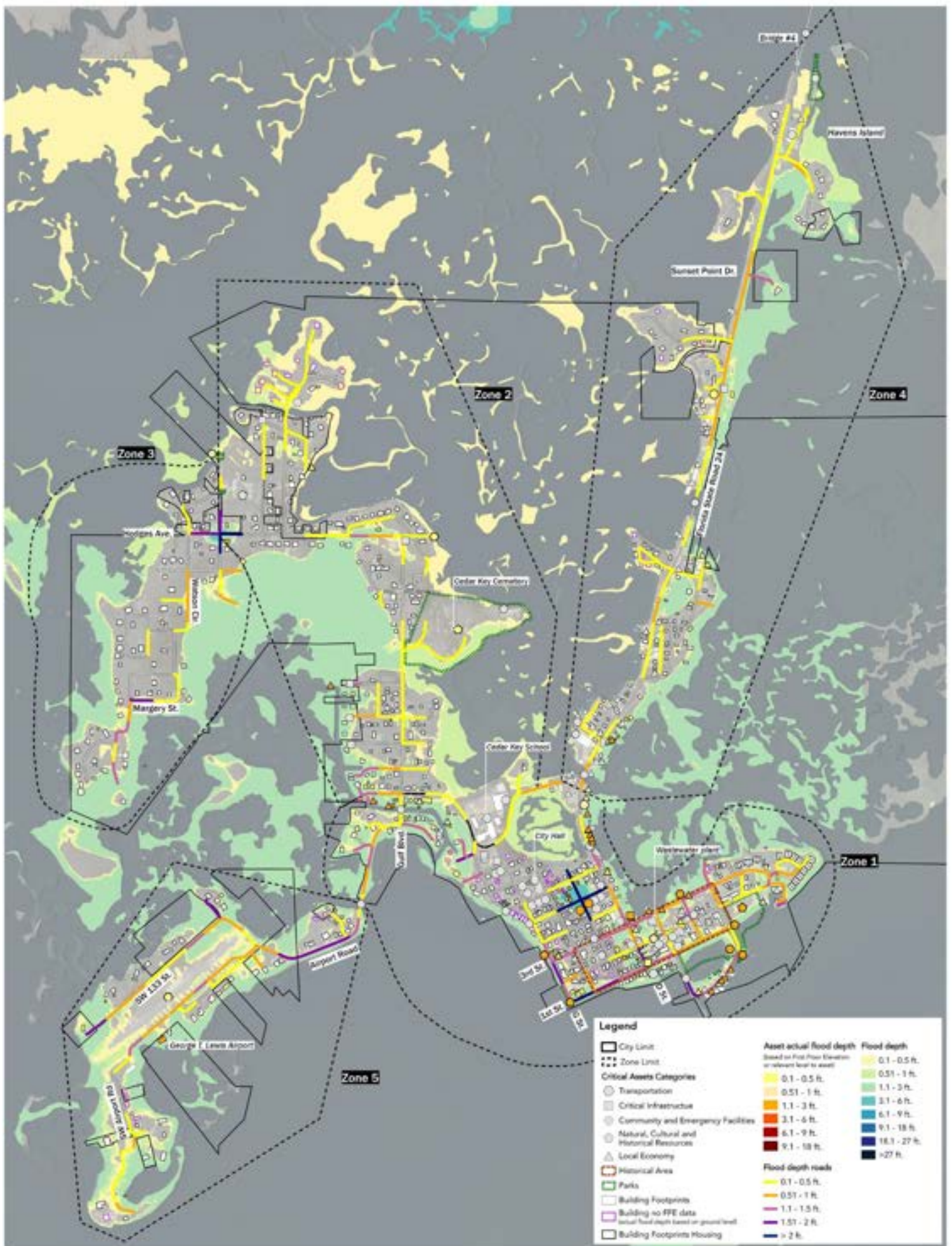


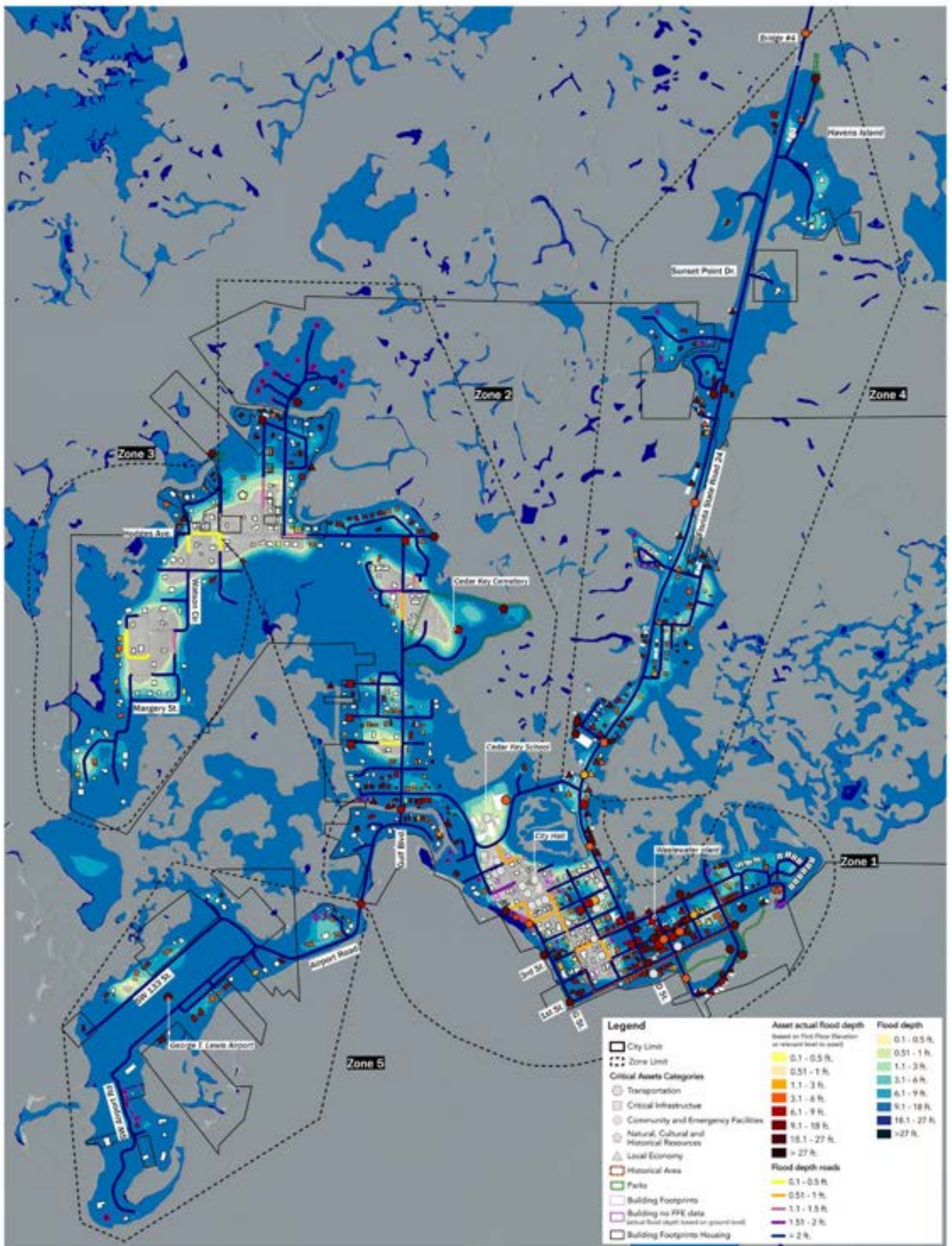


Cedar Key, Extreme Water Level 2yr. Return + SLR 2070 Int-Low





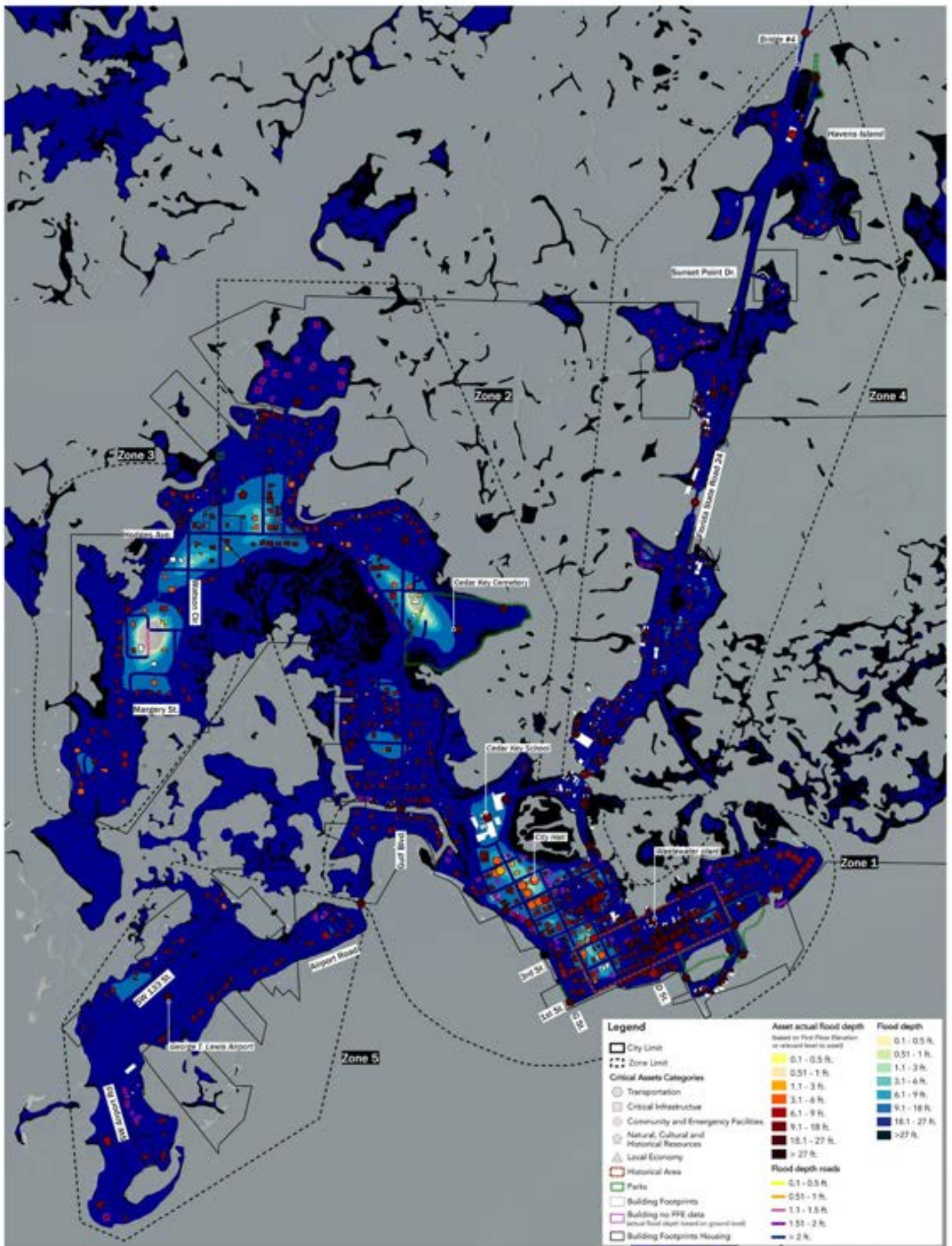


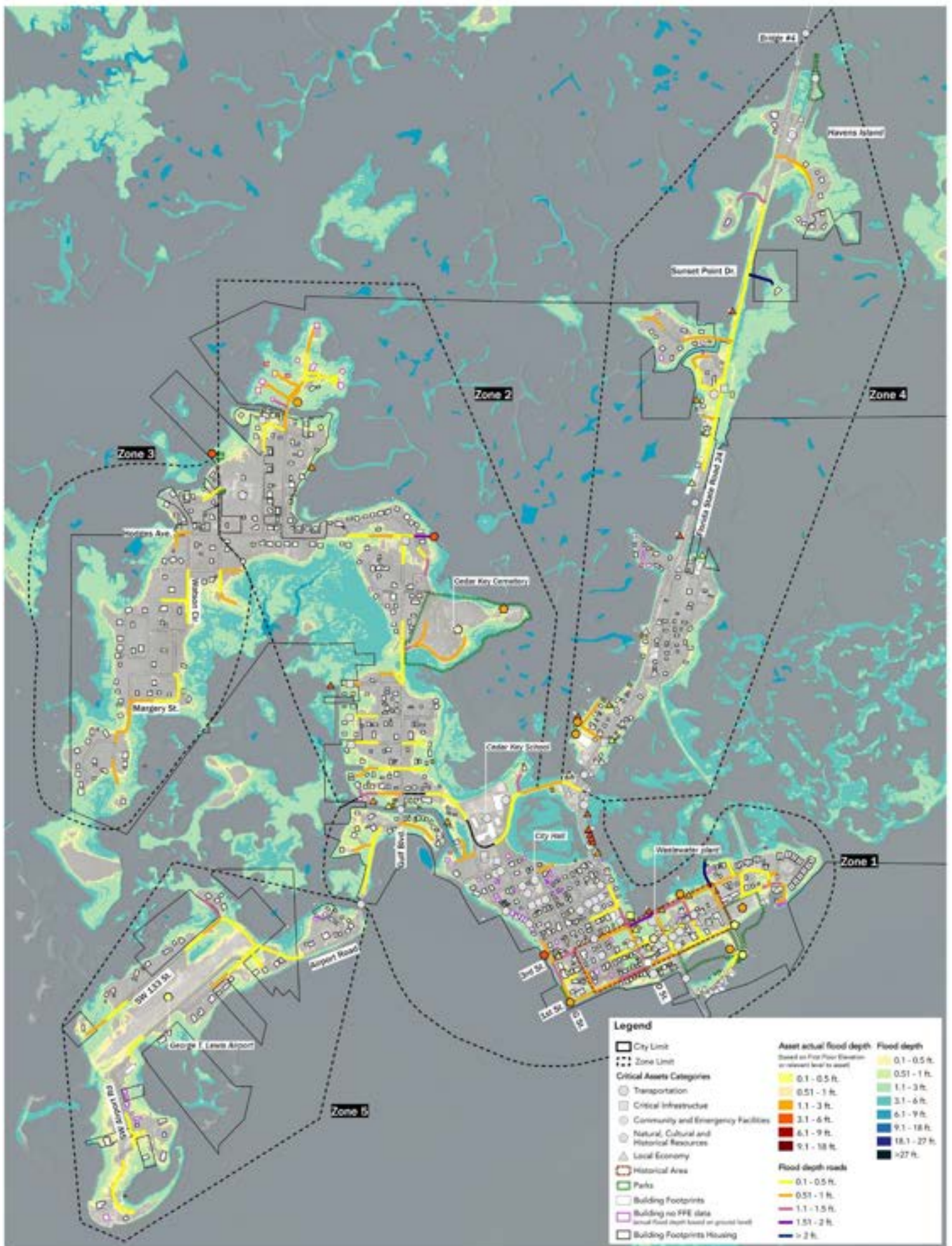


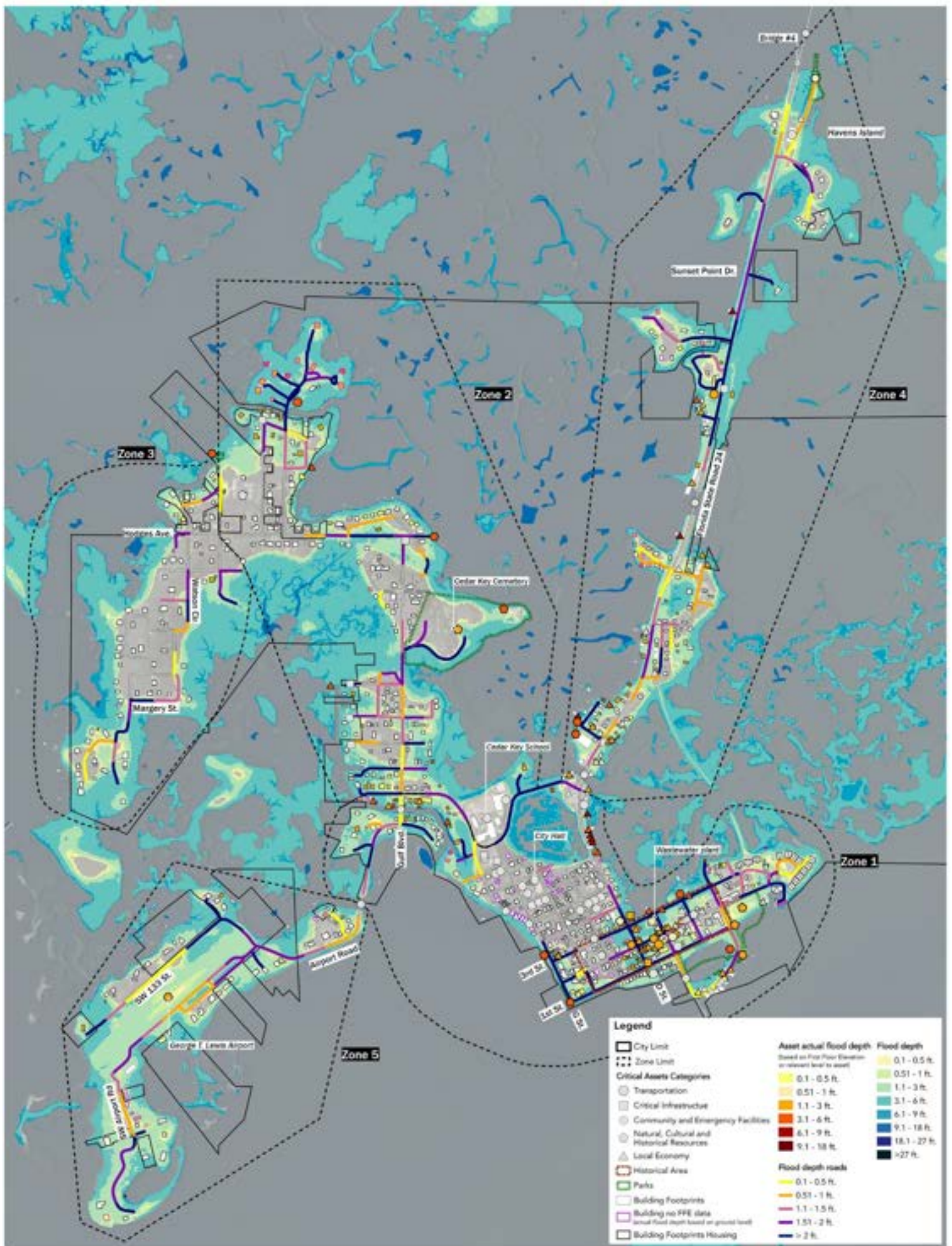
Cedar Key, Special Flood Hazard Area (SFHA) 100-yr + SLR 2070 Int-Low



