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Working Towards Resilient Coastal Communities

Village of Sea Ranch Lakes Vulnerability to Sea Level Rise Assessment Report



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Village of Sea Ranch Lakes Vulnerability to Sea Level Rise Assessment Report for CM238

Working Towards Resilient Coastal Communities



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Report Summary

The Village of Sea Ranch Lakes Vulnerability Report

Introduction

In the past century, sea level rise in South Florida rose 8-10 inches. In the future, the rate of sea level rise is expected to accelerate due to processes associated with global climate change. Broward County is highly vulnerable to sea level rise (SLR) due to its low lying topography. As a result, inundation, episodic flooding, drainage issues in low-lying areas and saltwater intrusions are significant threats. This document contains the vulnerability assessment of major municipal infrastructure in the Village of Sea Ranch Lakes during one and two foot SLR scenarios using a regional inundation digital elevation model (DEM) which incorporates 2007 LiDAR elevation data. Vulnerable areas are displayed by a grid with a 50 foot cell size, categorized as “possible” and “more likely”:

<p>LEGEND</p> <p> Possible</p> <p> More Likely</p>	<p>The individual colors are used to describe the uncertainty associated with the variability of the tidal data measurements and LiDAR elevation measurements. The purple areas have a 75-100% certainty of identifying elevations below the high tide and therefore are “More likely” to be vulnerable. Orange areas have a 25-74% certainty of being at elevations below the high tide and represent areas of “Possible” vulnerability.</p>
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Municipal Infrastructure Assessments

Mapping of different sea level rise scenarios can help to identify areas at potential risk and aid in planning for a sustainable community. This Geographic Information Systems (GIS) based study specifically assessed the following municipal infrastructure for the potential impacts of sea level rise:

1. Airports
2. Bridges
3. City Arterial Roads
4. City Hall
5. City Parks
6. Regional Parks
7. Community Redevelopment Areas (CRAs)
8. Evacuation Routes
9. Fire Rescue Stations
10. Hospitals
11. Law Enforcement Assets
12. Schools
13. Potable Water Treatment
14. Waste Water Treatment

* This work was funded, in part, through a grant agreement from the Florida Department of Environmental Protection, Florida Coastal Management Program.