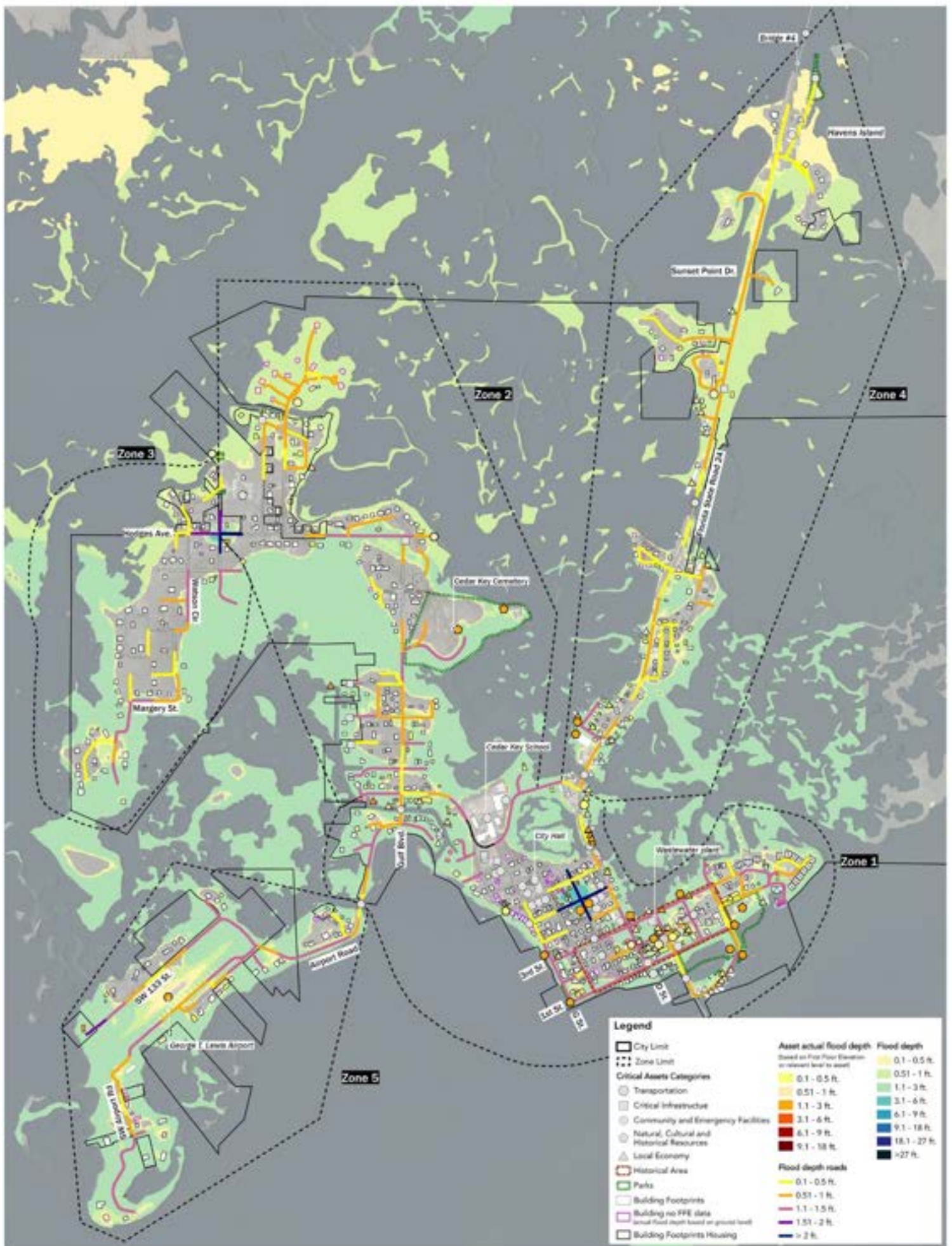




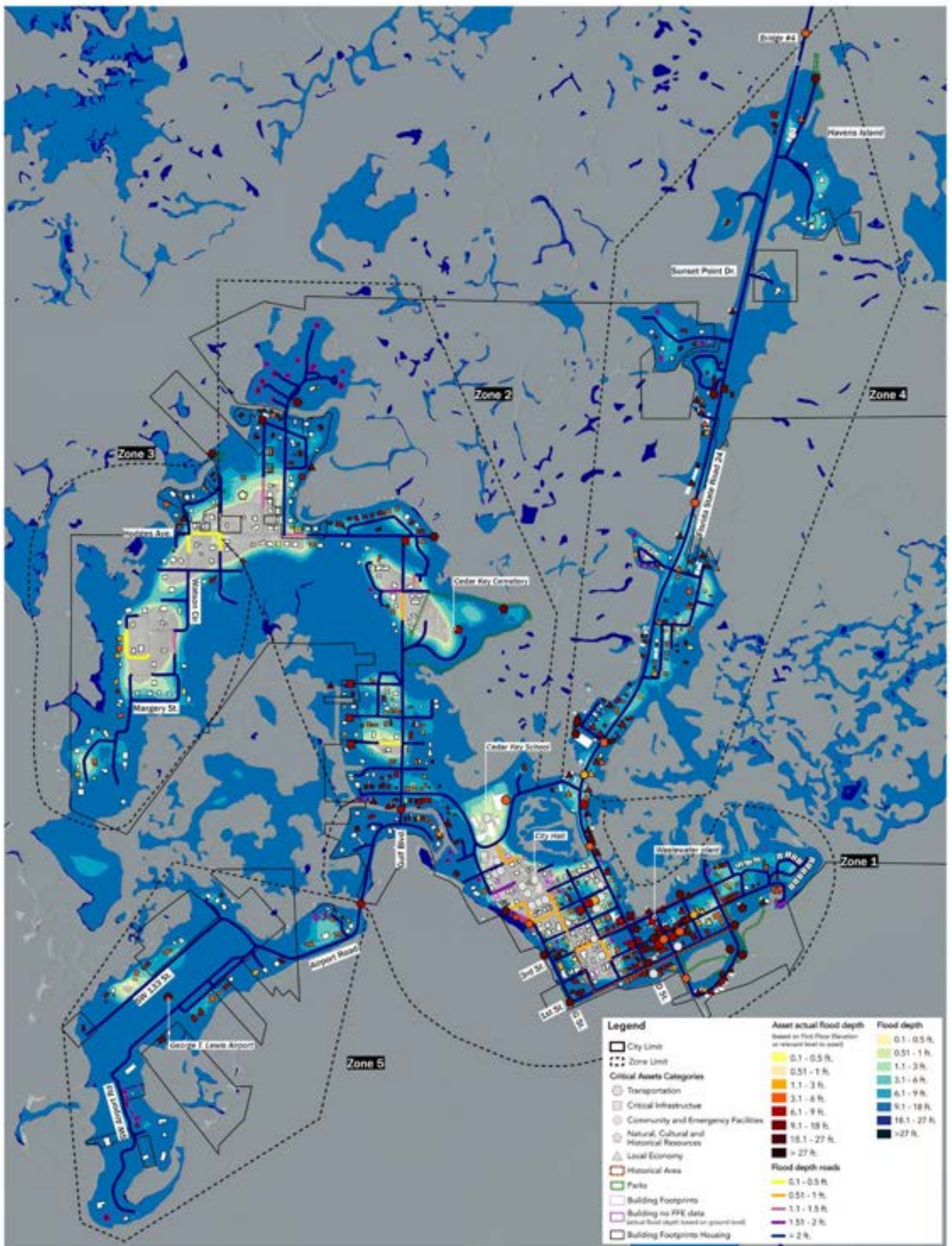




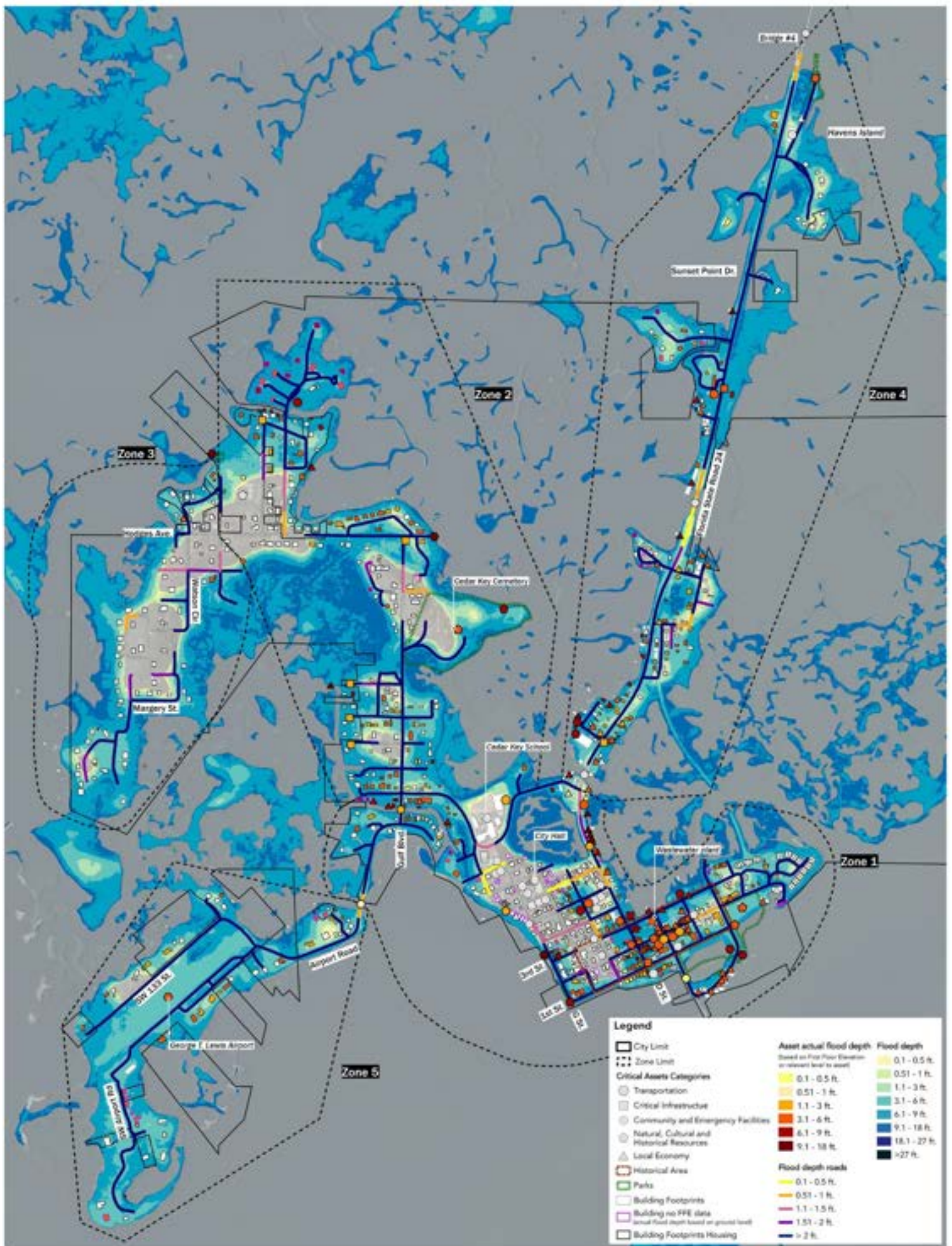




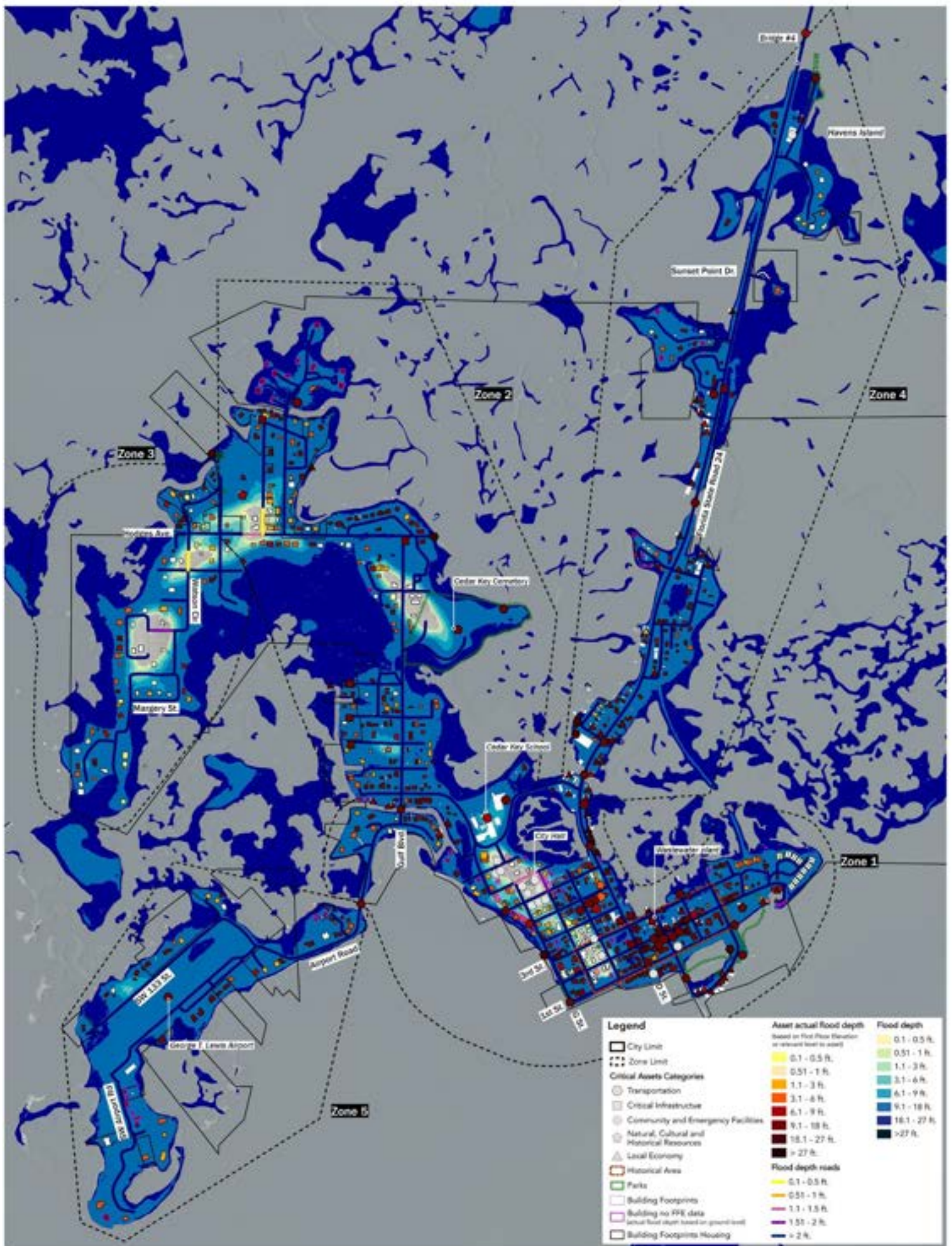
Cedar Key, Rainfall Induced Flooding, 500yr. 24hr.+ SLR 2070 Int-High



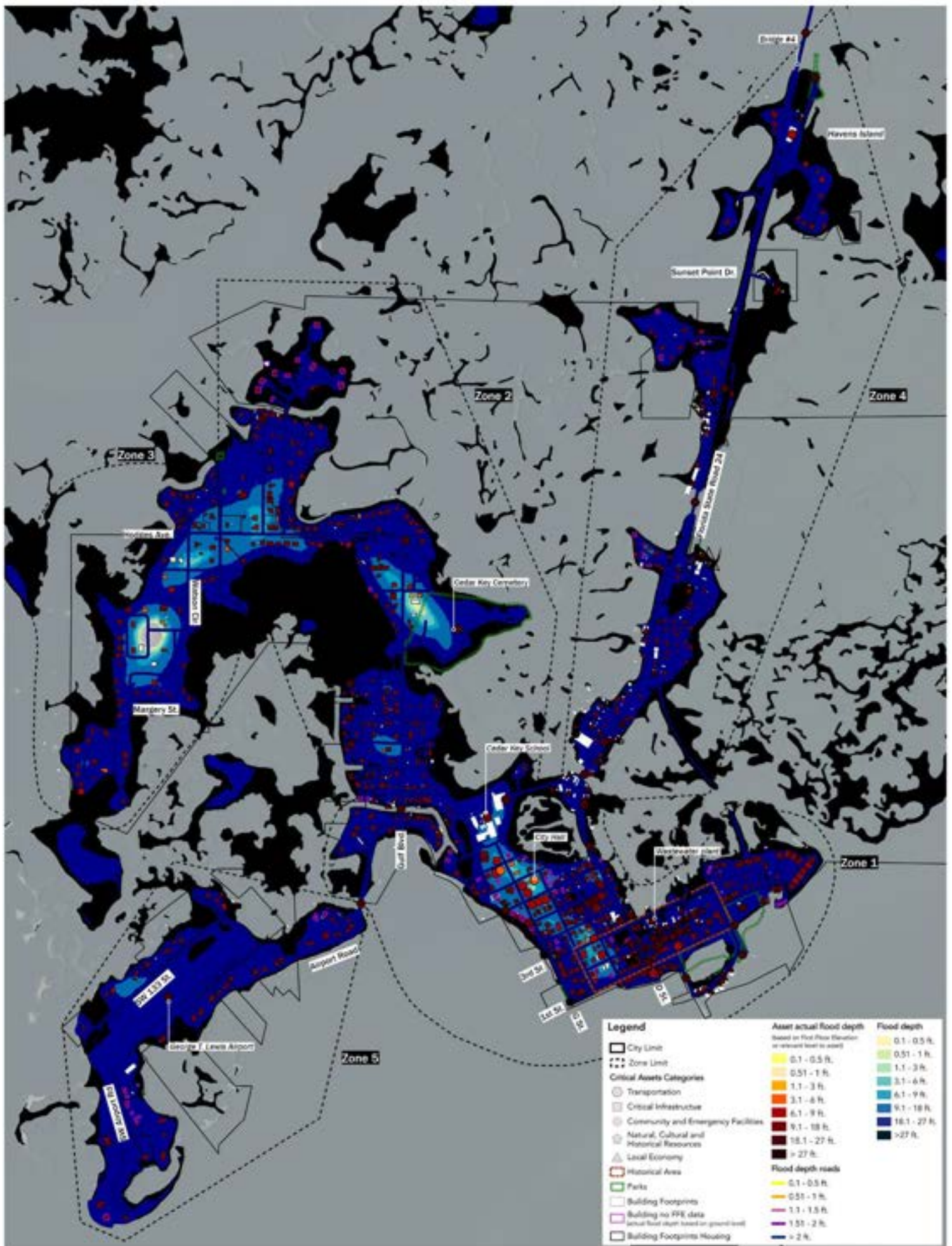
Cedar Key, Special Flood Hazard Area (SFHA) 100-yr + SLR 2070 Int-High

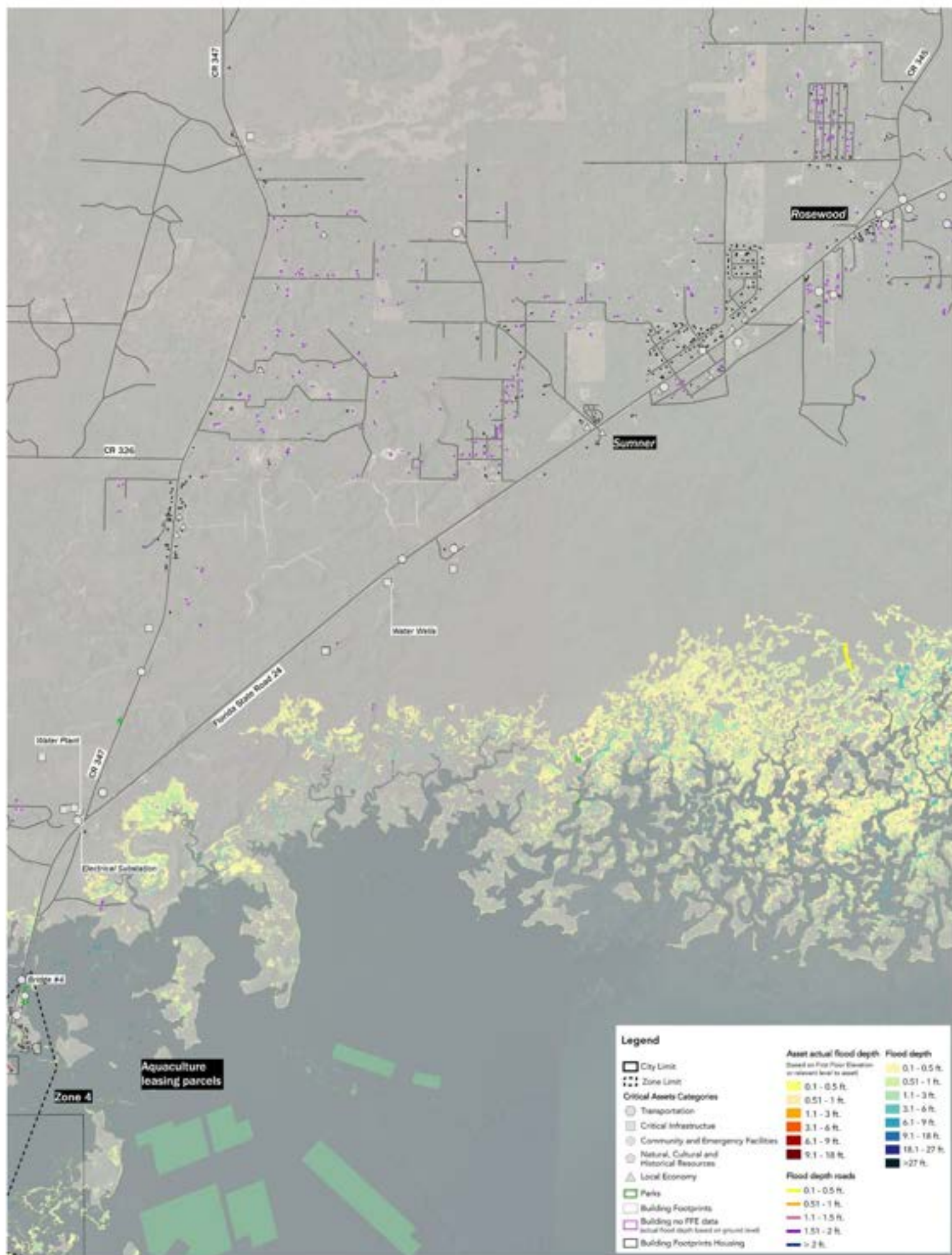


Cedar Key, Category 1 Hurricane + SLR 2070 Int-High

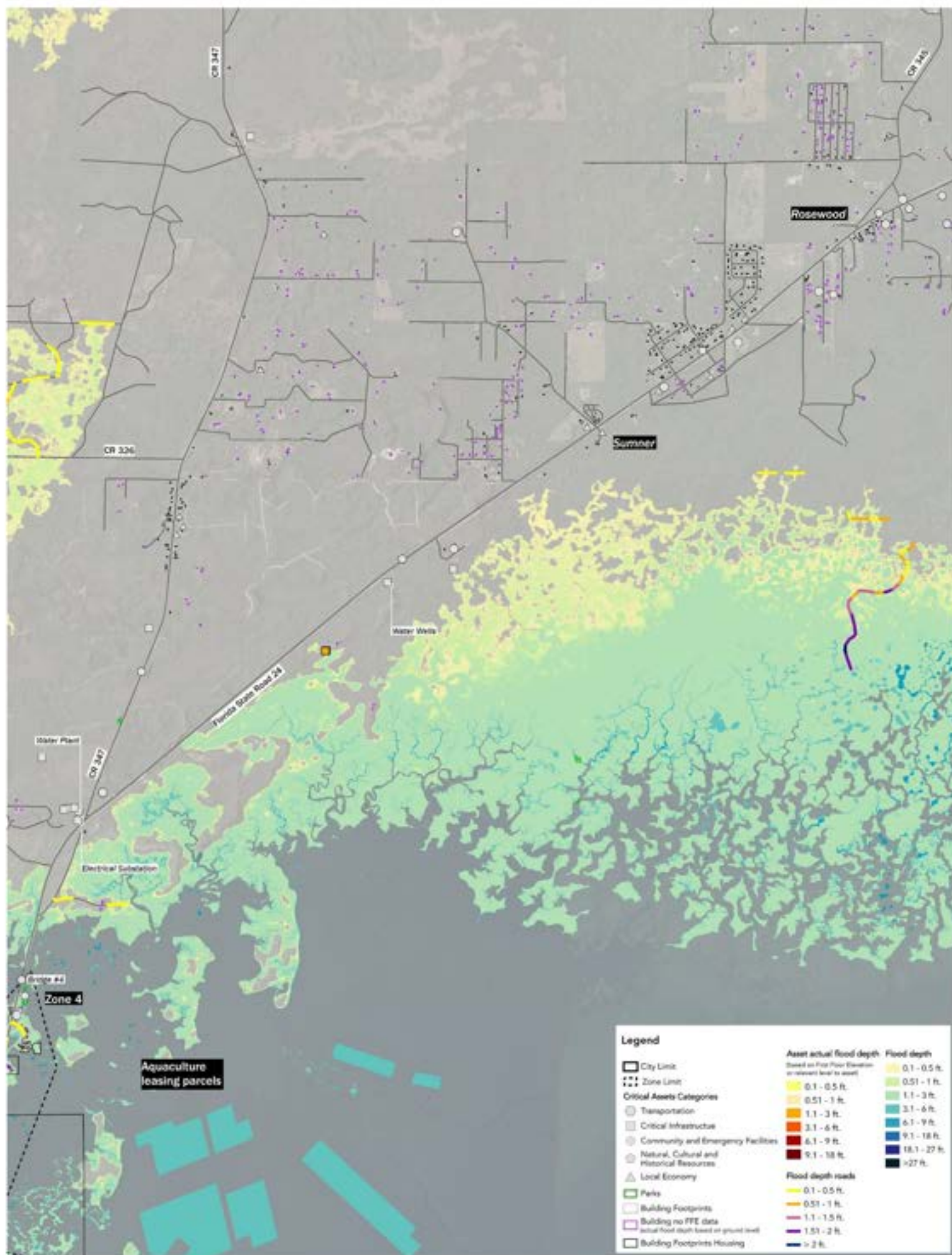


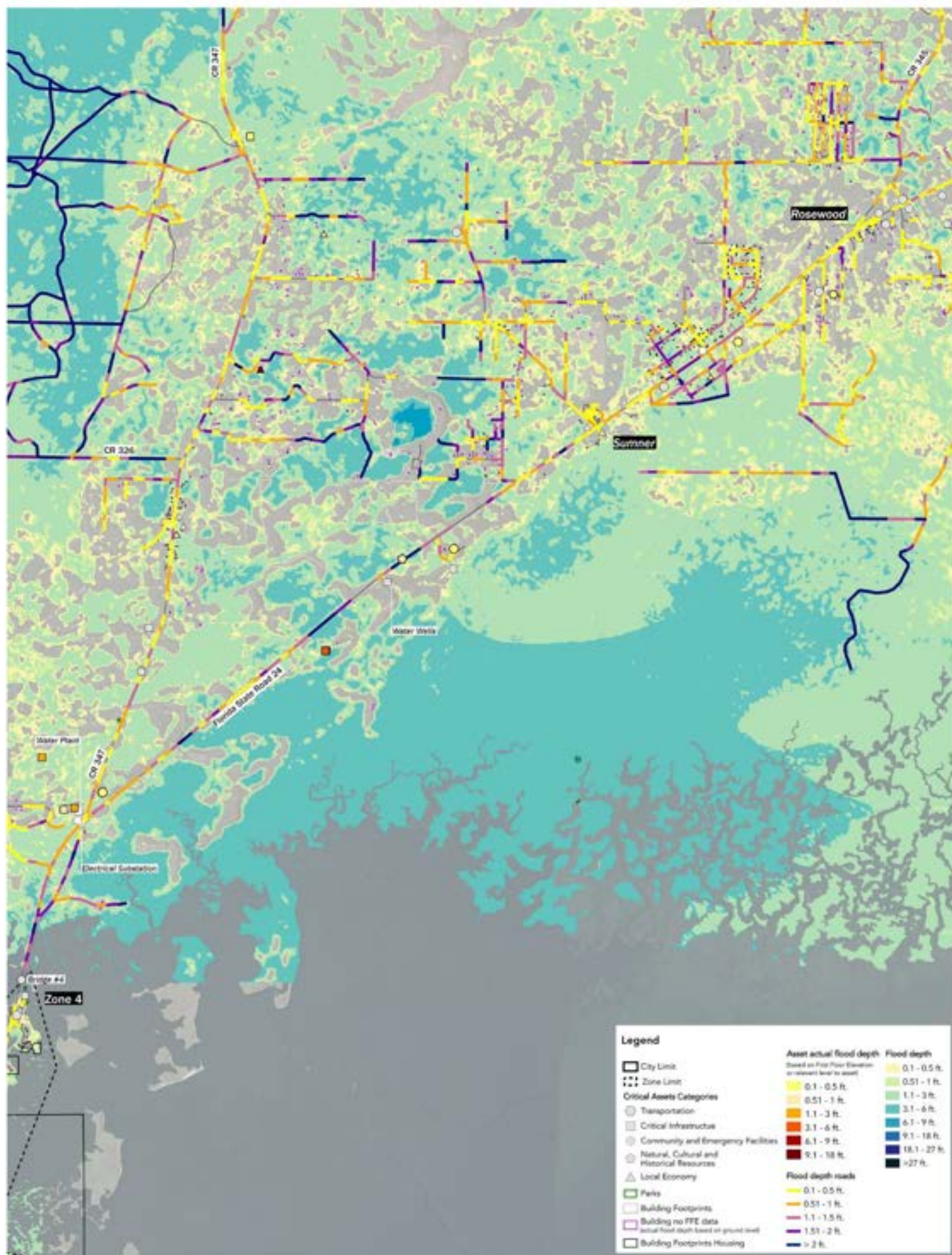
Cedar Key, Category 3 Hurricane + SLR 2070 Int-High