Municipal Scale Inundation Maps

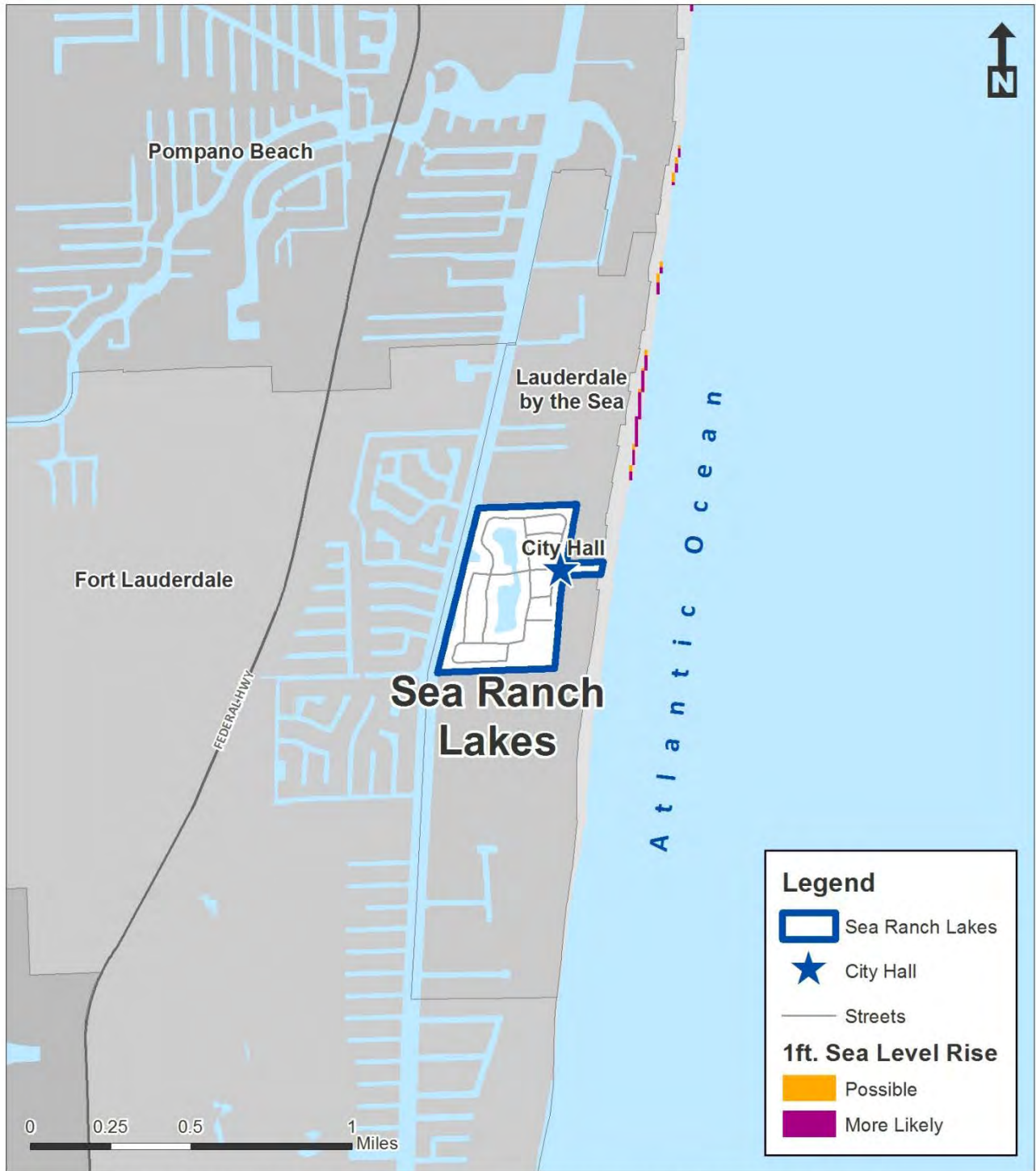
Municipal scale inundation maps provide at-a-glance overviews of areas within the Village of Sea Ranch Lakes Municipal boundary that are low lying and likely to be vulnerable to flooding associated with sea level rise. The maps on the following pages show the Village of Sea Ranch Lakes overlaid with the inundation grid for the one and two foot sea level rise scenarios. These maps identify no lands within the municipal boundary that lie at or below projected sea levels during either the one or two foot scenarios.

The Village of Sea Ranch Lakes has no areas located at or below projected sea levels during either the one or two foot scenarios, as detailed in the table below and the municipal scale inundation maps. The table breaks down the vulnerable acres for each scenario into “more likely,” “possible,” and total. Additionally, the table shows the percentage of the total area of the village that is vulnerable.

Village of Sea Ranch Lakes Vulnerability to Sea Level Rise Table							
Village of Sea Ranch Lakes	Total Area (Acres)	Area Vulnerable during One (1) Foot Scenario (Acres)		Total Area Vulnerable during One (1) Foot Scenario (Acres)	Acreage Vulnerable during Two (2) Foot Scenario (Acres)		Total Area Vulnerable during Two (2) Foot Scenario (Acres)
		More Likely	Possible		More Likely	Possible	
		109.66	0.00	0.00	0.00	0.00	0.00
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Village of Sea Ranch Lakes Inundation Map