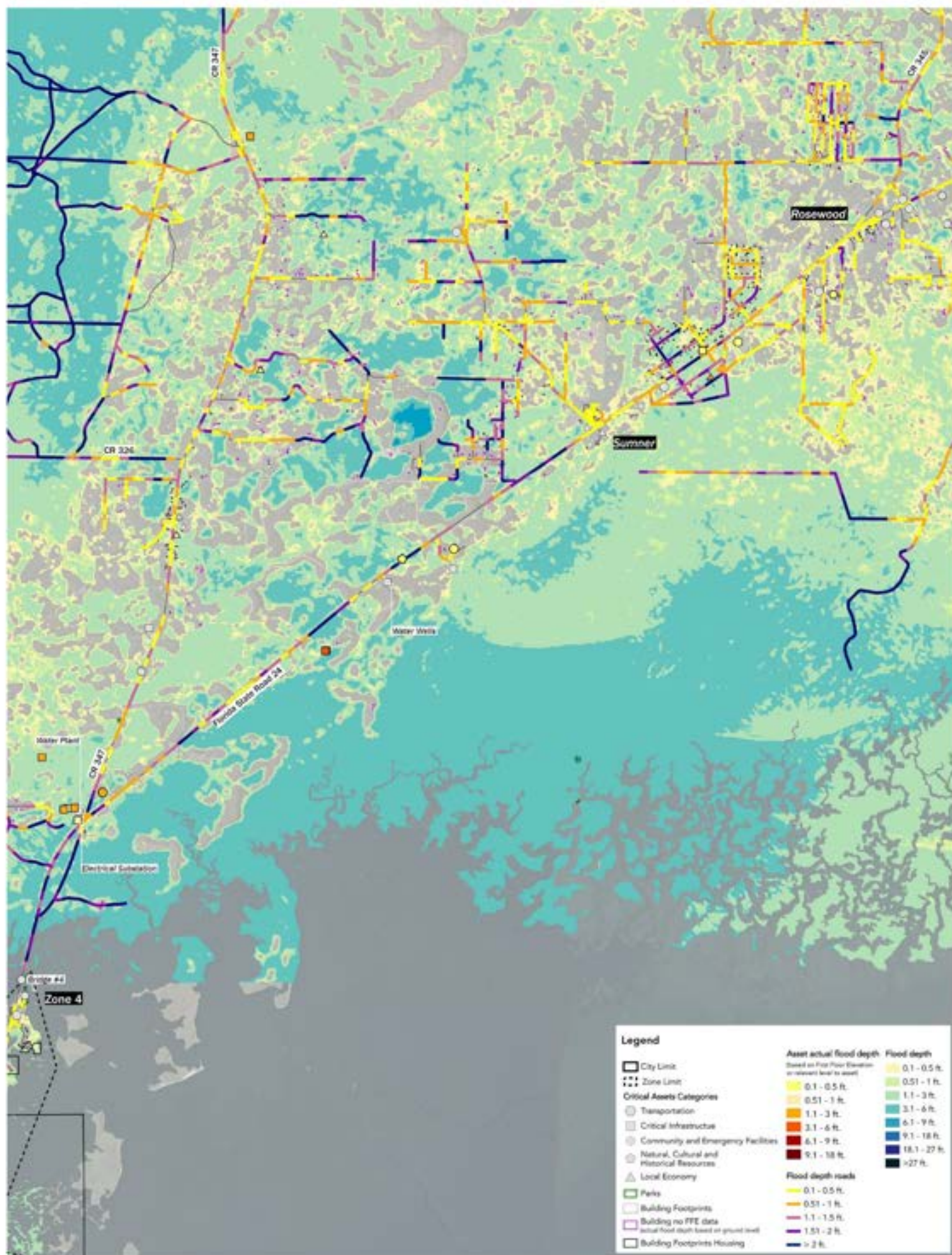


Cedar Key Influence Area, Mean Higher High Water, 2022

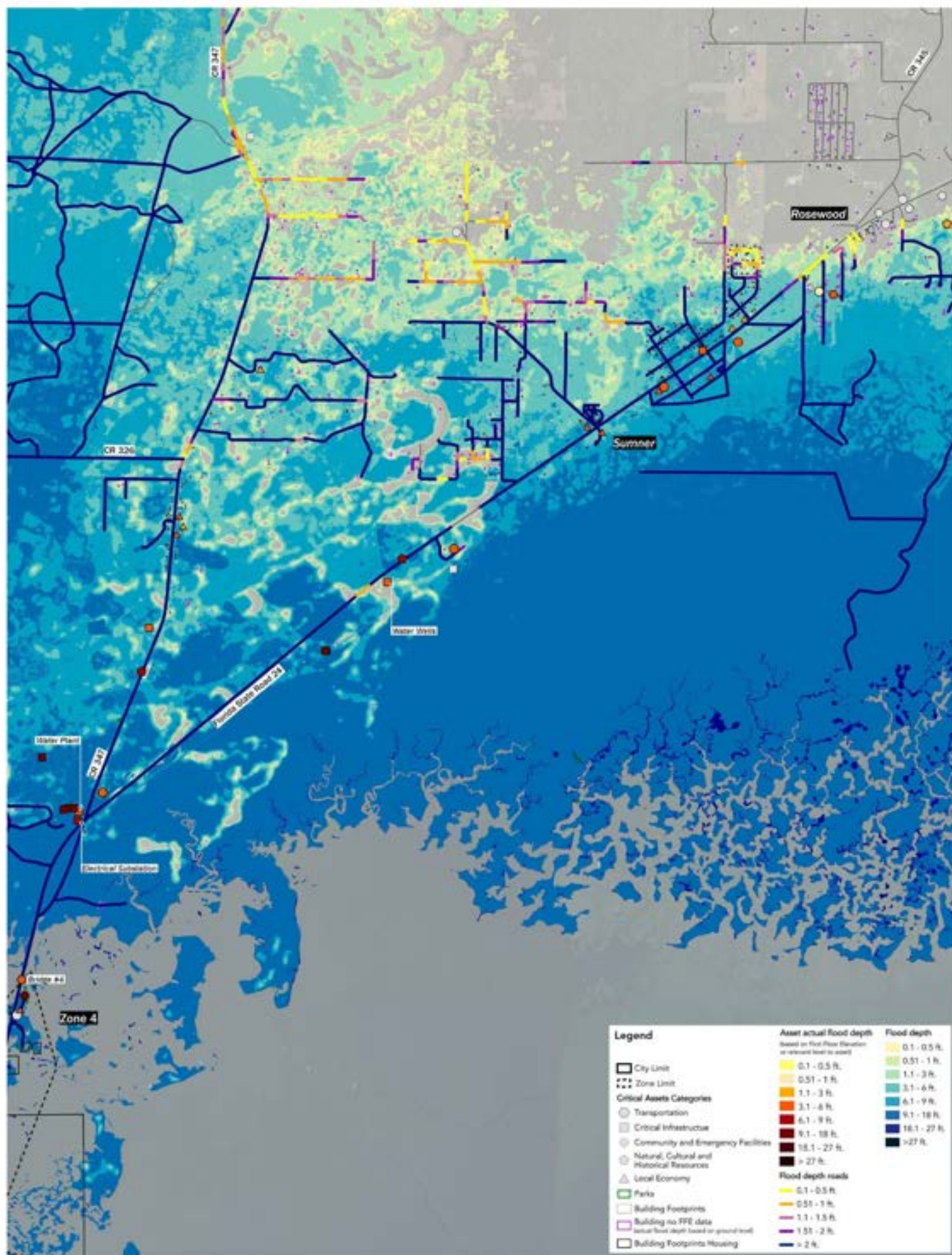


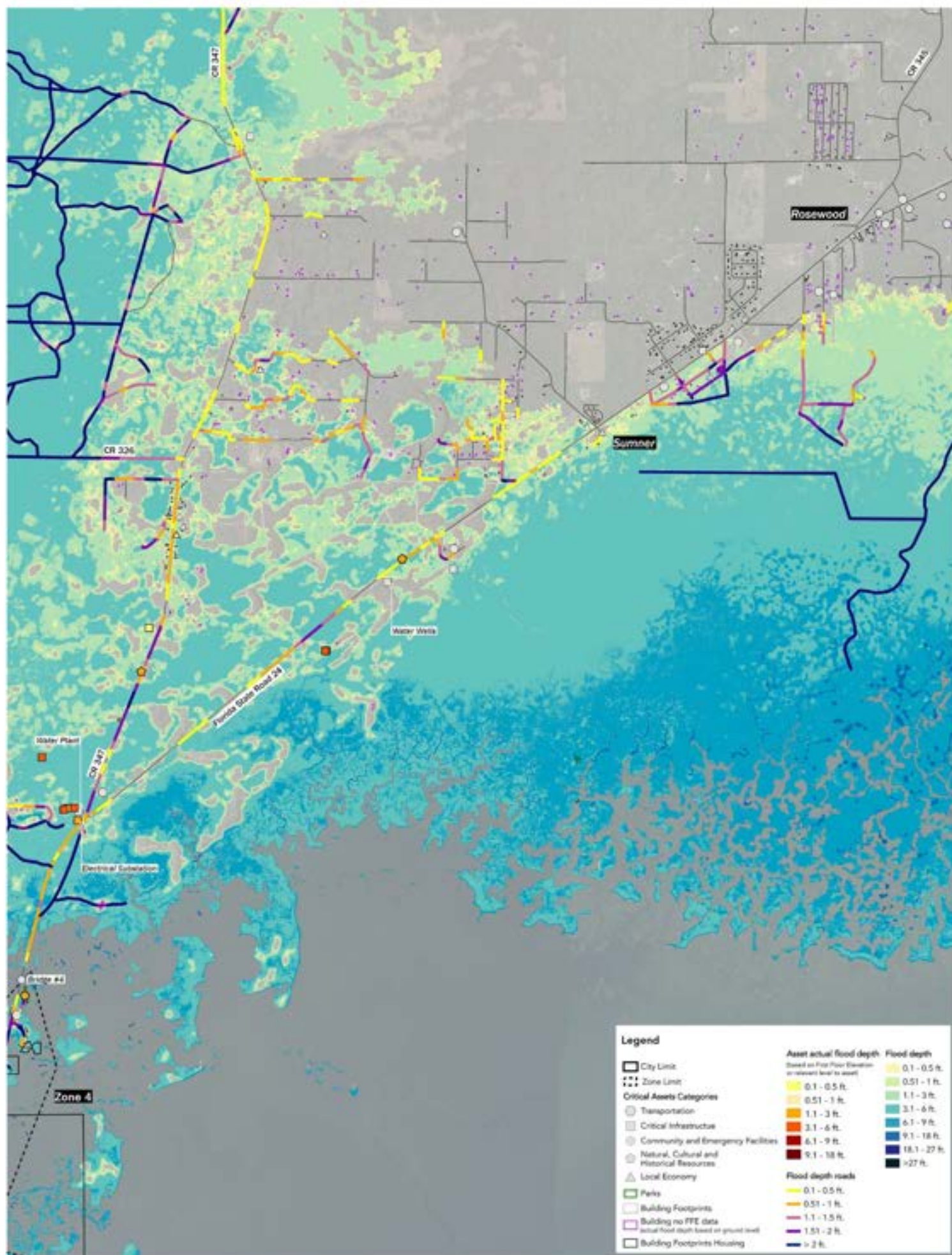


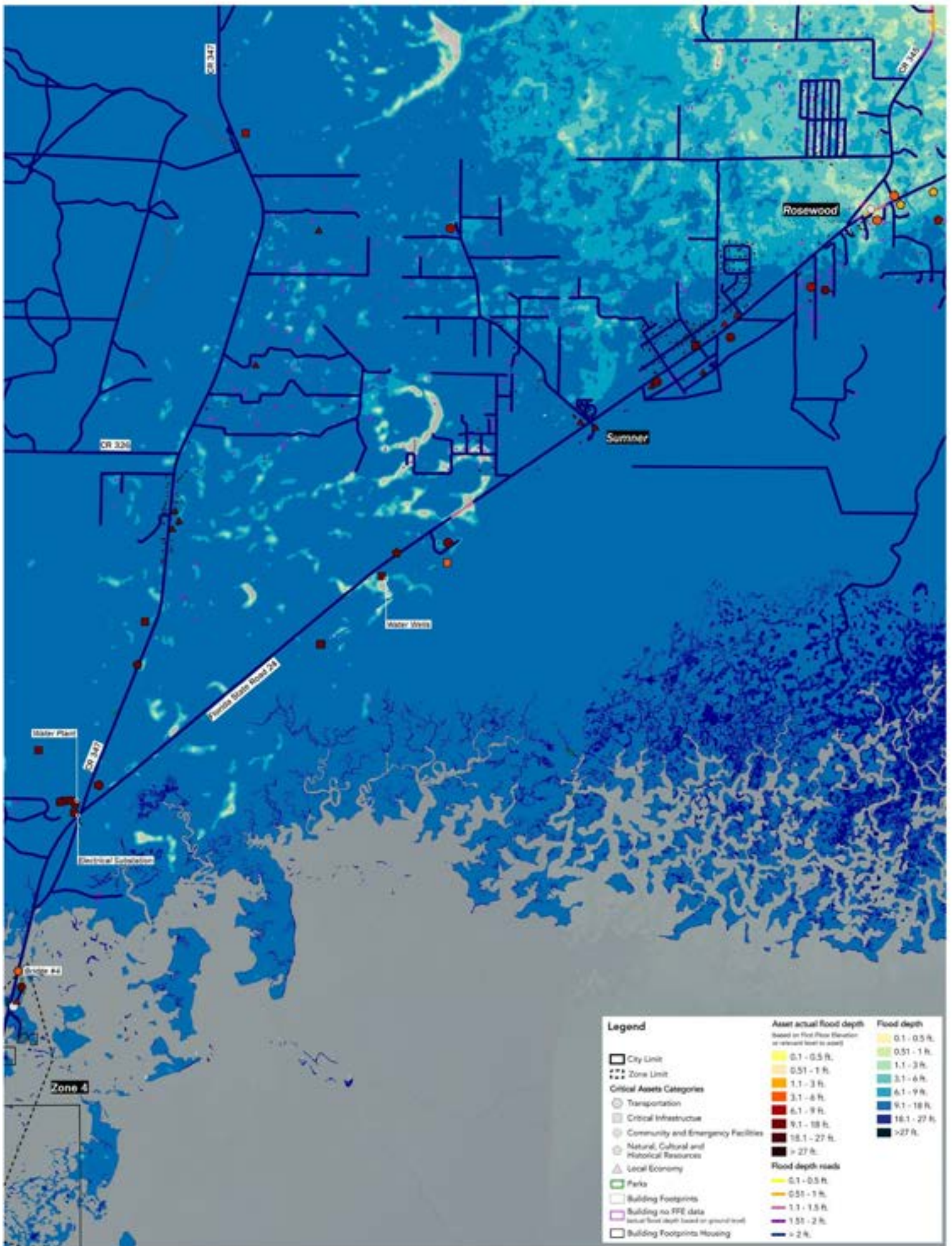
Cedar Key Influence Area, Rainfall Induced Flooding 100yr 24h



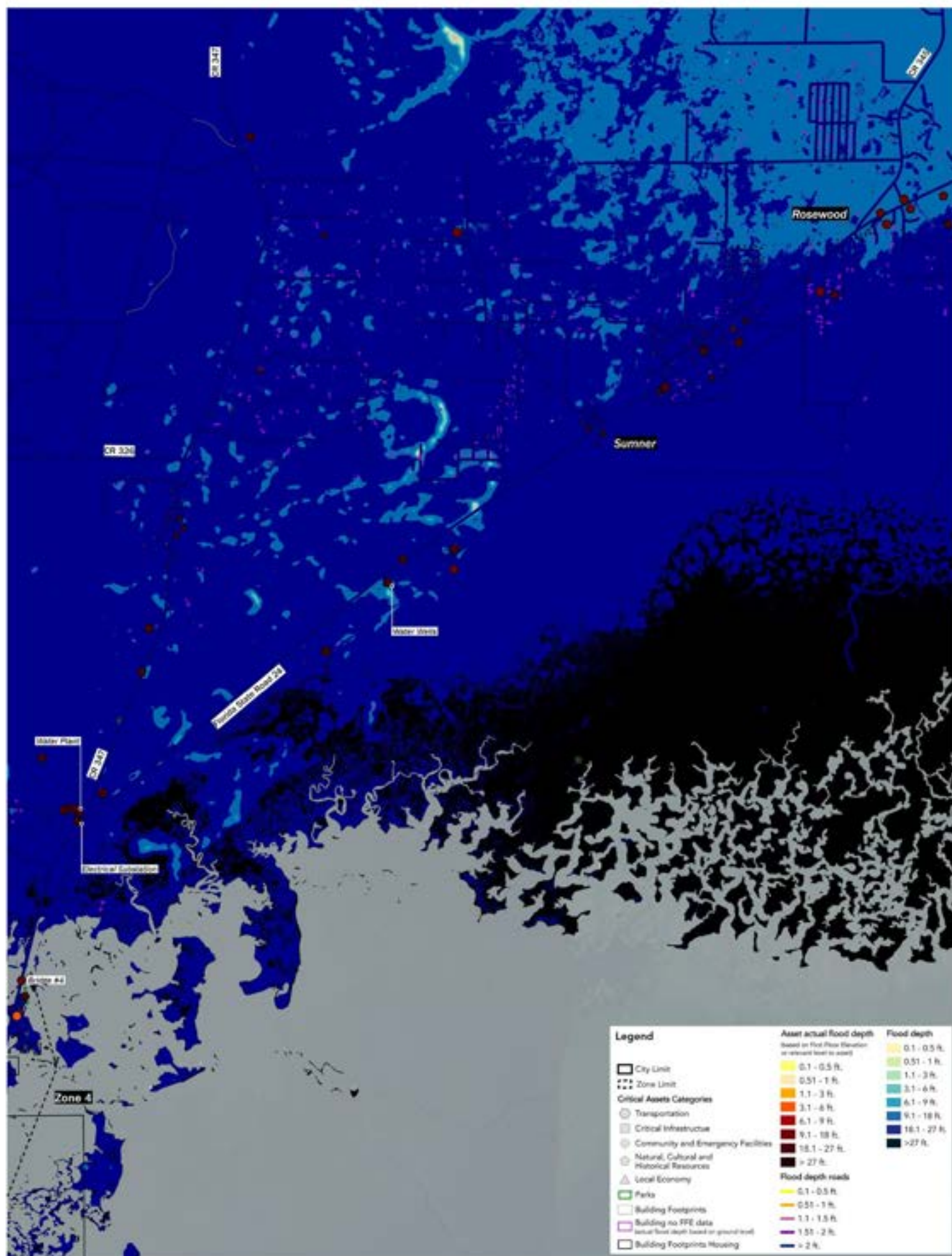
Cedar Key Influence Area, Rainfall Induced Flooding 500yr 24h



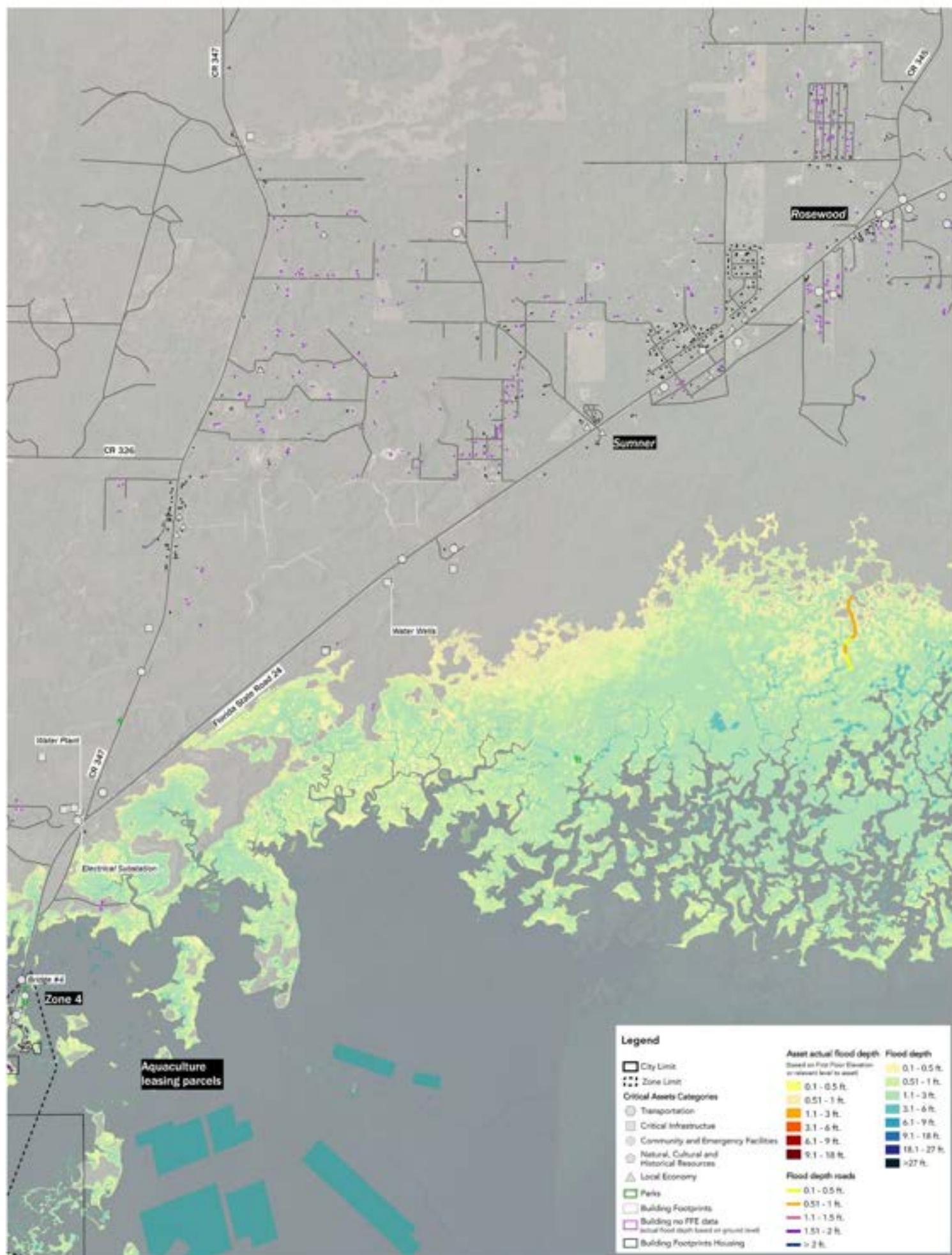


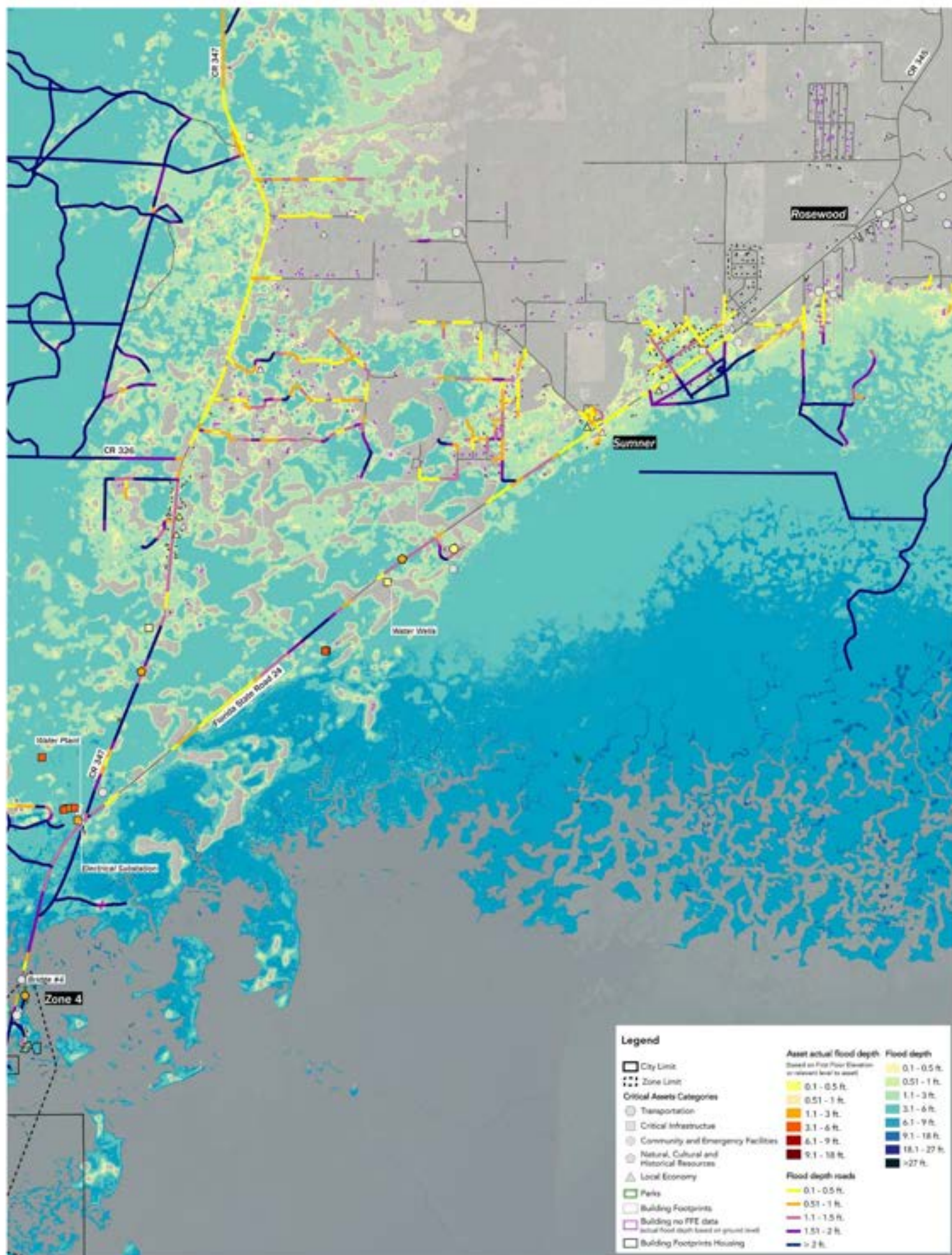


Cedar Key Influence Area, Category 3 Hurricane, 2022

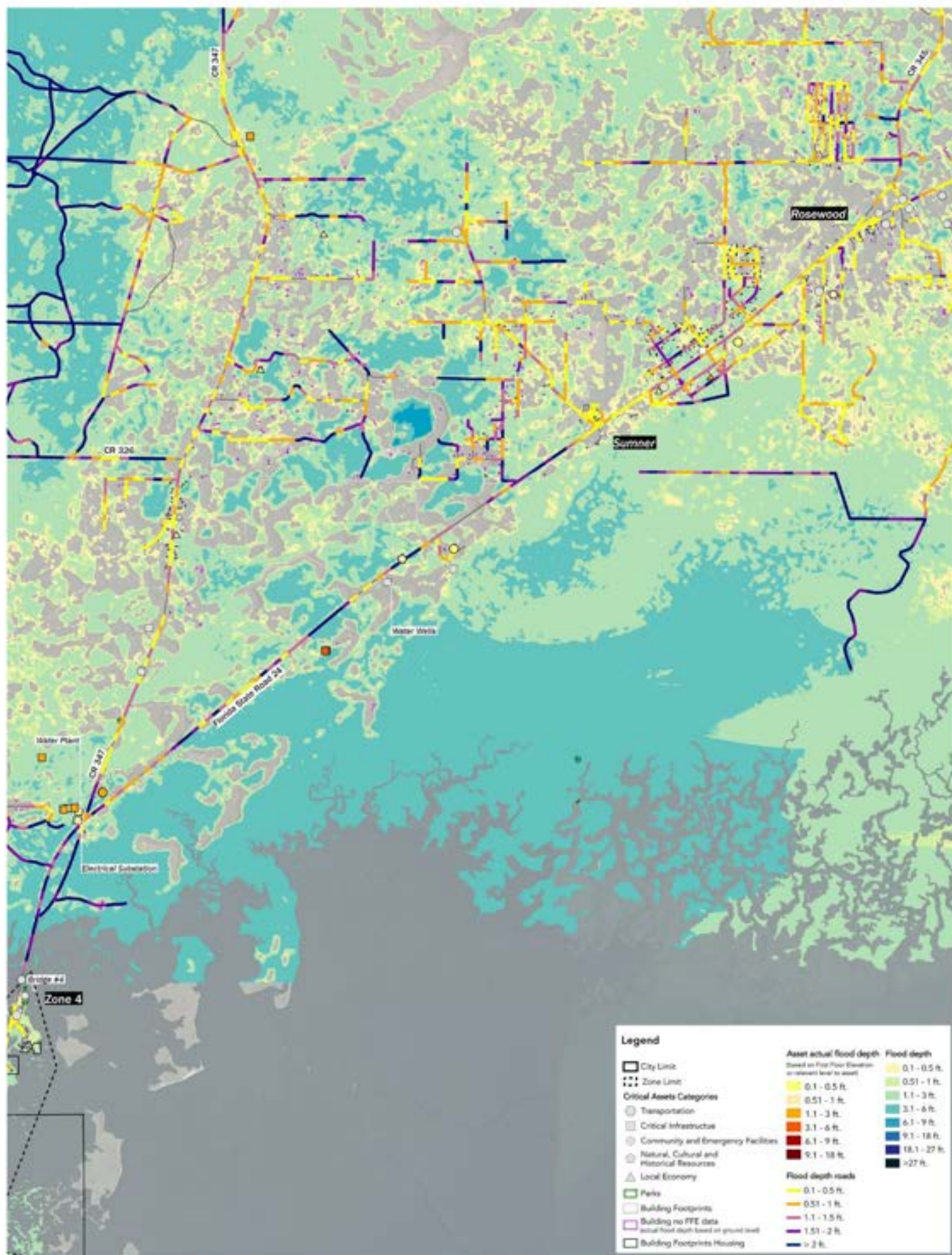


Cedar Key Influence Area, Category 5 Hurricane, 2022

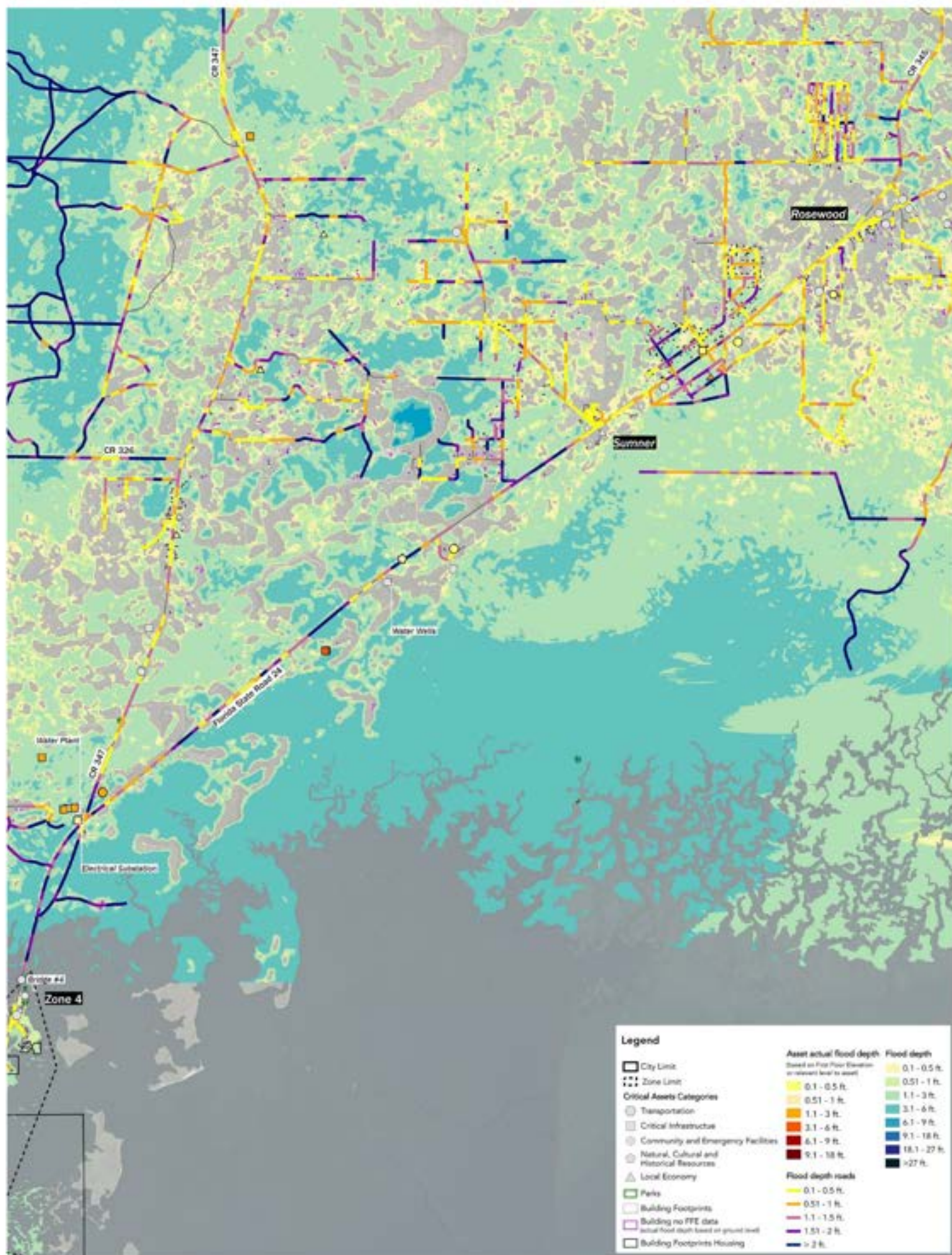




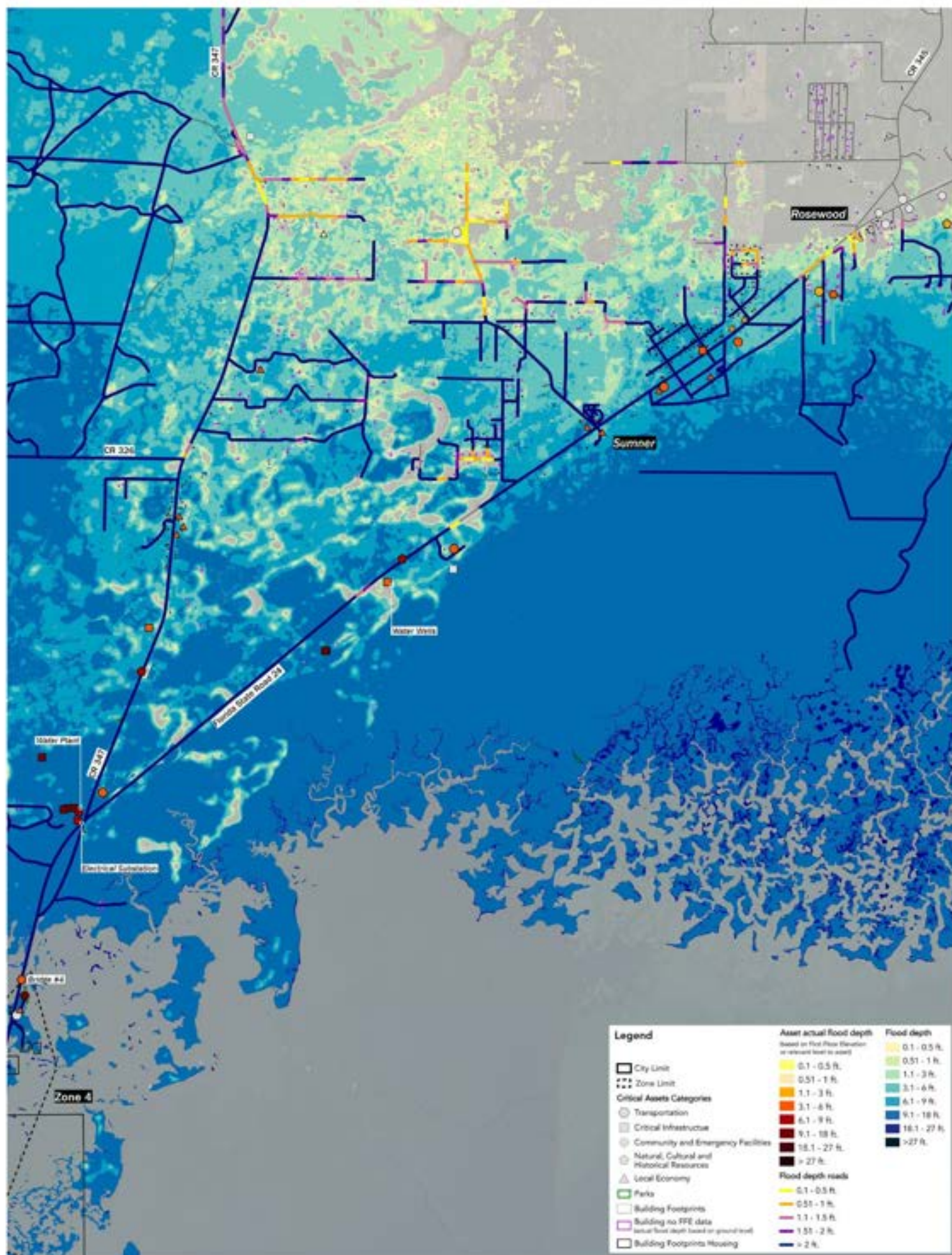
Cedar Key Influence Area, Extreme Water Level 2-year return + SLR 2040 Int-Low

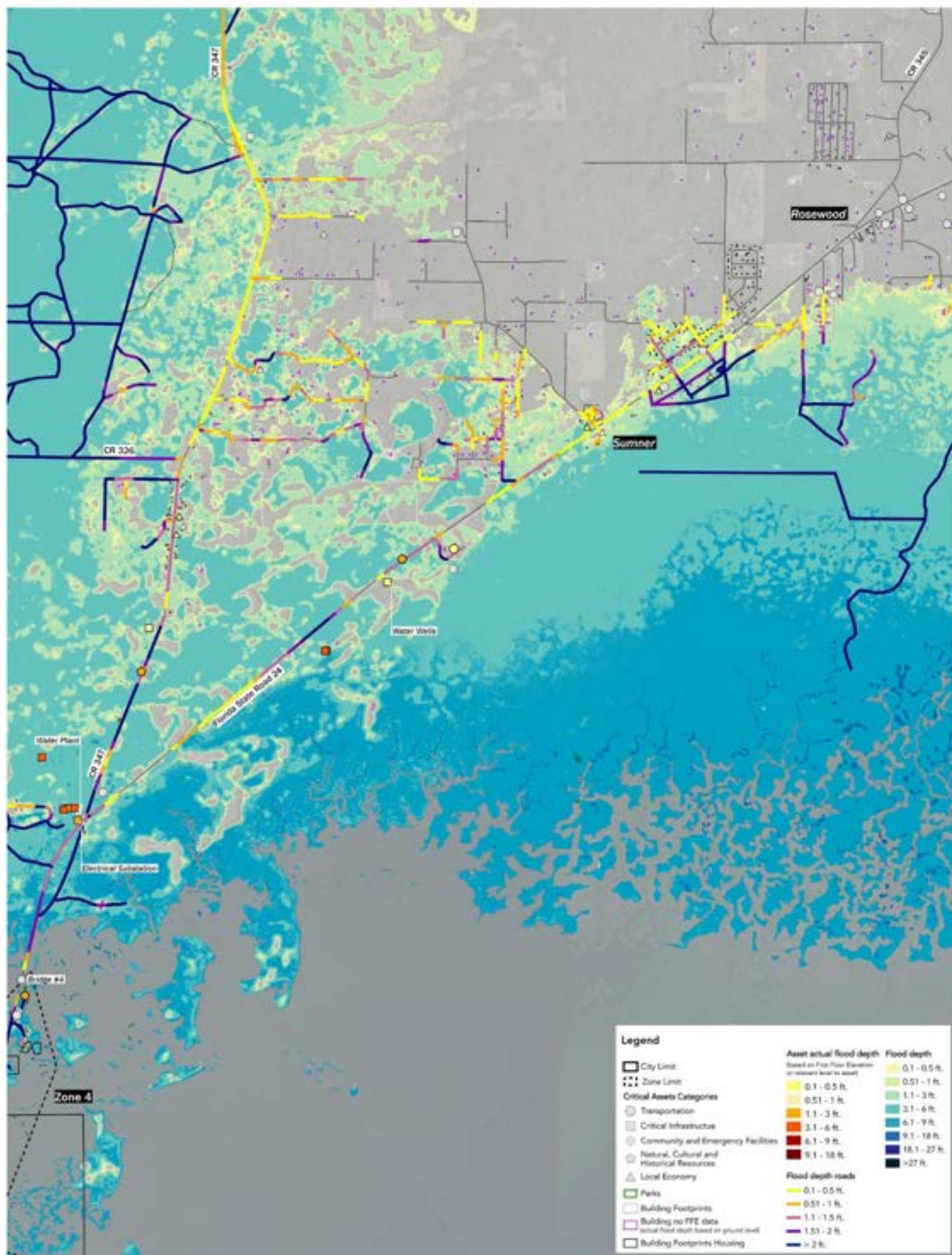


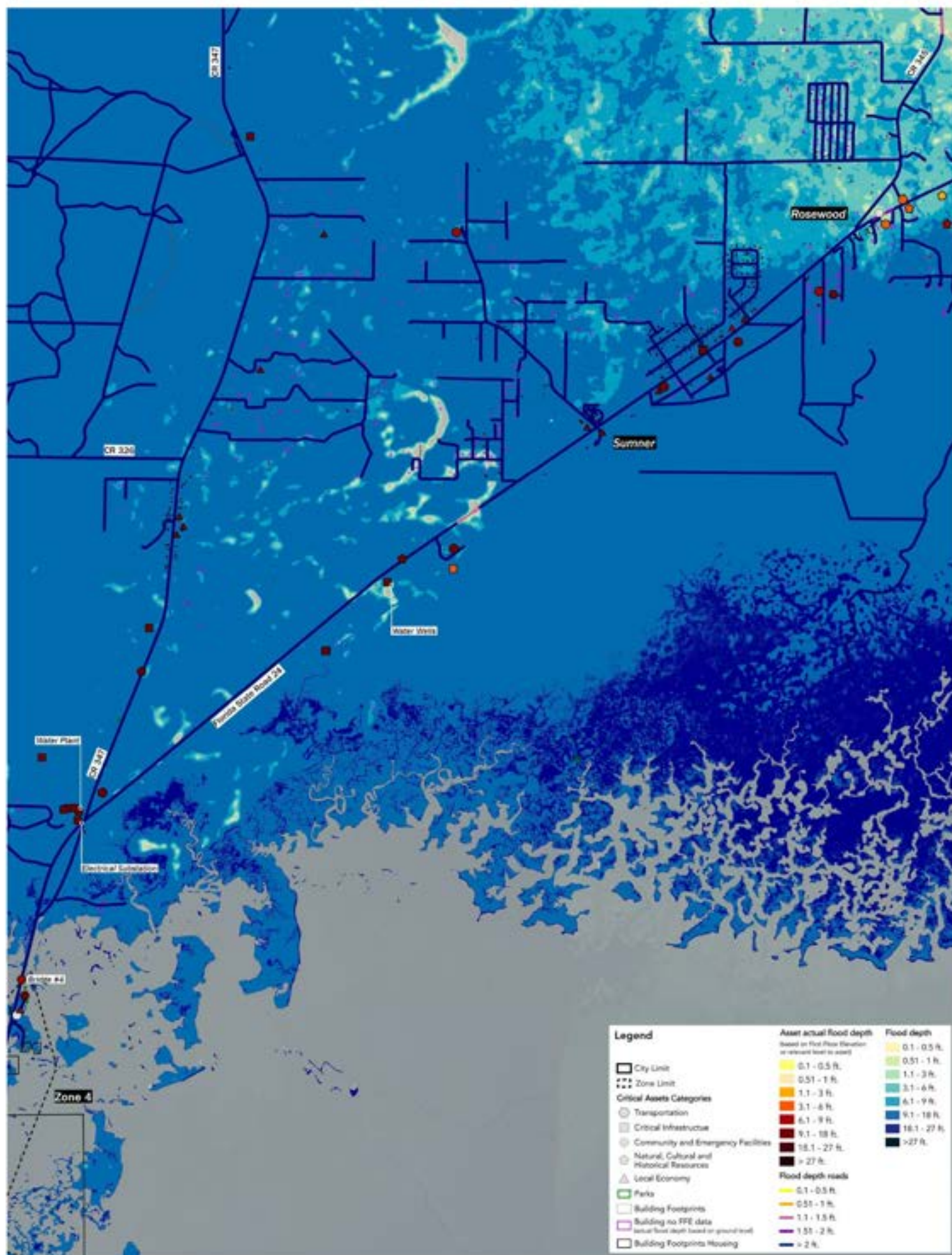
Cedar Key Influence Area, Rainfall Induced Flooding 100yr 24h + SLR 2040 Int-Low



Cedar Key Influence Area, Rainfall Induced Flooding 500yr 24h + SLR 2040 Int-Low

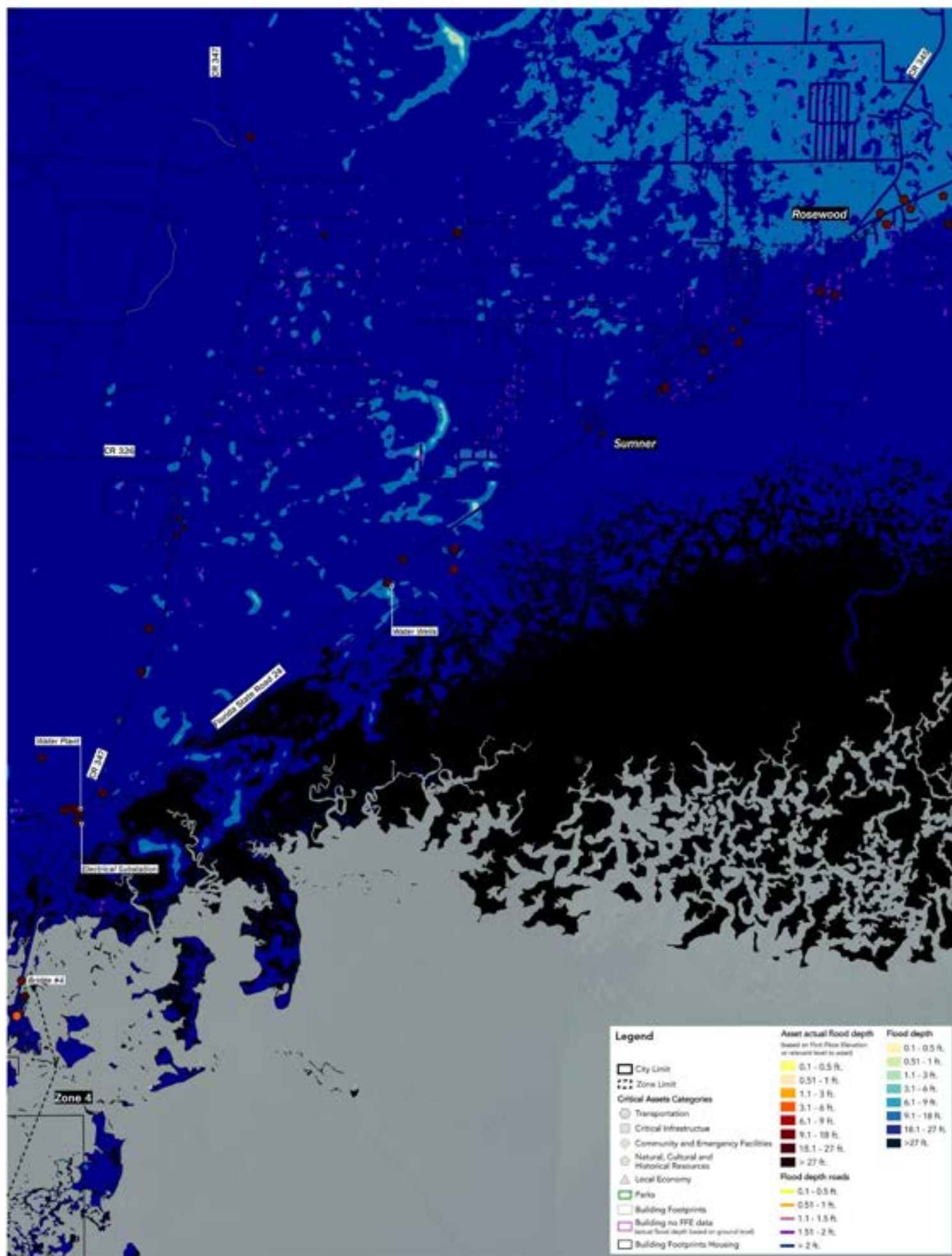






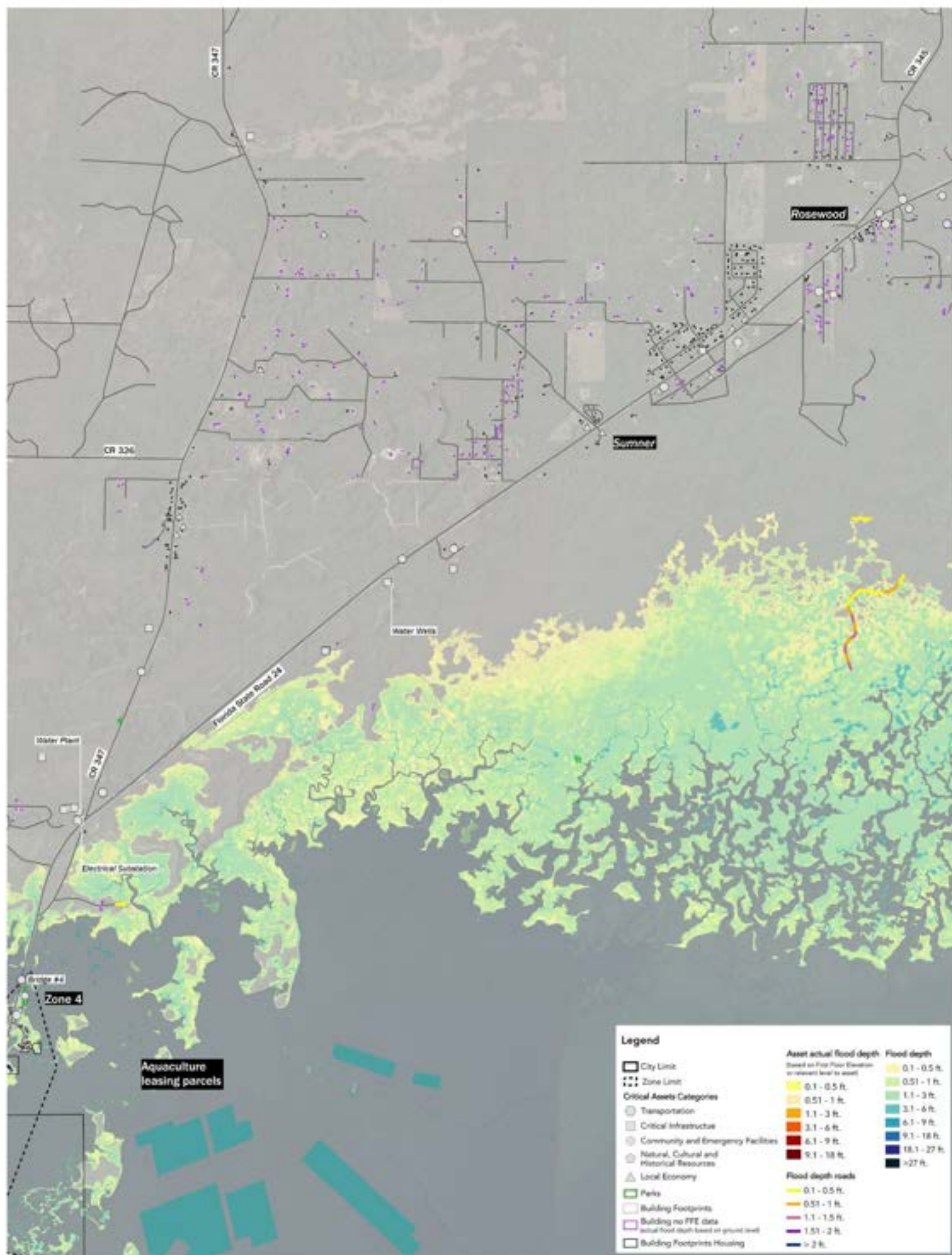
Cedar Key Influence Area, Category 3 Hurricane + SLR 2040 Int-Low