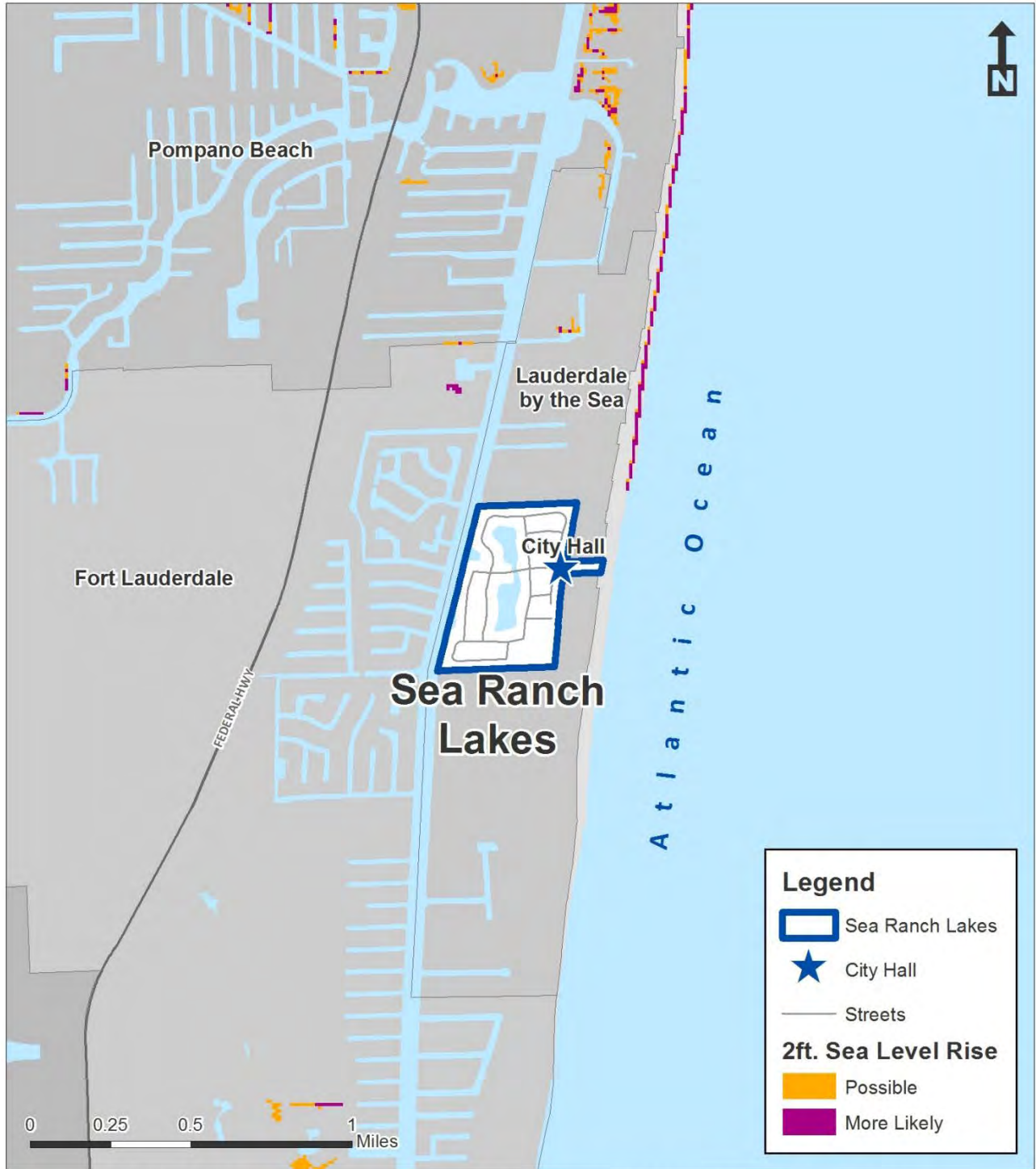
One Foot Sea Level Rise Scenario



This map is for conceptual purposes only and should not be used for legal boundary determinations.