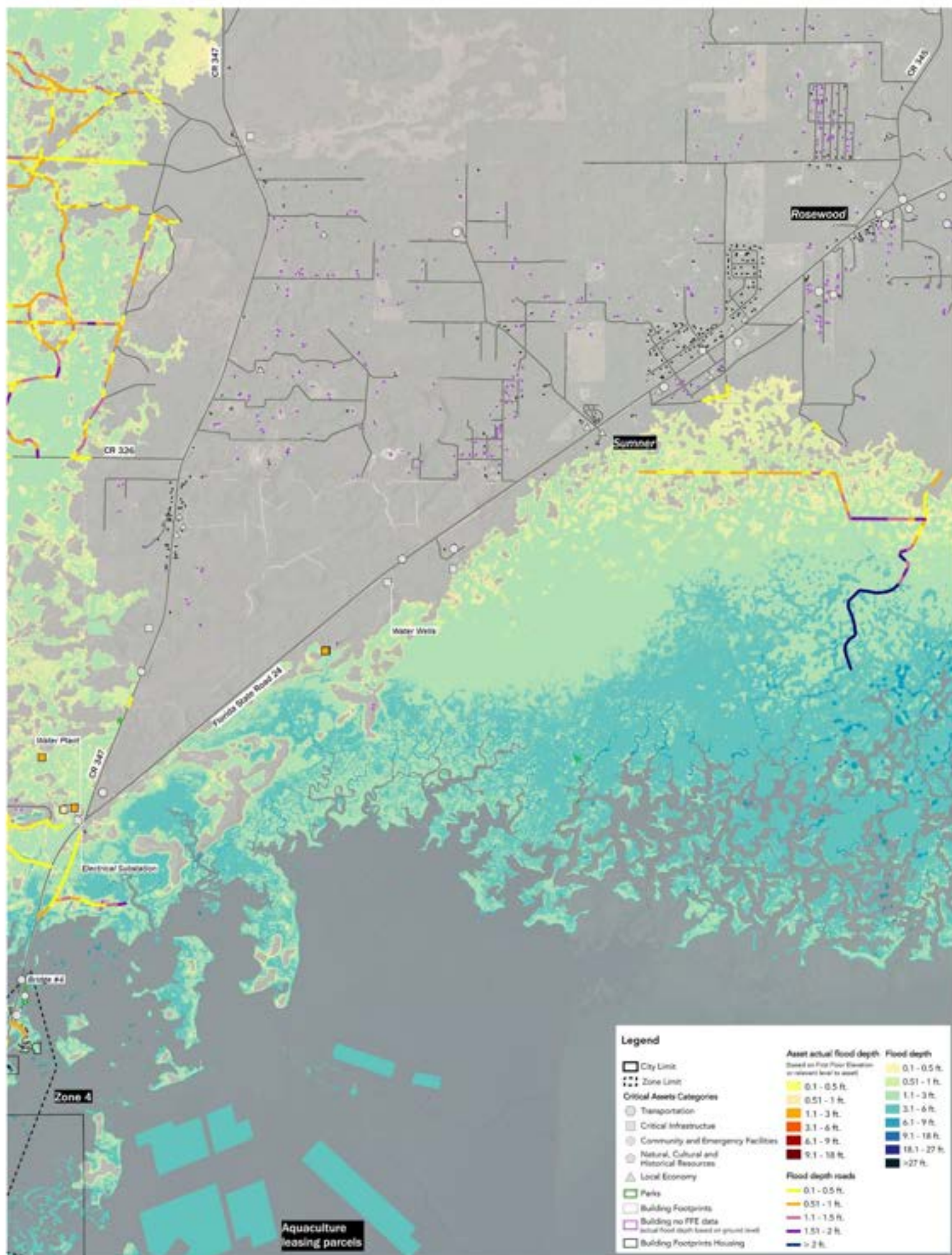




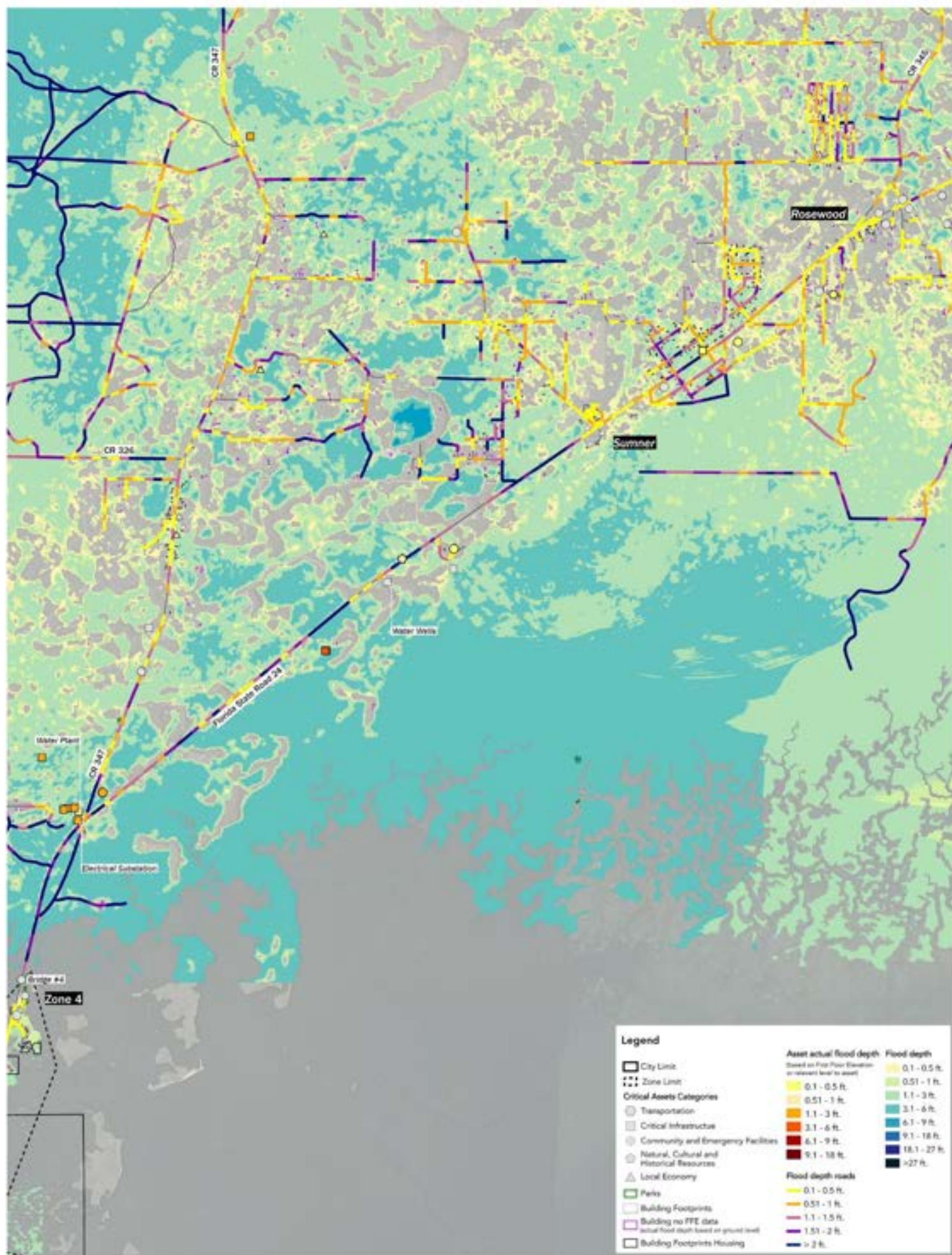
Cedar Key Influence Area, Category 5 Hurricane + SLR 2040 Int-High



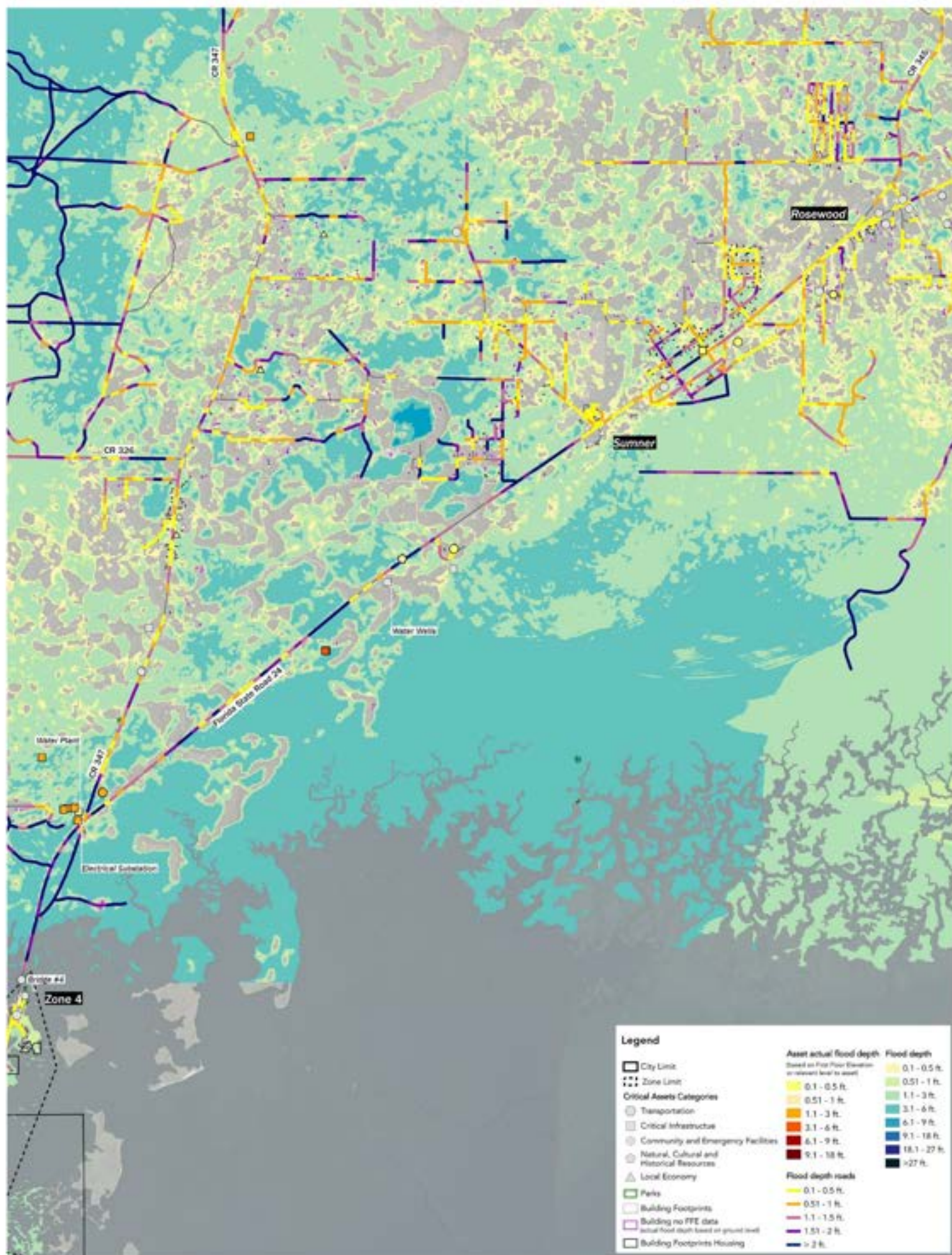




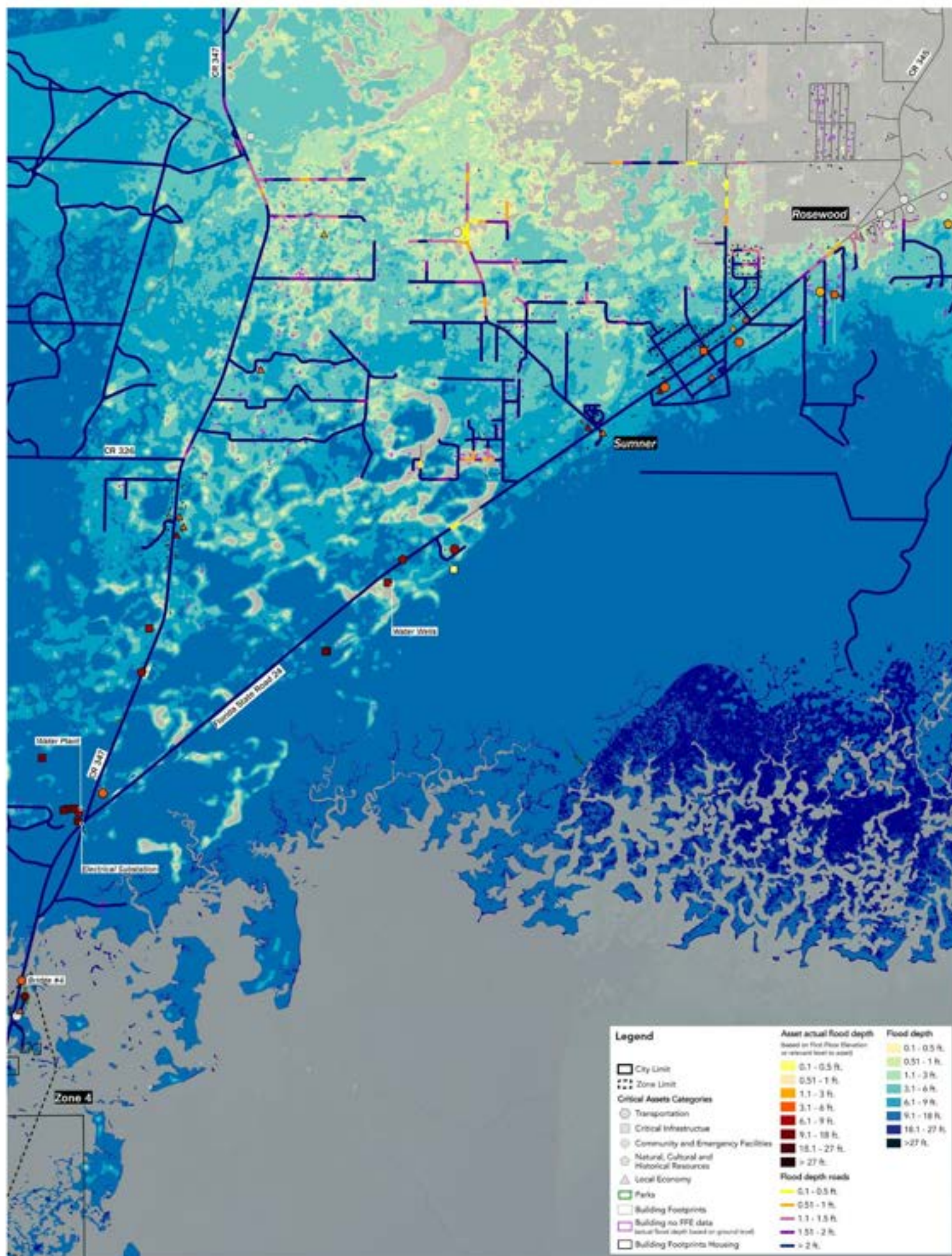
Cedar Key Influence Area, Extreme Water Level 2-year return + SLR 2040 Int-High.



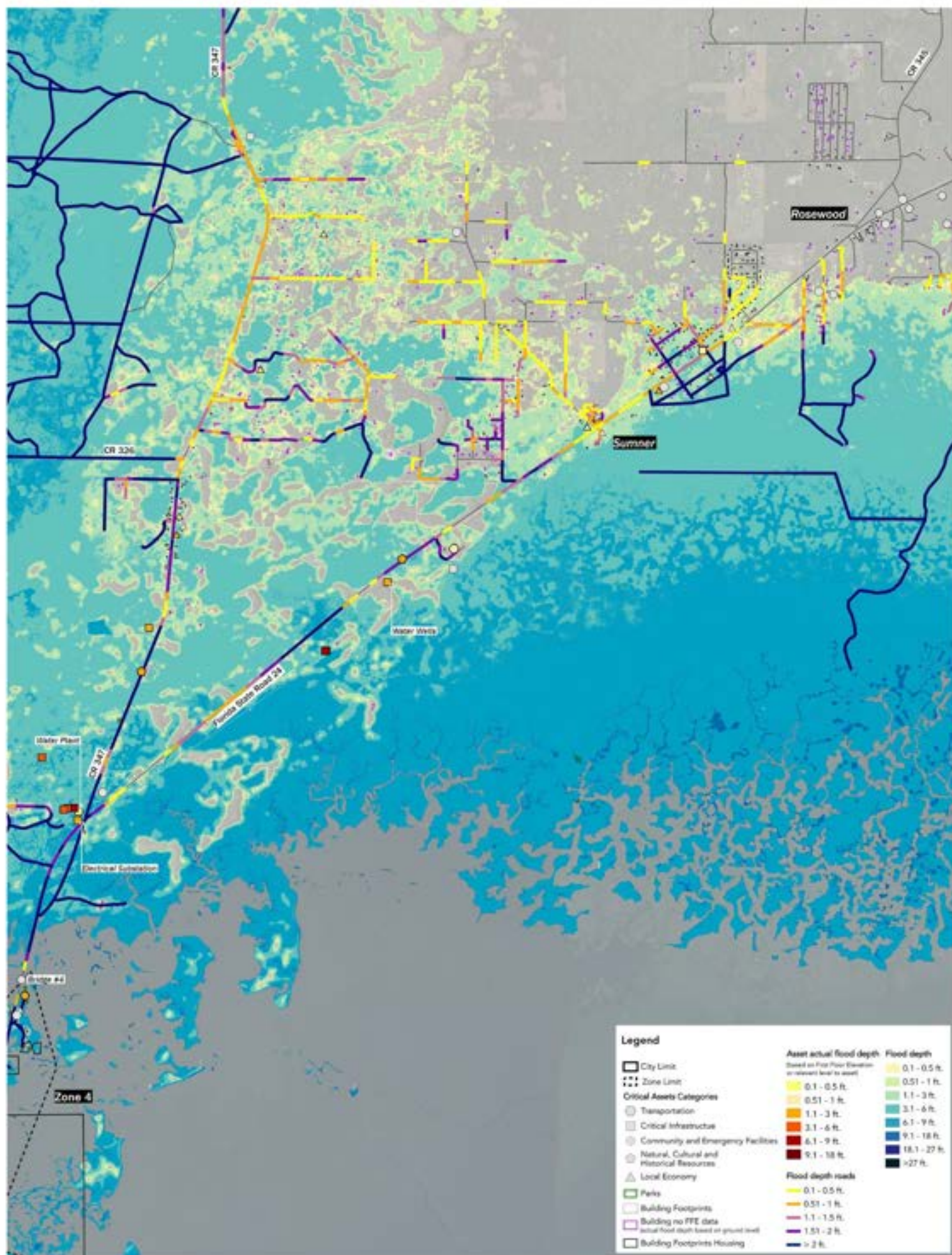
Cedar Key Influence Area, Rainfall Induced Flooding 100yr 24h + SLR 2040 Int-High

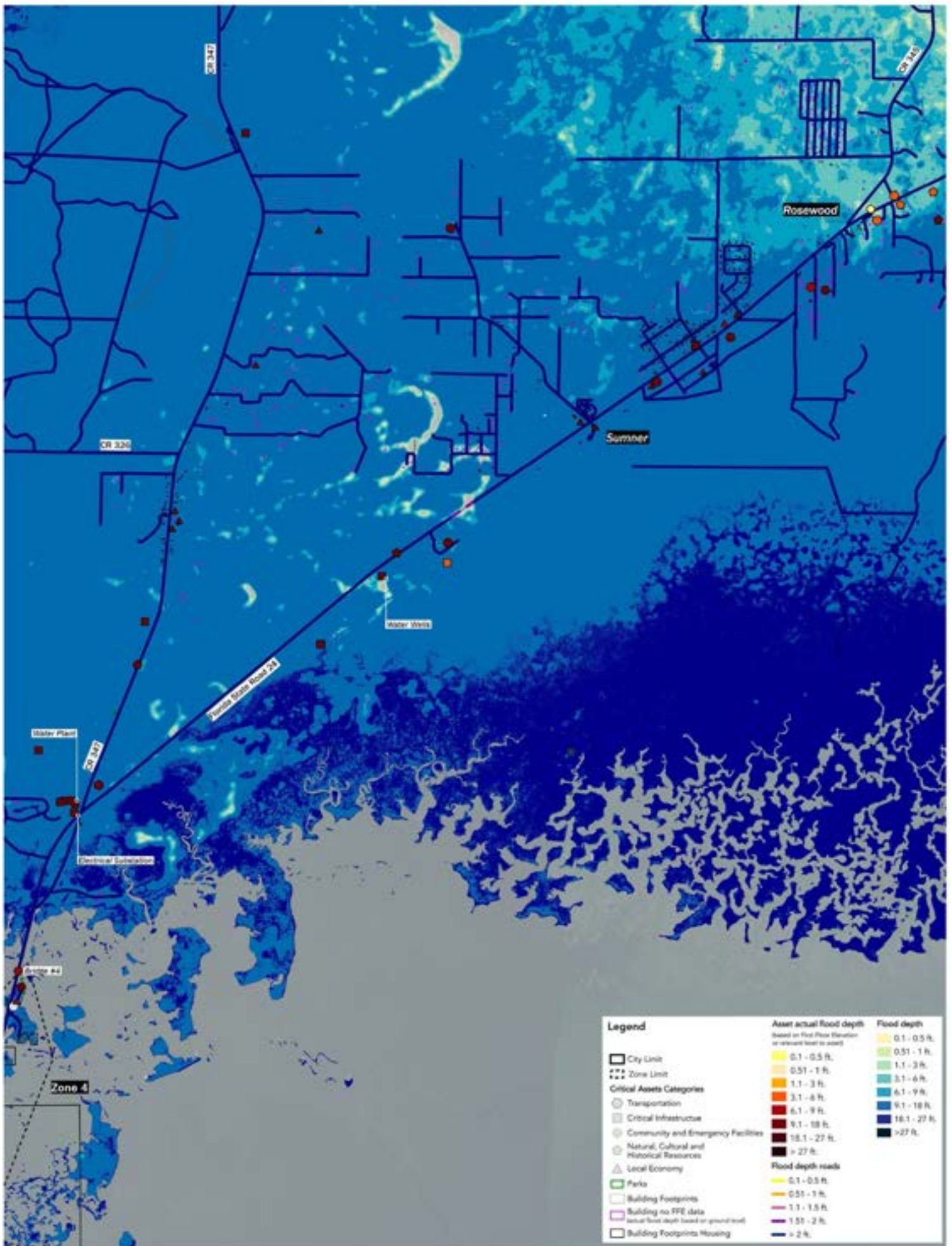


Cedar Key Influence Area, Rainfall Induced Flooding 500yr 24h + SLR 2040 Int-High



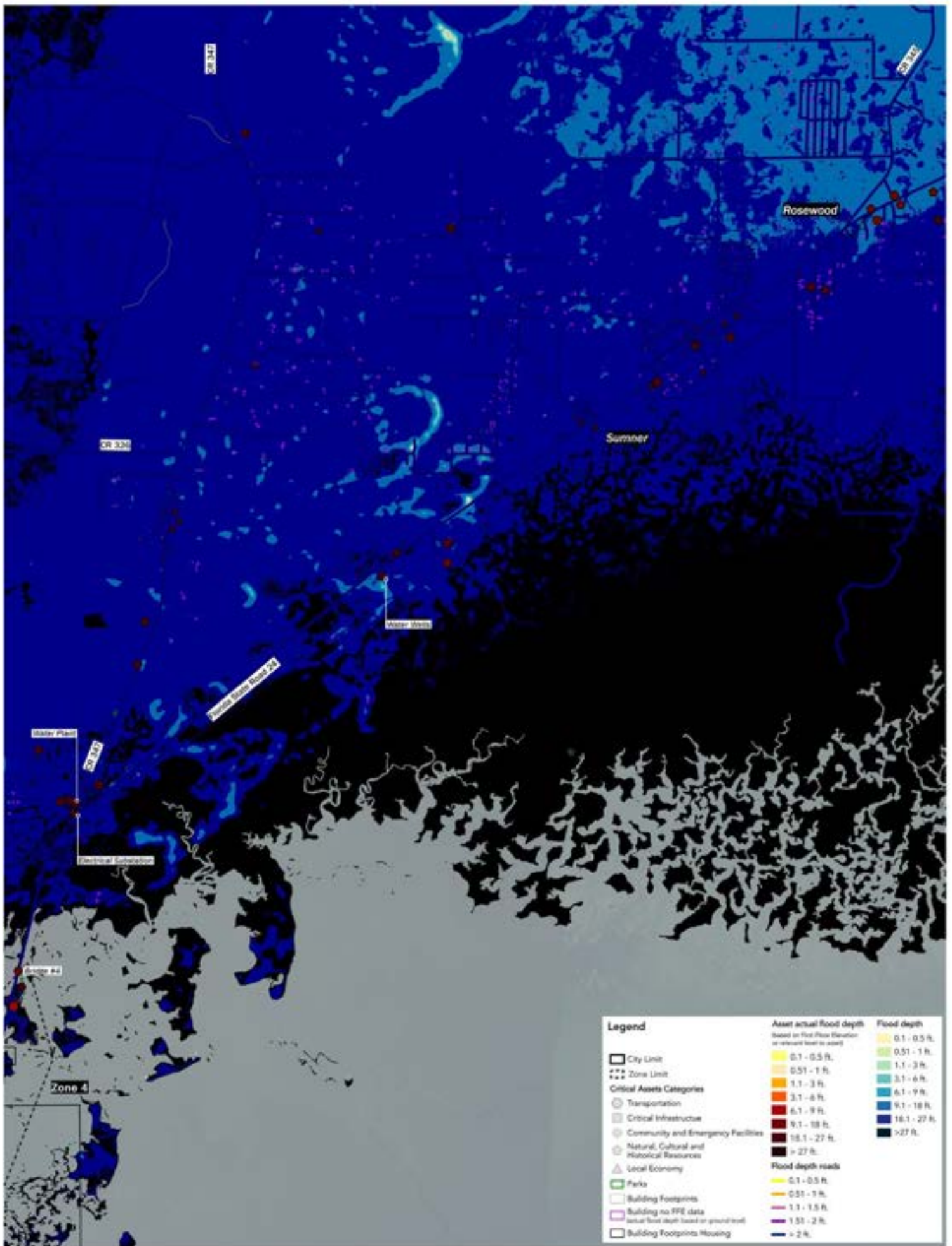
Cedar Key Influence Area, Special Flood Hazard Area SFHA 100-year + SLR 2040 Int-High.