Village of Sea Ranch Lakes Inundation Map

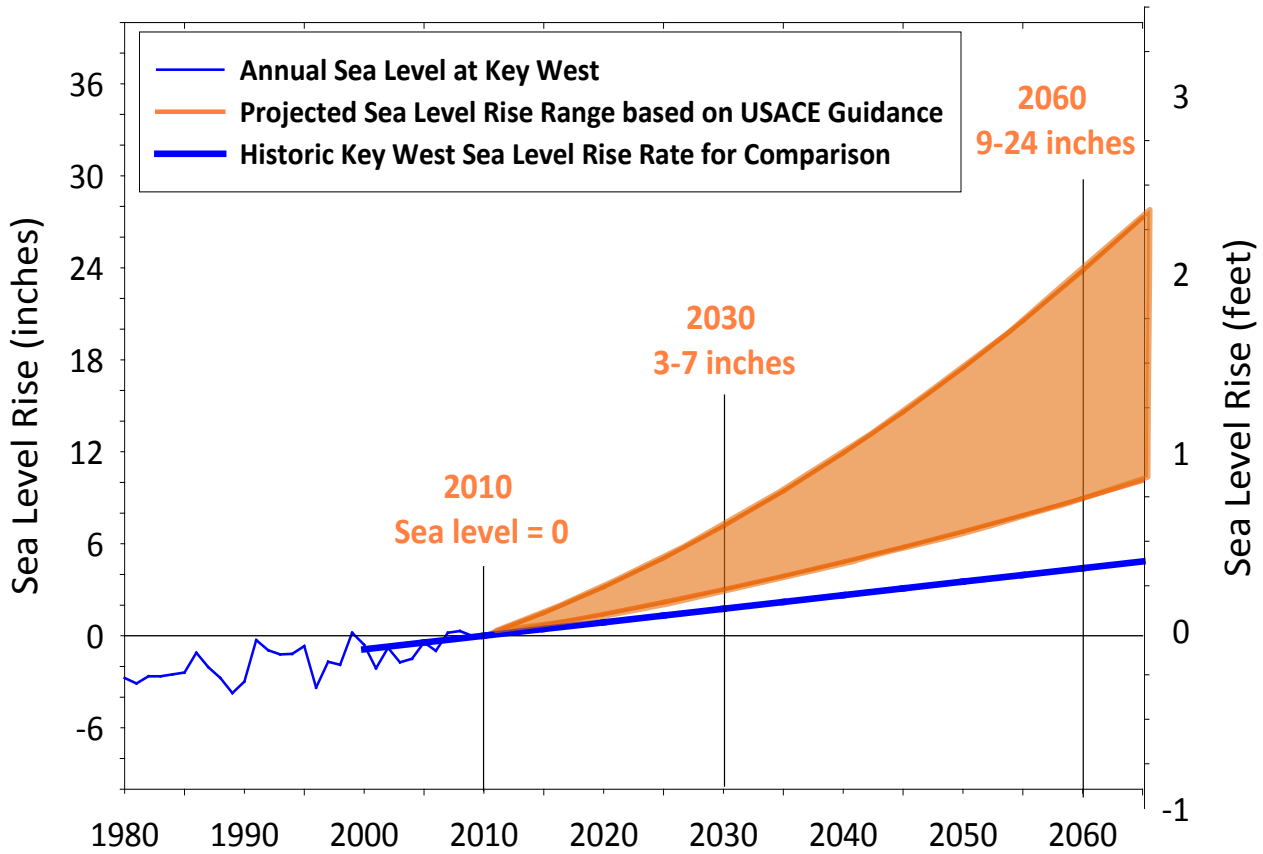
Two Foot Sea Level Rise Scenario



This map is for conceptual purposes only and should not be used for legal boundary determinations.

Unified Sea Level Rise Projection

The Southeast Florida Regional Climate Change Compact, collaboration among Monroe, Miami-Dade, Broward and Palm Beach Counties, convened a group of scientists and local experts to develop the Unified Southeast Florida Sea Level Rise Projection. This projection allows us to assign timeframes to the given sea level rise scenarios with a one foot sea level rise projected to occur between 2040-2070 and a two foot rise likely to occur between 2060 – 2115.



Unified Southeast Florida Sea Level Rise Projection for Regional Planning Purposes - This projection uses historic tidal information from Key West and was calculated by Kristopher Esterson from the United States Army Corps of Engineers using USACE Guidance (USACE 2009) intermediate and high curves to represent the lower and upper bound for projected sea level rise in Southeast Florida. Sea level measured in Key West over the past several decades is shown. The rate of sea level rise from Key West over the period of 1913 to 1999 is extrapolated to show how the historic rate compares to projected rates.

Vulnerability Assessment Methodology

Municipal infrastructure (fire rescue stations, schools, city owned arterial roads, etc.) was overlaid with the sea level rise inundation grid to review which infrastructure may be located at or below projected sea levels during the one and two foot scenarios. This process was expedited with the creation of a python script that quickly locates infrastructure which may be vulnerable during a given sea level rise scenario. Each location was reviewed visually for confirmation. The report uses inundation maps developed in collaboration with the Southeast Florida Regional Climate Change Compact with vulnerability methods and oversight by the GIS Section of the Planning and Redevelopment Division. All measurements of area and length are based on GIS datasets of the county and depend on these for accuracy. Additionally, measurements and percent values given in this report are rounded, which may contribute to minor inconsistencies.