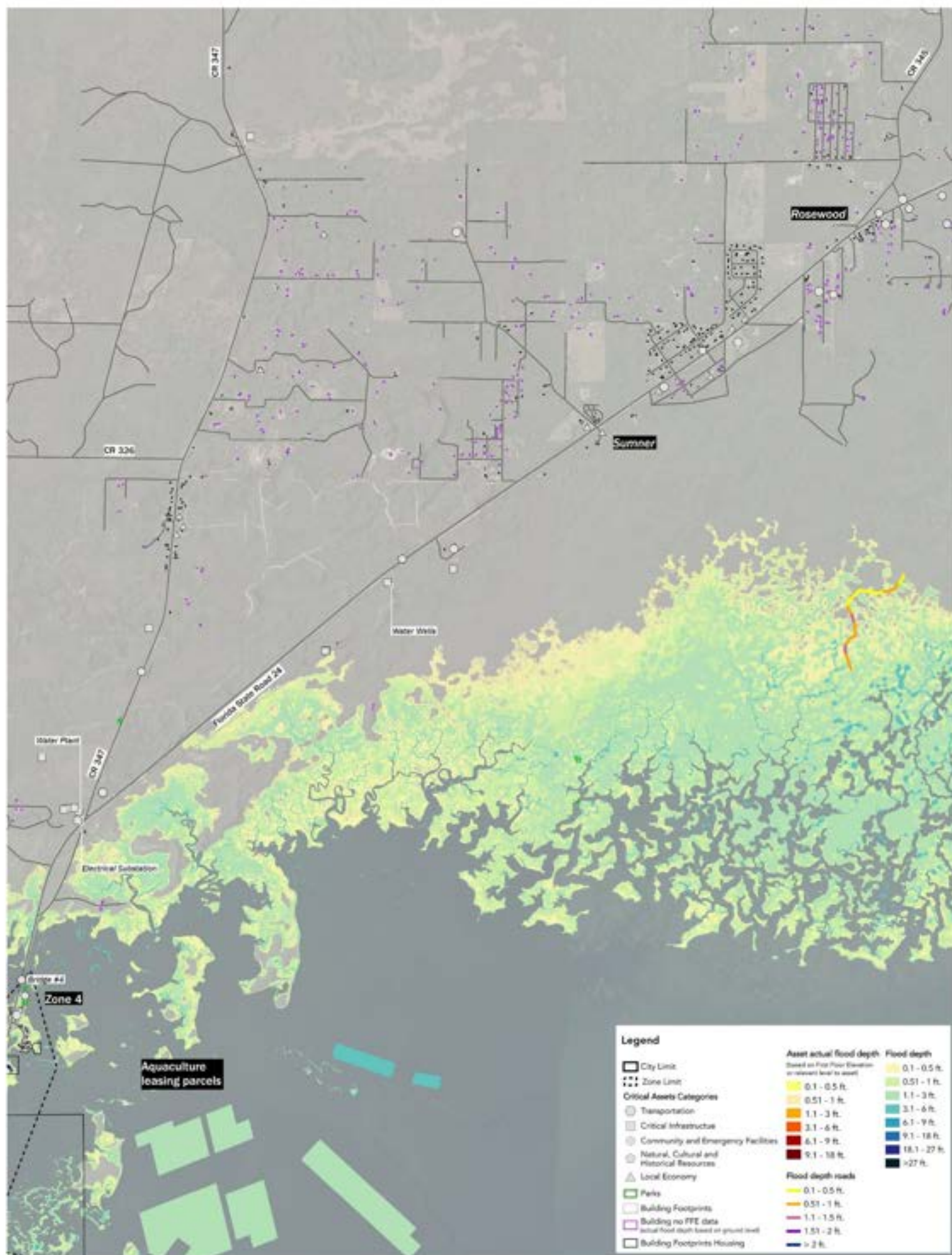
Cedar Key Influence Area, Category 3 Hurricane + SLR 2040 Int-High

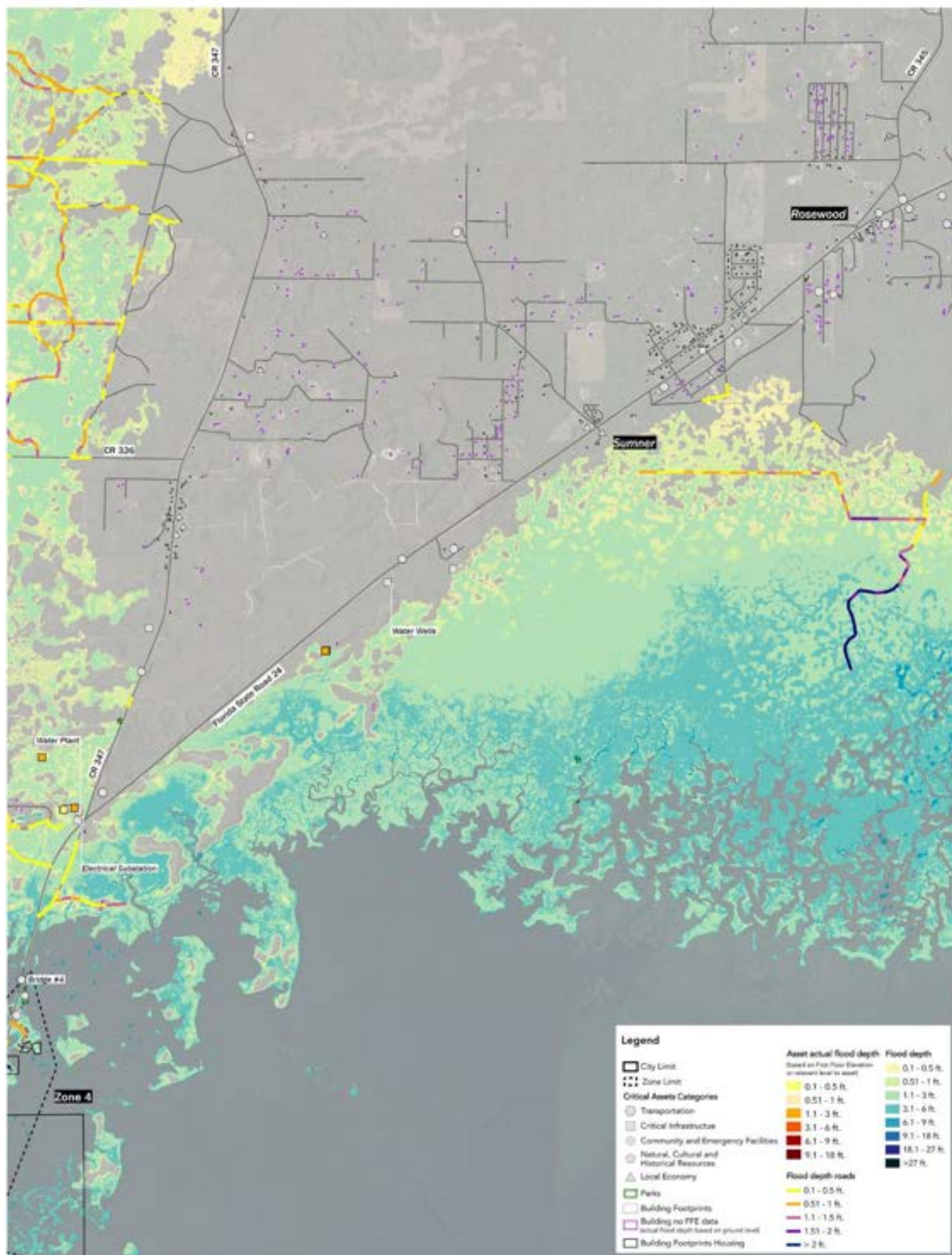




Cedar Key Influence Area, Category 5 Hurricane + SLR 2040 Int-High

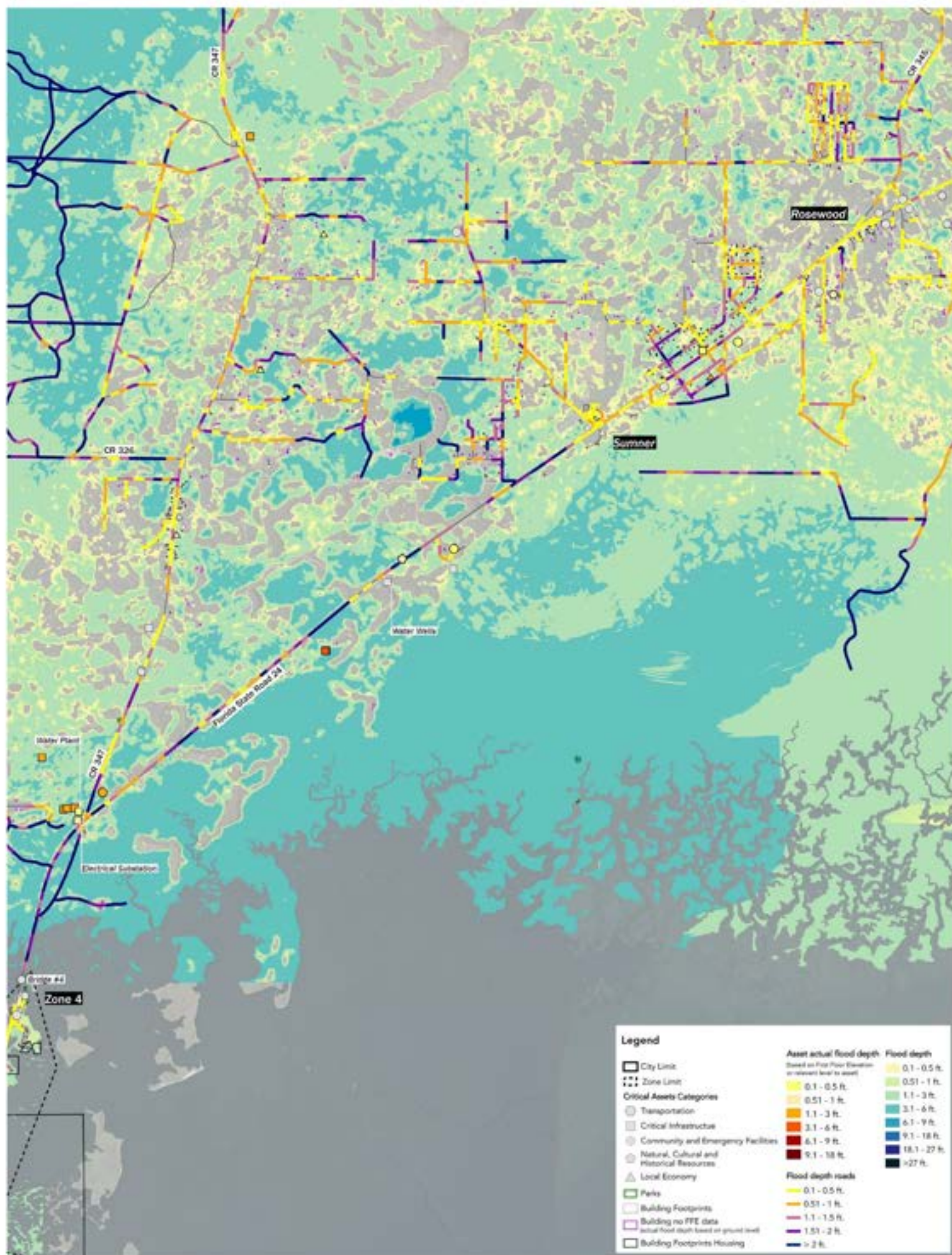




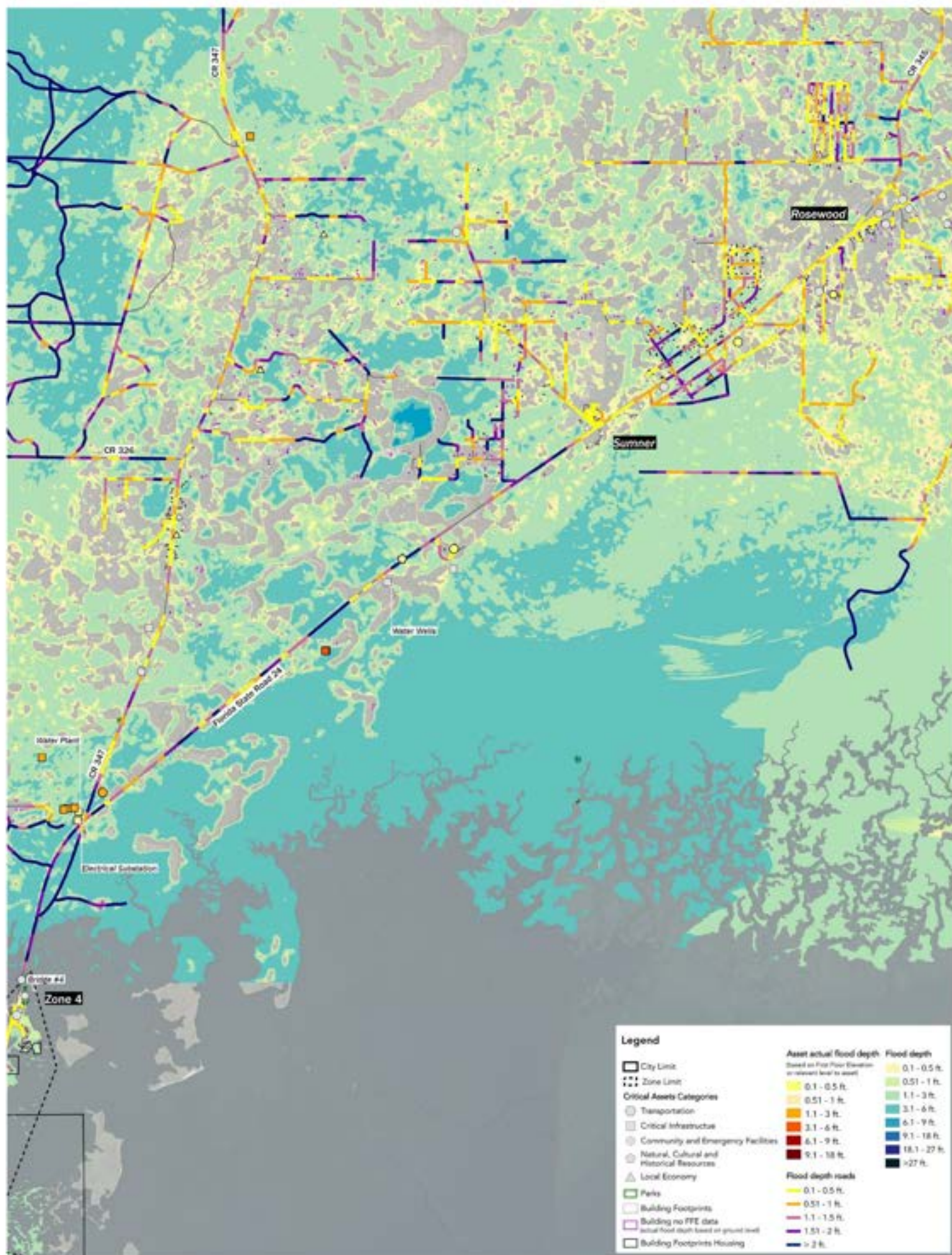


Cedar Key Influence Area, Extreme Water Level 2-year return + SLR 2070 Int-Low

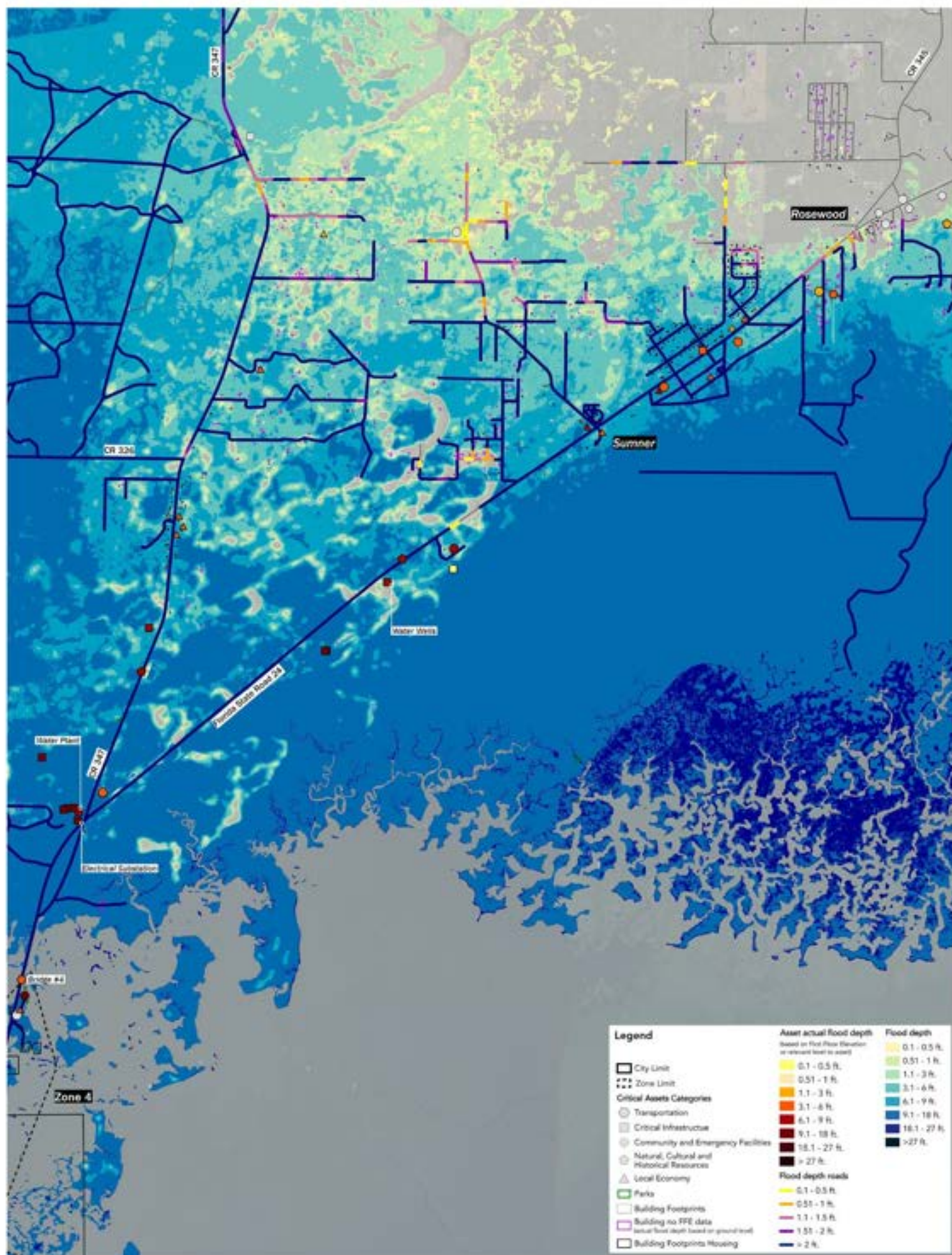


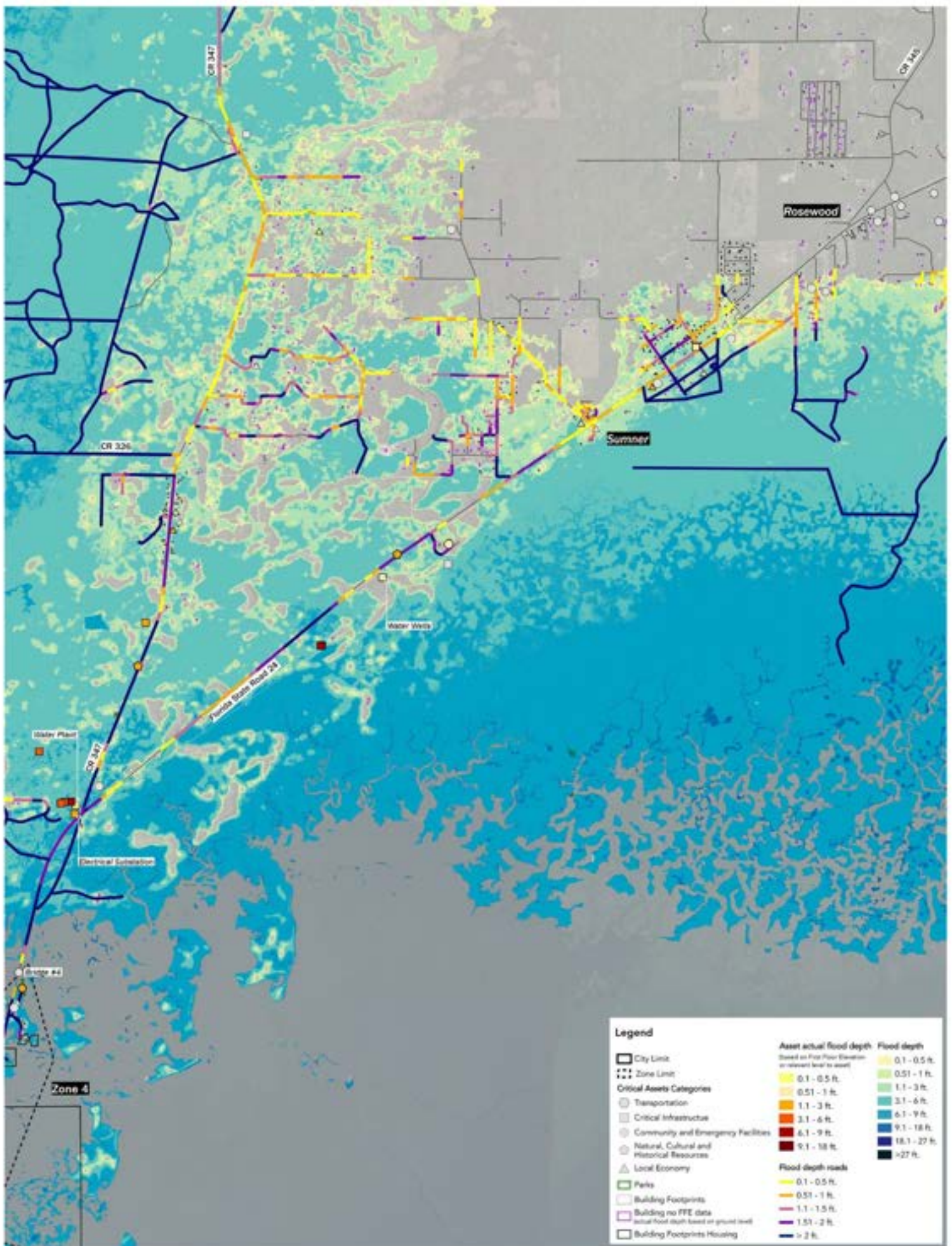


Cedar Key Influence Area, Rainfall Induced Flooding 100yr 24h + SLR 2070 Int-Low

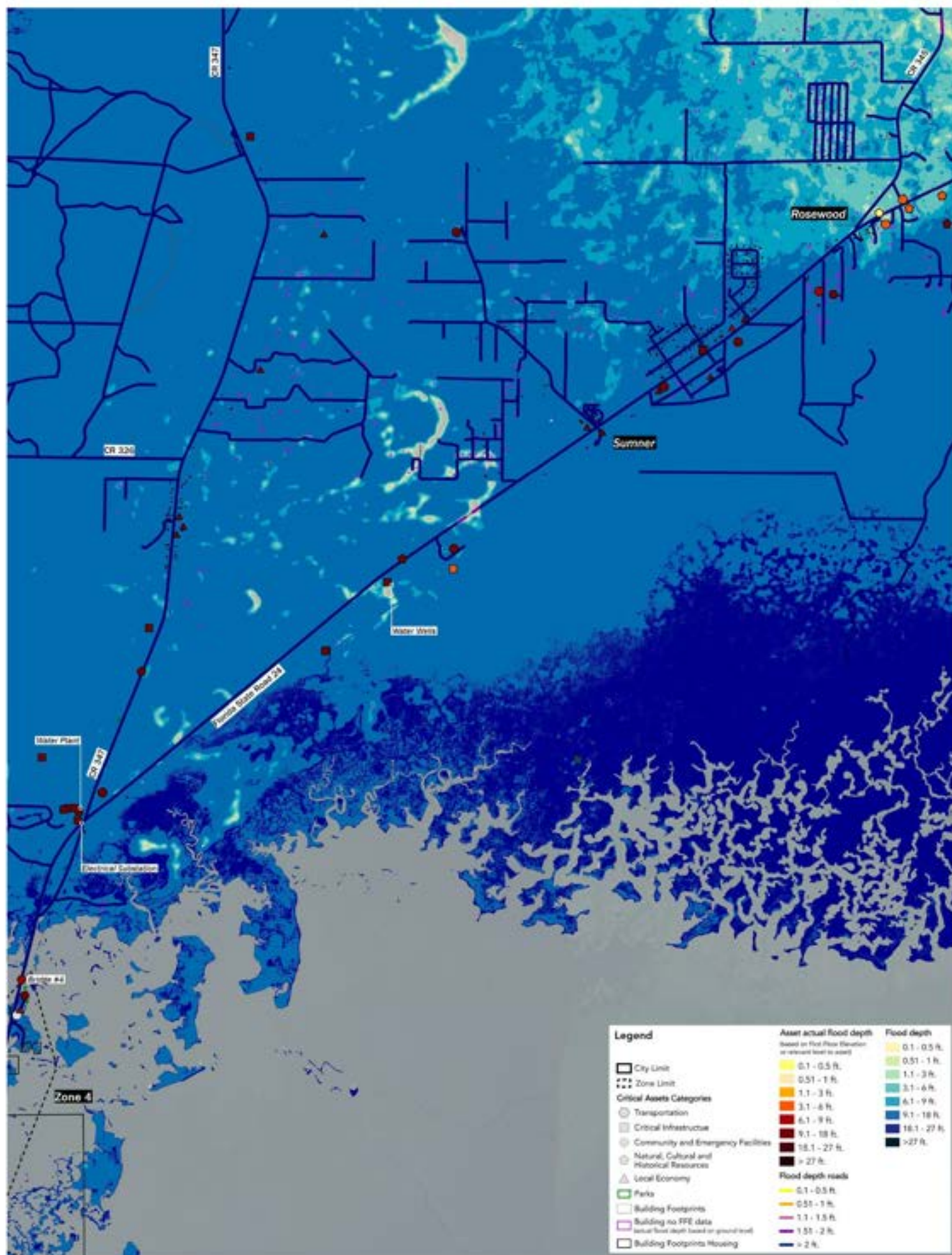


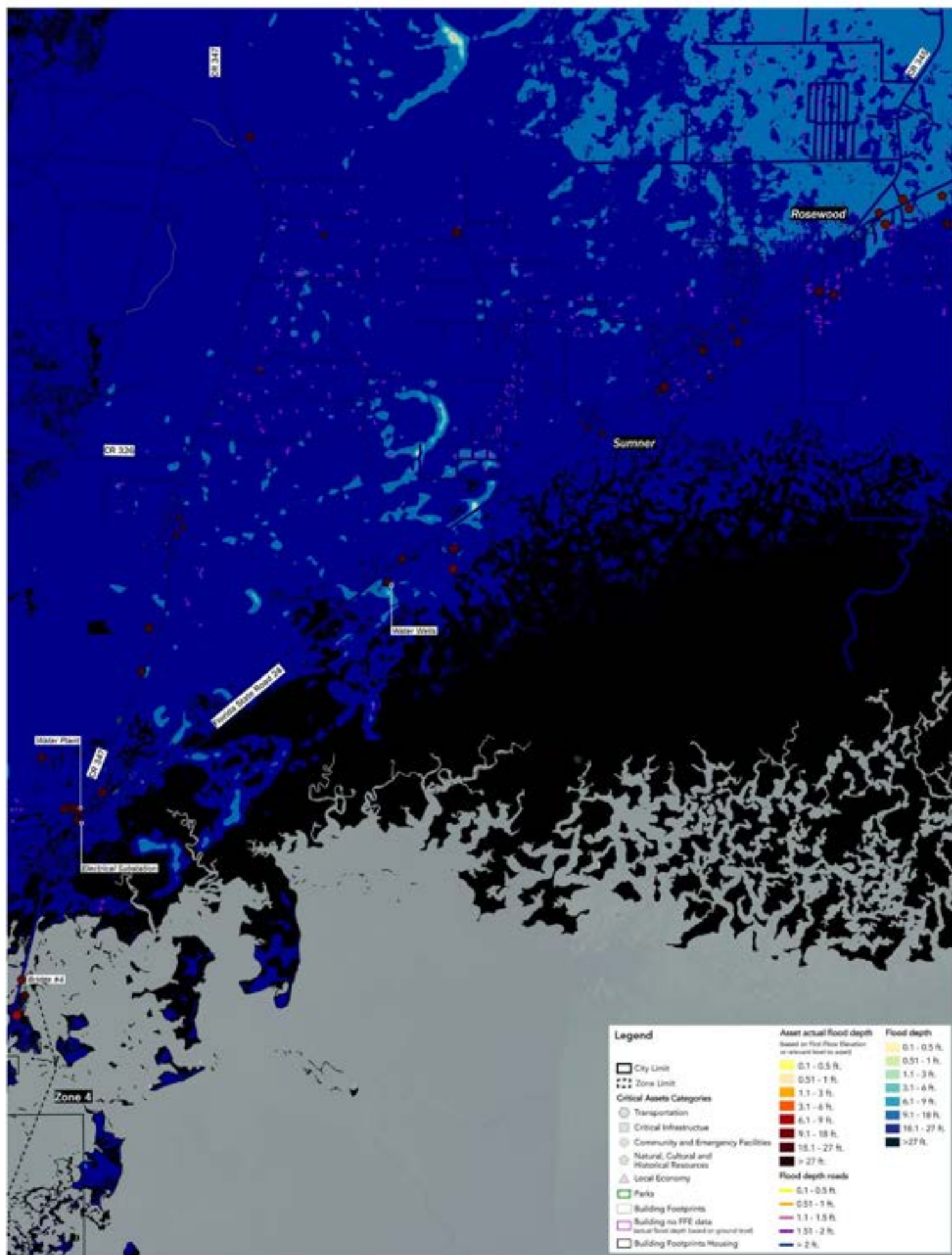
Cedar Key Influence Area, Rainfall Induced Flooding 500yr 24h + SLR 2070 Int-Low





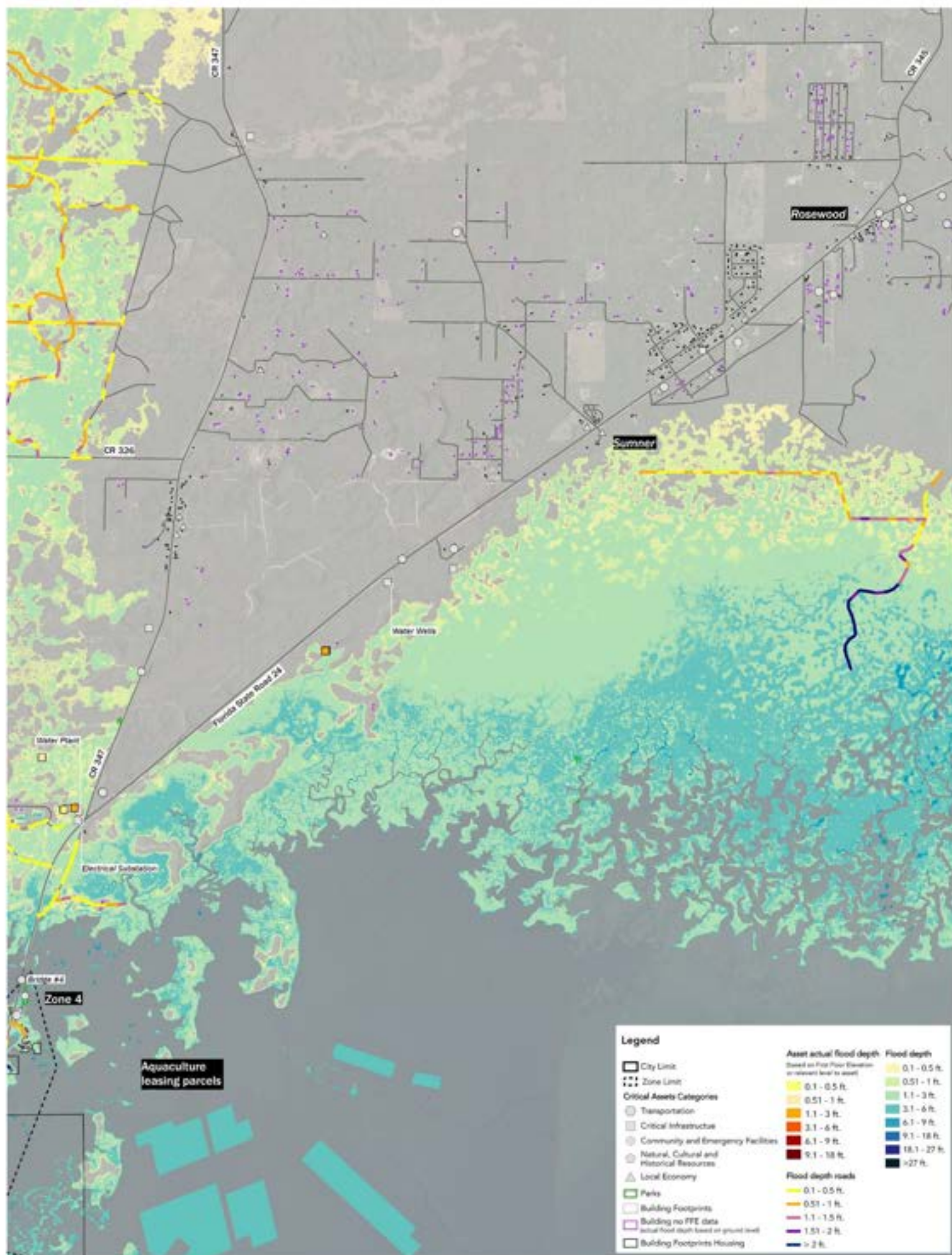
Cedar Key Influence Area, Category 1 Hurricane + SLR 2070 Int-Low

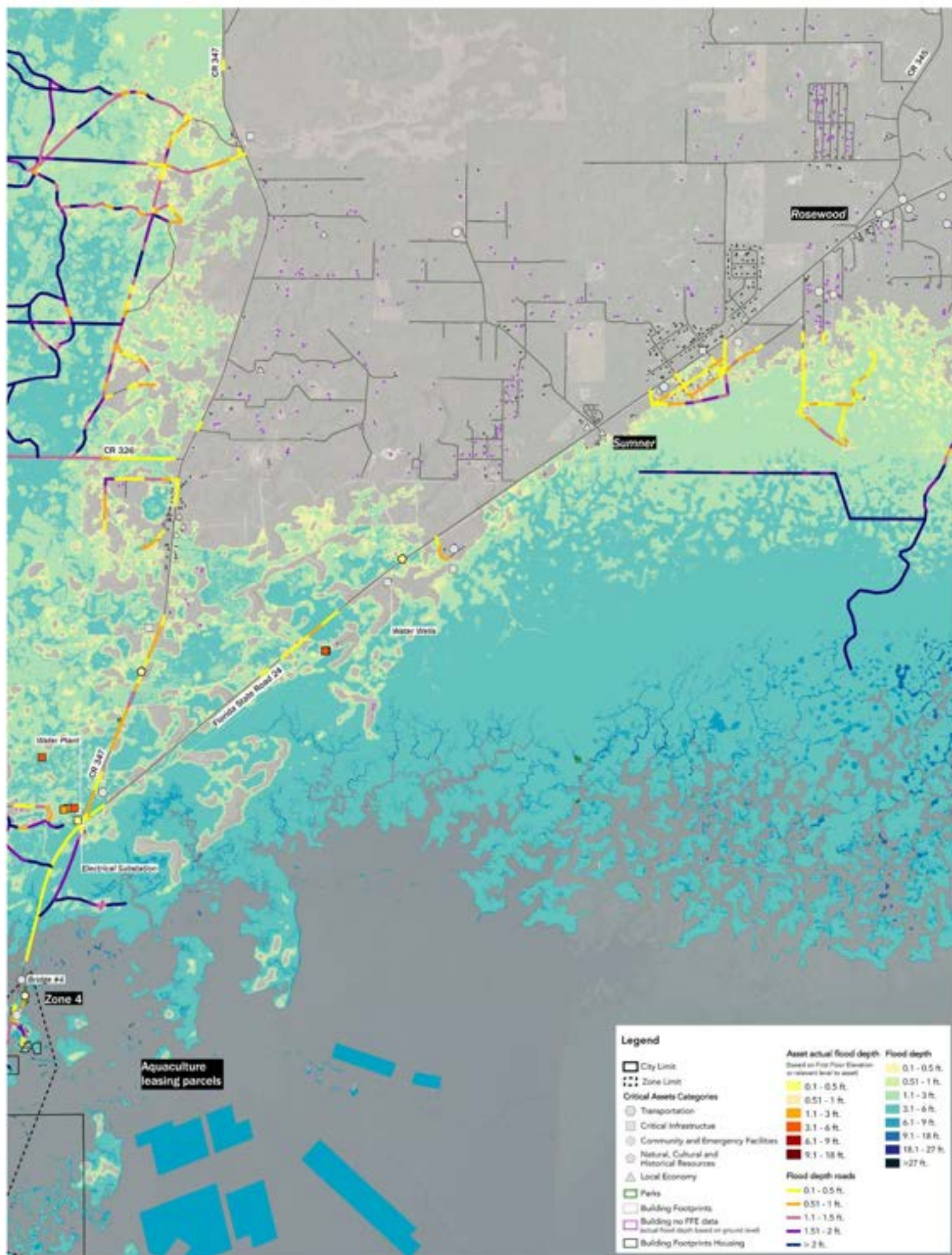




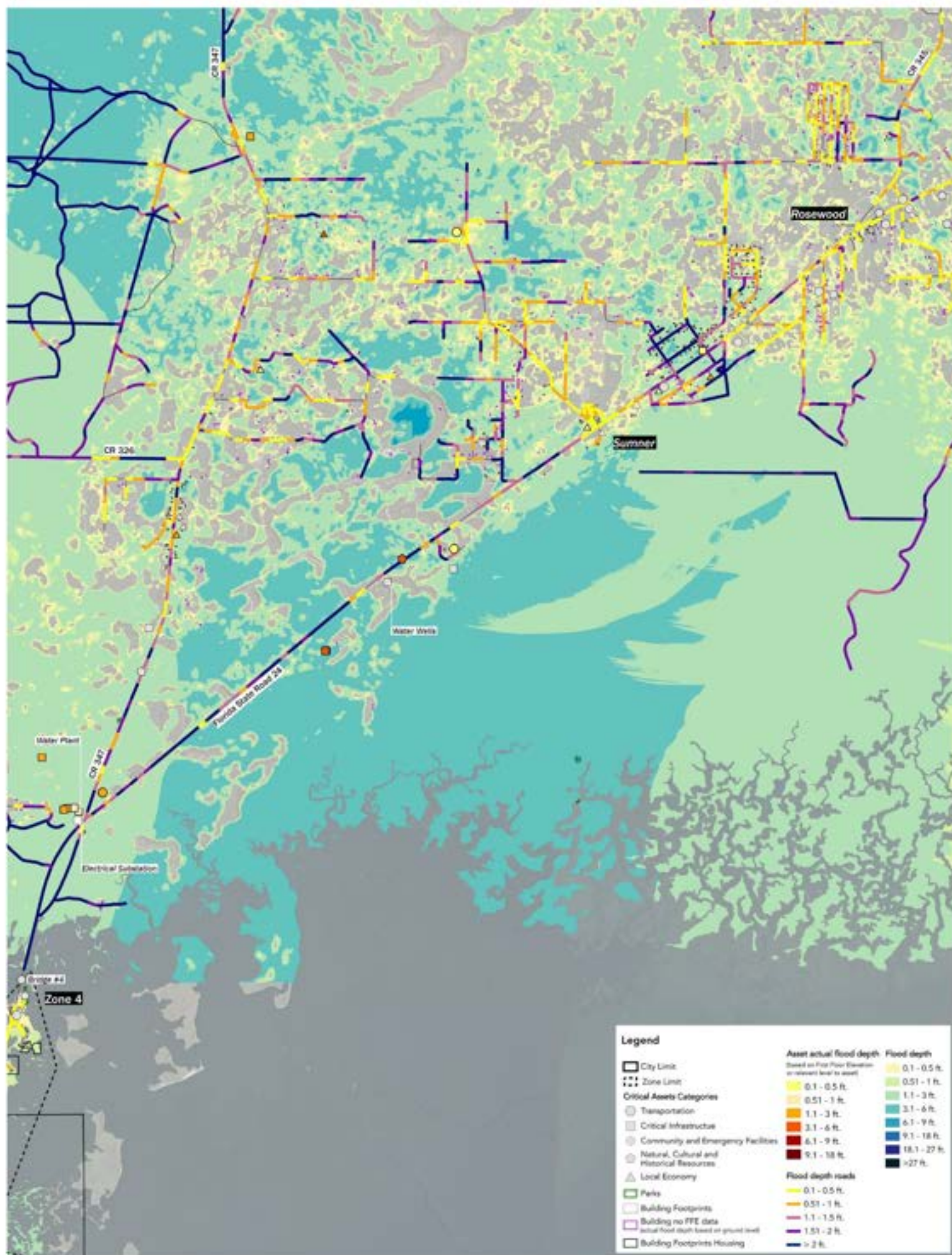
Cedar Key Influence Area, Category 5 Hurricane + SLR 2070 Int-Low



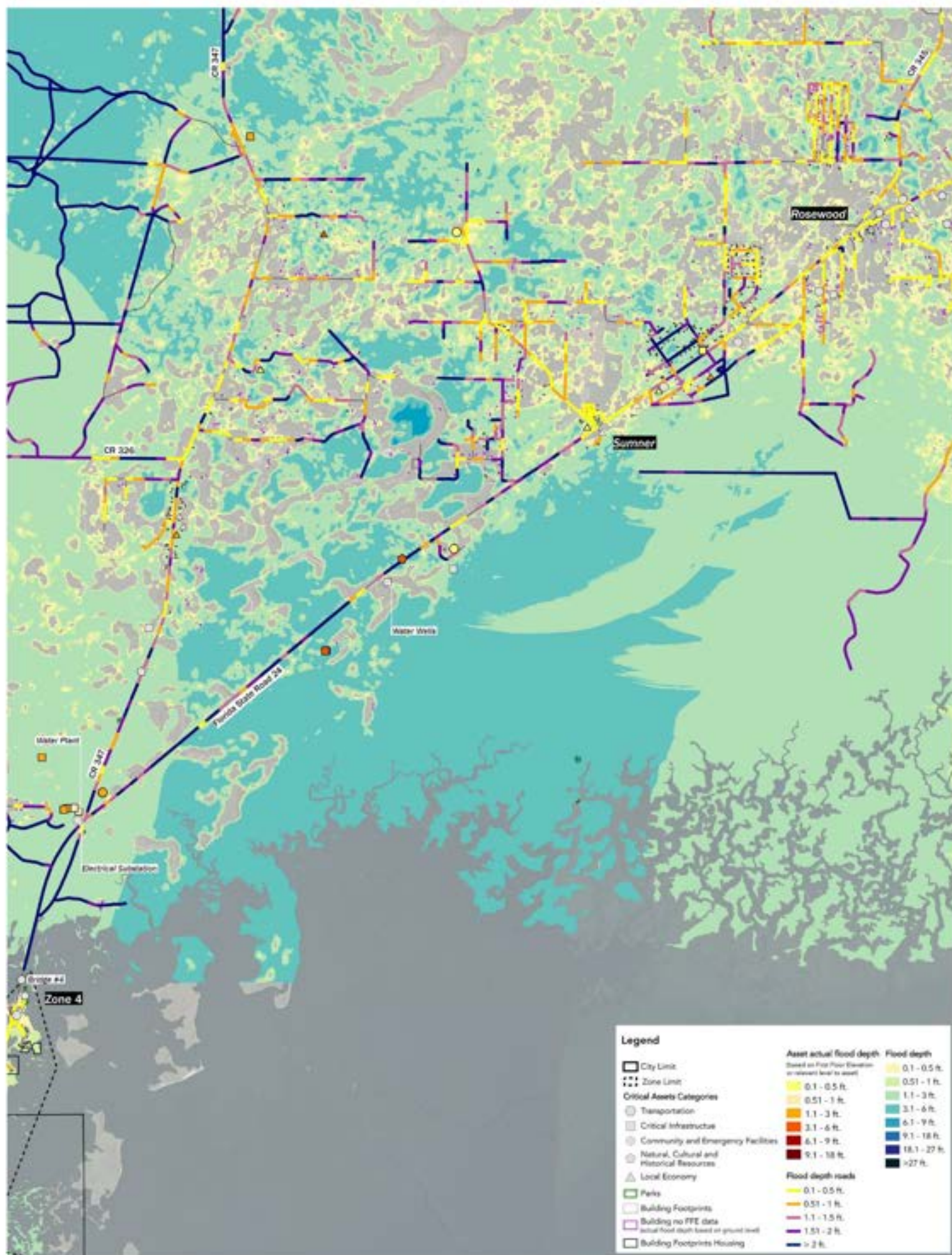




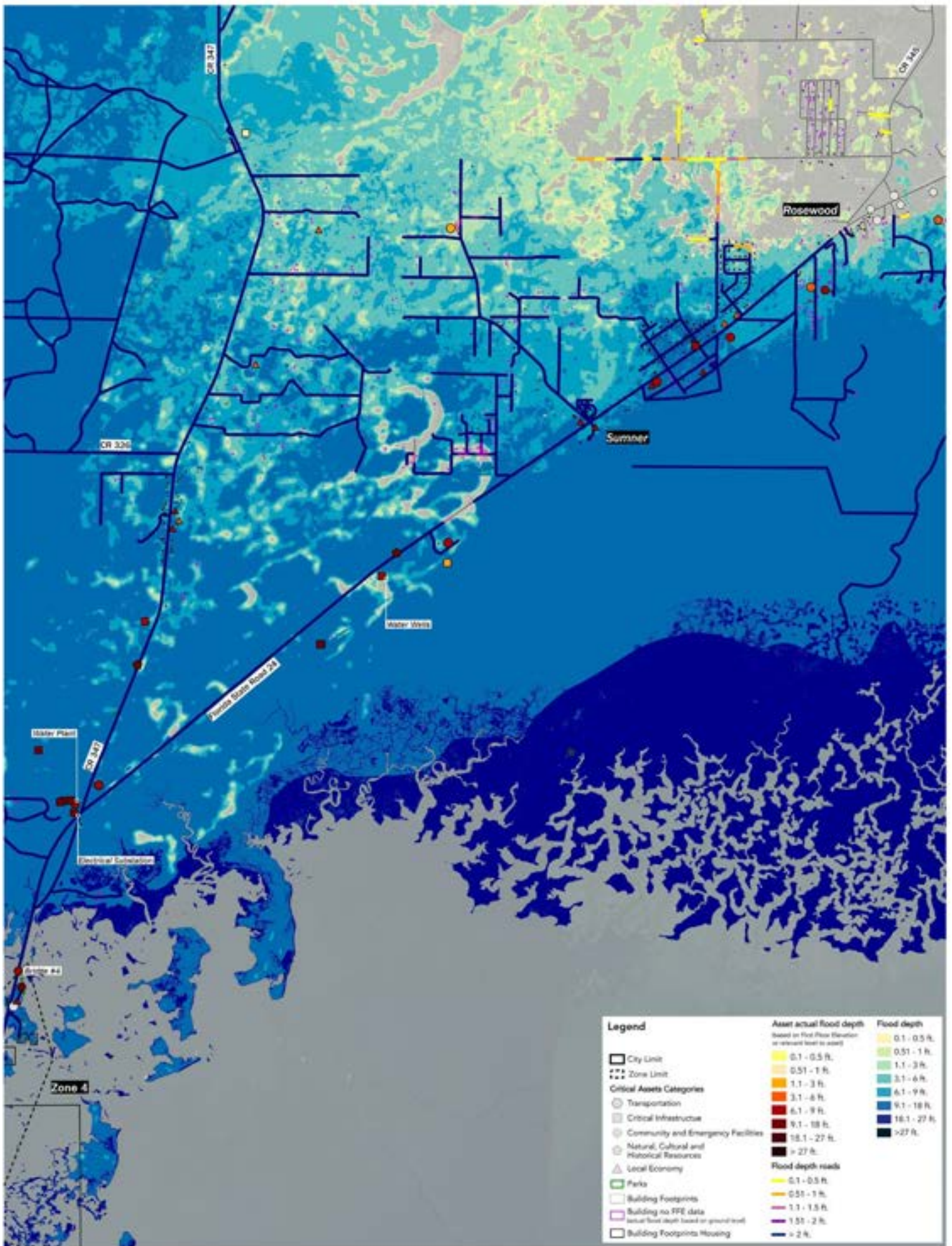
Cedar Key Influence Area, Extreme Water Level 2-year return + SLR 2070 Int-High.



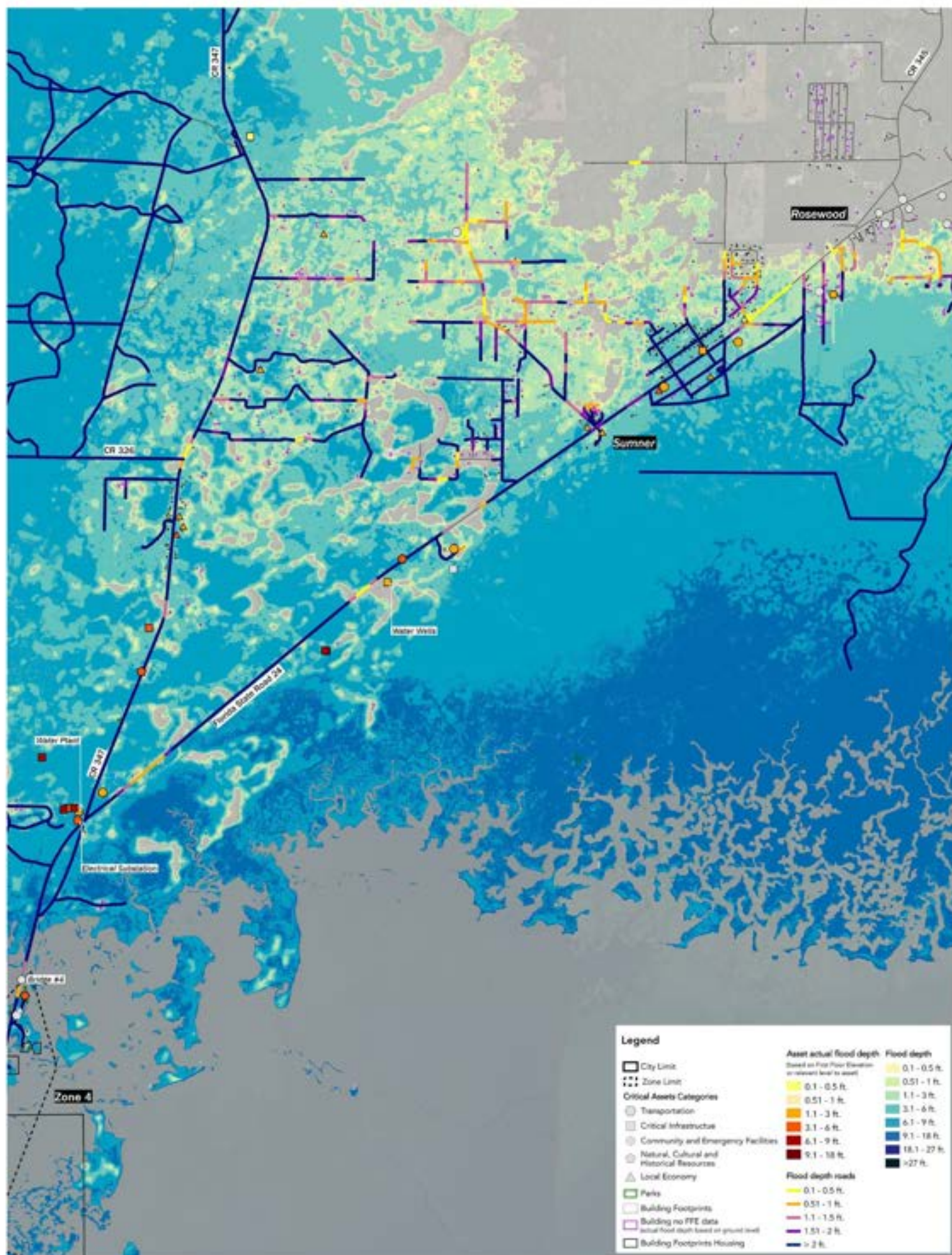
Cedar Key Influence Area, Rainfall Induced Flooding 100yr 24h + SLR 2070 Int-High

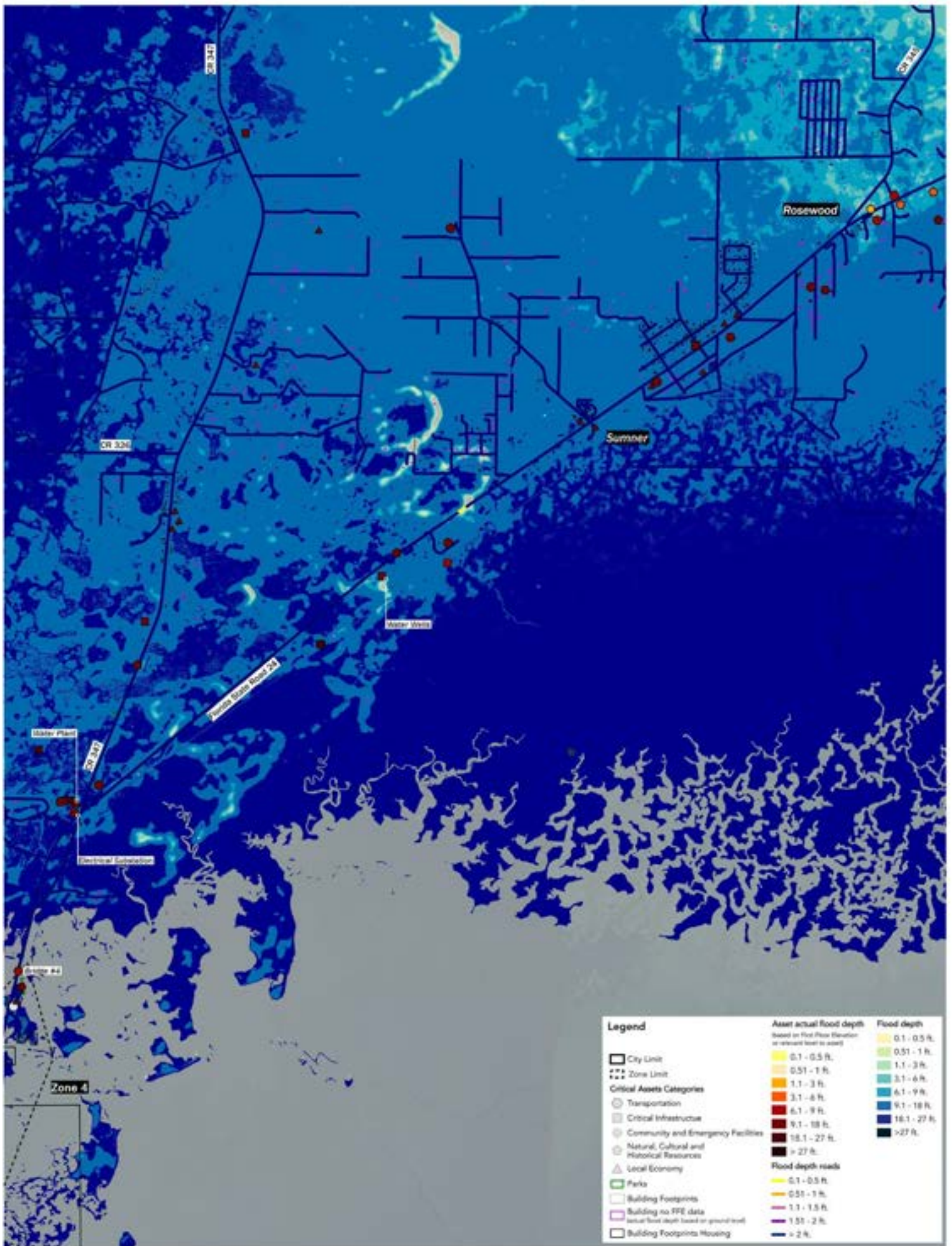


Cedar Key Influence Area, Rainfall Induced Flooding 500yr 24h + SLR 2070 Int-High



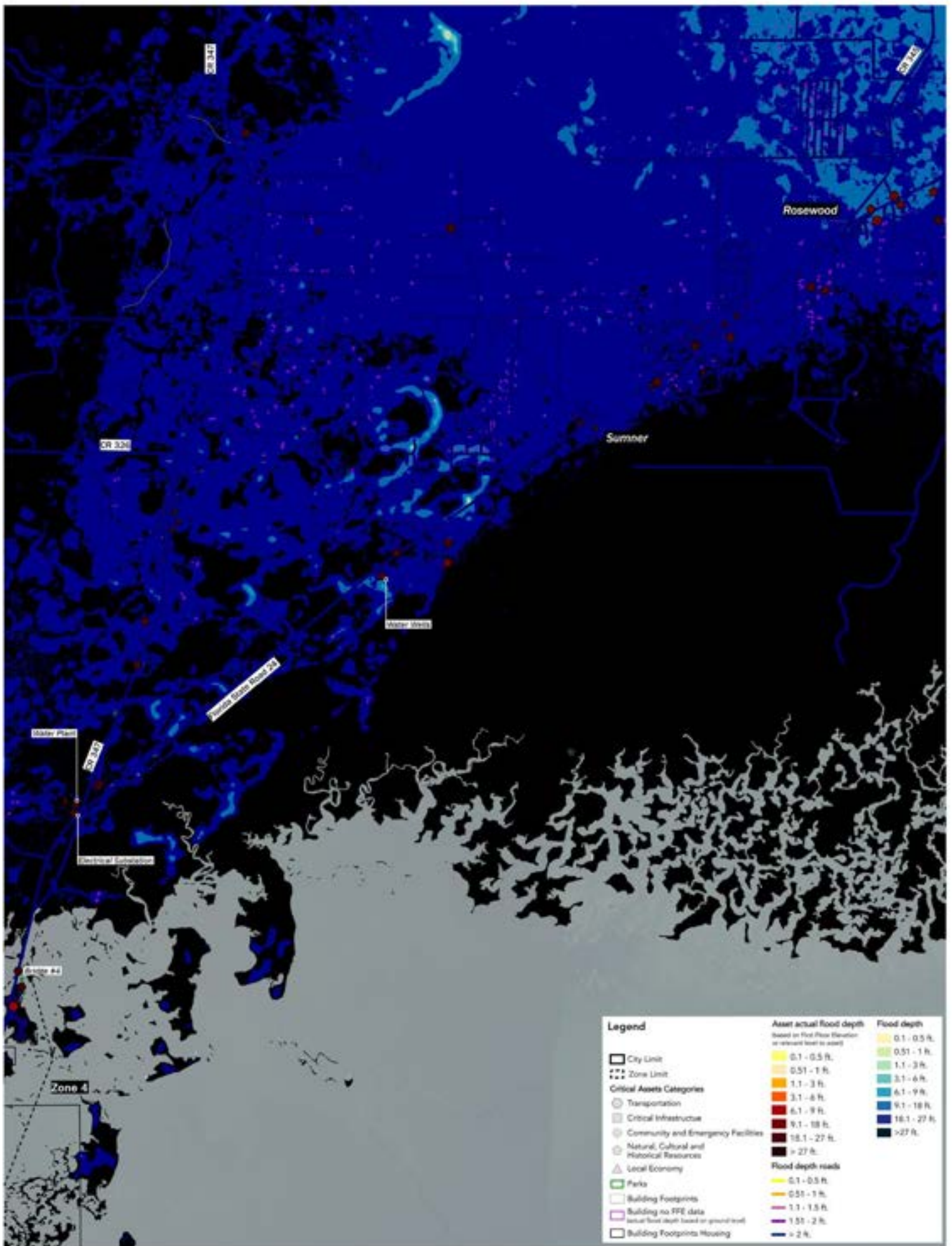
Cedar Key Influence Area, Special Flood Hazard Area SFHA 100-year + SLR 2070 Int-High.





Cedar Key Influence Area, Category 3 Hurricane + SLR 2070 Int-High





Cedar Key Influence Area, Category 5 Hurricane + SLR 2070 Int-High



FOCUS AREAS

The exposure and sensitivity analyses revealed several areas across Cedar Key where compound vulnerability is evident. The accompanying map highlights vulnerable zones for each infrastructure category, identifying four focus areas with concentrated vulnerability issues.

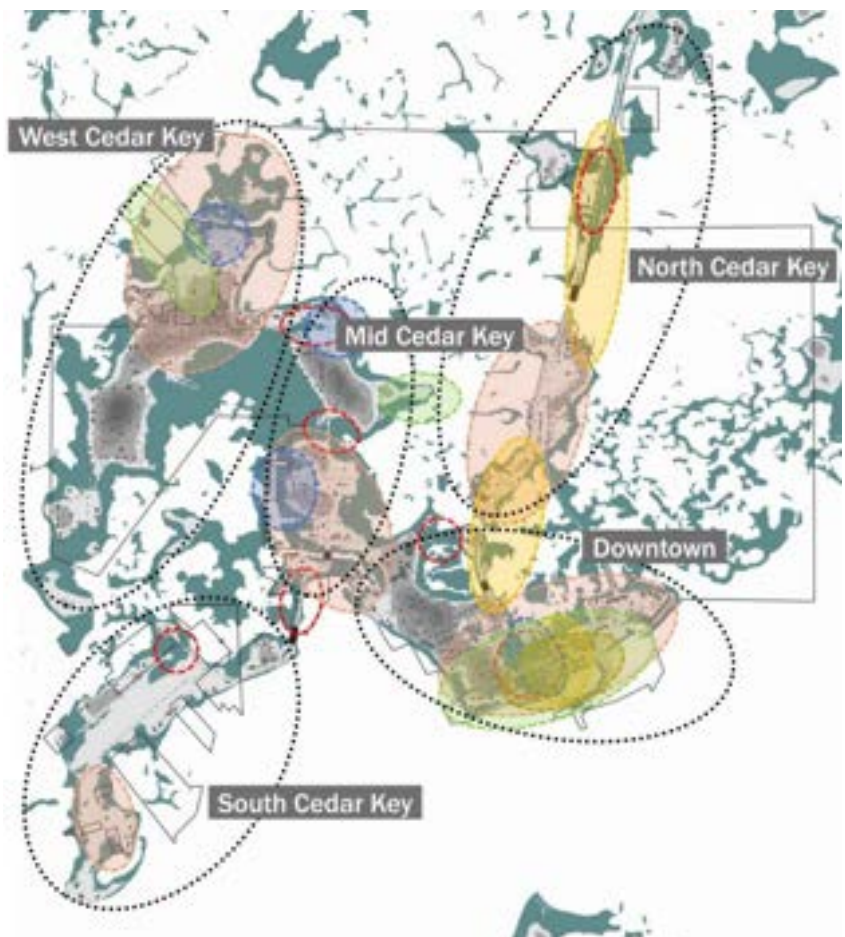
Focus Area 1. Downtown Cedar Key stands out as the core vulnerability area for all asset categories, particularly around 1st, 2nd, and 3rd Street sections between A and D streets.

Focus Area 2. Mid Cedar Key presents compound vulnerability for housing, critical infrastructure, natural and cultural assets, and connectivity. Particularly low-elevation areas along Gulf Blvd. between Palmetto Drive and the Cemetery access present vulnerabilities in housing flooding, wastewater infrastructure (lift stations) in extraordinary flood events, and street network connectivity during extreme tidal events.

Focus Area 3. West Cedar Key concentrates on vulnerability in terms of housing, natural and cultural assets in the northern part of Hodges Avenue, and transportation connectivity along Hodges Avenue. Additionally, many parcels remain undeveloped in the areas surrounding Watson Circle and Hodgson Avenue.

Areas of concentration of vulnerable assets per category

-  Transportation disconnection
-  Housing
-  Local Economy
-  Community Services
-  Critical Infrastructure
-  Natural Cultural Resources



Focus Area 4. Lastly, North Cedar Key faces connectivity, economy, and housing challenges. State Road 24 is a key element due to its sole access route to the town, which is prone to flooding during extreme tidal flood events.

COMMUNITY ENGAGEMENT

SOURCES OF COMMUNITY INPUT

Community acceptance and understanding of the risks and vulnerabilities facing Cedar Key are critical for future buy-in for large-scale adaptation actions and personal risk reduction. As part of the Resilient Cedar Key project, we formed direct lines of communication with City leaders and relied on a series of task force meetings and public workshops, the outcomes of which are detailed below.

TASK FORCE MEETINGS

Meeting 1

We convened the first Task Force meeting on October 19, 2022. Task Force membership is presented in the following table. At Task Force meeting 1, we covered the basics in terms of the role of the group and the project goals. The team presented some background data about critical assets and discussed data gaps and data needs with members. Special attention was paid to the housing and aquaculture workforce sectors. The Task Force was engaged during and after meeting 1 to assist in addressing data gaps (detailed above). Finally, Task Force members assisted with planning items for the first public engagement workshop.

Name	Affiliation(s)
Sue Colson	City of Cedar Key - Vice Mayor, Cedar Key Chamber of Commerce
Jamie McCain	City of Cedar Key - Public Works Director, Cedar Key Fire Department
Rose Cantwell	Cedar Key Aquaculture Association - Chair, Dog Island Blues Clam Co. - Owner, Florida Shellfish Aquaculture Association - Member
Andrew Gude	Lower Suwannee & Cedar Keys NWR (USFWS) - Manager
Dan Solano	Cedar Key Aquaculture Association
Joe Hand	Cedar Key Water and Sewer District - Board Member
Mark DeHaven	FDACS Aquaculture Division
Caryn Stevenson	Pelican Realty - Owner/Broker, 2 nd Street Redevelopment Project
James McCain	Cedar Key Water and Sewer District
Mandy Offerle	Florida Nature Coast Conservancy, Cedar Key News
Frank Offerle	Florida Nature Coast Conservancy, Cedar Key News
Leslie Sturmer	UF/IFAS Shellfish Aquaculture Extension
Chris Cowart	Superintendent, Levy County School Board
Sam Gibbs	Florida Nature Coast Conservancy - President, US Fish and Wildlife Service



Meeting 2

Task Force meeting 2 was convened on March 23, 2023. At this meeting, we presented draft vulnerability assessment results and solicited feedback from members. At the meeting, a City representative commented on the suggested neighborhood areas presented by the project team, saying that they were surprisingly similar to pre-established zones the City uses for Public Works maintenance. The official asked the project team to bring neighborhood names and boundaries in line with the City's existing zones.

We also discussed the format of the upcoming public workshop. There was general agreement by task force members that the results are very complex and a lot to take in. They suggested we produce simpler visualizations and infographics and select only one or two maps for each area. The Task Force agreed that a gallery style public workshop would be better than presentation style.

PUBLIC WORKSHOPS

Workshop 1

Agenda

- | | |
|---------|--|
| 10 mins | Welcome & Introductions |
| 15 mins | Icebreaker |
| 30 mins | Project goals and anticipated outcomes/products |
| 10 mins | Q&A and discussion of overall project scope/terminology questions, feedback on planning horizons and scenarios |
| 5 mins | Break |
| 20 mins | Breakout groups |
| | <ul style="list-style-type: none">• <i>Identify any assets that are missing</i>• <i>What makes an asset critical to you?</i>• <i>Identify connections between assets</i>• <i>Identify threats and opportunities to assets</i> |
| 10 mins | Switch breakout groups (if desired) |
| 10 mins | Report out about critical asset list/regionally significant assets |
| 15 mins | Wrap-up/synthesis |

The first Resilient Cedar Key public workshop was held from 6 to 8 PM on Thursday, December 8, 2022 at the Cedar Key Community Center and was attended by 43 community members. We



provided refreshments and as participants entered there was a large, printed map of Cedar Key and the outlying areas. We provided colored dots for people to stick on the map for where they live (one color), where they work (different color), and a place they have had a personal experience with flooding (third color). We also gave each participant three large post-its and asked for 1) a memory, 2) a challenge, and 3) a wish for the future. For the icebreaker activity, we asked several attendees to come up to the front and share what they placed on the map and post-its.

Then, the project team presented the overall project goals, initial data gathering efforts, critical asset inventory/data gaps, and the project timeline. The second half of the workshop was dedicated to a breakout activity where each group focused on a subset of critical assets (e.g., housing, aquaculture, or natural and cultural resources) to identify data gaps and key threats or opportunities in that category. Groups reported out to the whole group to close out the workshop. The project team worked to integrate data and feedback gathered from the public during this workshop into their analysis and assessment efforts.

Workshop 2

Agenda

STATIONS. Please make your way around the room and view each station. You may visit the stations in any order, though we prefer you visit Station 7: Adaptation Options last.

5. *Zone 1 maps and data*
6. *Zone 2 maps and data*
7. *Zone 3 maps and data*
8. *Zone 4 maps and data*
9. *Zone 5 maps and data*
10. *Interactive mapping dashboard demonstration*
11. *Adaptation Options - please visit last*

HOMEWORK. Explore data on your own. Use the link to the data dashboard below to view maps and data in more detail. Link to dashboard: <https://resilientcedarkey.web.app/>

Public Workshop 2 was hosted from 6-8 PM on April 13, 2023, at the Cedar Key Community Center and was attended by at least 36 community members. Based on feedback gathered at Task Force meeting 2, the second public meeting was hosted in a gallery format where participants were invited to interact with the maps and vulnerability analyses at their own pace. The Task Force felt that the overwhelming amount of data in the draft maps was too much to present in a structured way and that a more interactive format was needed. We provided refreshments and seven self-paced stations where participants could view the draft flooding maps and a flooding visualization for each neighborhood (5 stations), view an interactive flooding vulnerability tool (1 station), and weigh in about the types of actions they would like to see Cedar Key take to address and adapt to



vulnerabilities (1 station). Each station was monitored by a project team member so attendees could ask questions and understand the maps and tools on offer.

CONCLUSIONS

The vulnerability assessment process detailed herein has identified and quantified flooding exposure and sensitivity of a broad suite of Cedar Key's infrastructure, natural, economic, and cultural assets. The community engagement process ensured that local knowledge, values, and concerns were addressed and incorporated into the assessment. There are many opportunities to address vulnerabilities using a combination of grey or green infrastructure, policy, and land use planning interventions. Especially within the focus areas identified by the assessment, the next step for the City of Cedar Key is to identify and prioritize a list of adaptation actions to address the vulnerabilities identified herein.

The next phase of the Resilient Cedar Key project will be to work with City leaders, community stakeholders, and the team at the University of Florida to produce an adaptation plan.

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