Results

The following findings pertain to the vulnerability assessment completed for the Village of Sea Ranch Lakes. The Village of Sea Ranch Lakes was found to have no infrastructure located at or below projected sea levels during either the one or two foot scenarios.

Additionally, this report expands on neighbor's city parks, regional parks, hospitals, or schools within two miles of the municipal boundary. Clearance of navigable bridges may be reduced along the Intracoastal Waterway, thereby reducing accessibility by watercraft. The following list details the assessed infrastructure, maps follow. This vulnerability assessment details vulnerability up to two feet only, sea levels may continue to rise beyond two feet.

1. Airports:
There are no airports in the Village of Sea Ranch Lakes.
2. Bridges:
Included is a graphic that provides the location of bridges located in and near the Village of Sea Ranch Lakes overlaid by the inundation grid. One bridge is located within Sea Ranch Lakes. The idea is to provide an at-a-glance overview of the vulnerability of bridges with the understanding that most navigable bridges are located on tidally-influenced water bodies. Sea level will reduce the clearance under these bridges thereby reducing the number and size of craft that can pass under them.
3. Arterial Roads:
There are no arterial roads maintained by the Village of Sea Ranch Lakes.
4. City Hall:
The Village of Sea Ranch Lakes city hall showed no vulnerability to sea level rise during the one or two foot scenarios.
5. City Parks:
There are no City Parks in the Village of Sea Ranch Lakes. Within a two mile radius of Sea Ranch Lakes, one park, 13th Street Park, is vulnerable during the two foot sea level rise scenario.

6. Regional Parks:
There are no Regional Parks in the Village of Sea Ranch Lakes. There are no regional parks within two miles of Sea Ranch Lakes.
7. Community Redevelopment Areas (CRA)
There are no CRAs in the Village of Sea Ranch Lakes
8. Evacuation Routes:
No evacuation routes immediately to the North and South of the Village of Sea Ranch Lakes are inaccessible during the one or two foot scenarios. An area immediately adjacent to Atlantic Avenue is located at or below projected sea levels, but does not overlap with the roadway.
9. Fire Rescue Stations:
There are no fire rescue stations in the Village of Sea Ranch Lakes. No fire rescue stations within a two mile radius of Sea Ranch Lakes are vulnerable up to the two foot sea level rise scenario.
10. Hospitals:
There are no hospitals in the Village of Sea Ranch Lakes. No hospitals within two miles of Sea Ranch Lakes are vulnerable up to the two foot sea level rise scenario.
11. Law Enforcement Assets:
The Sea Ranch Lakes Police Department is not vulnerable up to the two foot sea level rise scenario. No law enforcement assets within two miles of Sea Ranch Lakes are vulnerable up to the two foot sea level rise scenario.
12. Schools:
There are no schools in the Village of Sea Ranch Lakes. No schools within two miles of Sea Ranch Lakes are vulnerable up to the two foot sea level rise scenario.
13. Potable Water Treatment:
There are no potable water treatment plants in the Village of Sea Ranch Lakes.
14. Waste Water Treatment:
There are no waste water treatment plants in the Village of Sea Ranch Lakes.

Conclusion

The information contained in this report is intended to be used for planning purposes to begin to identify and address municipal infrastructure at risk. While this report finds that the Village of Sea Ranch Lakes has no infrastructure vulnerable during the projected one and two foot sea level rise scenarios, the municipality may still be at risk due to secondary threats such as flooding events and ponding, storm drainage, erosion, bridge clearance, etc. Sea level may continue to rise beyond two feet. The Sea Ranch Lakes municipal authorities should begin the development of policies to address these risks and institutionalize the consideration of climate issues for adaptation strategies.

Definitions

ArcGIS: Software for working with maps and geographic information.

Arterial Roads: A major or main road, but not a highway.

DEM: Digital Elevation Model – A digital model or 3D representation of a terrain’s surface using topographic information.

Geographic Information Systems (GIS): A system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data.

LiDAR: A remote sensing technology whereby elevation is measured by illuminating a target with a laser and analyzing the reflected light.

PPA: Priority Planning Areas – Identifies areas influenced by tidal water bodies at increased risk of inundation under a 2 foot sea level rise scenario, projected to occur as soon as 2060.

Python Script: A widely-used general purpose programming language. It is used in ArcGIS to automate processes whereby new geographic information is created from existing data.

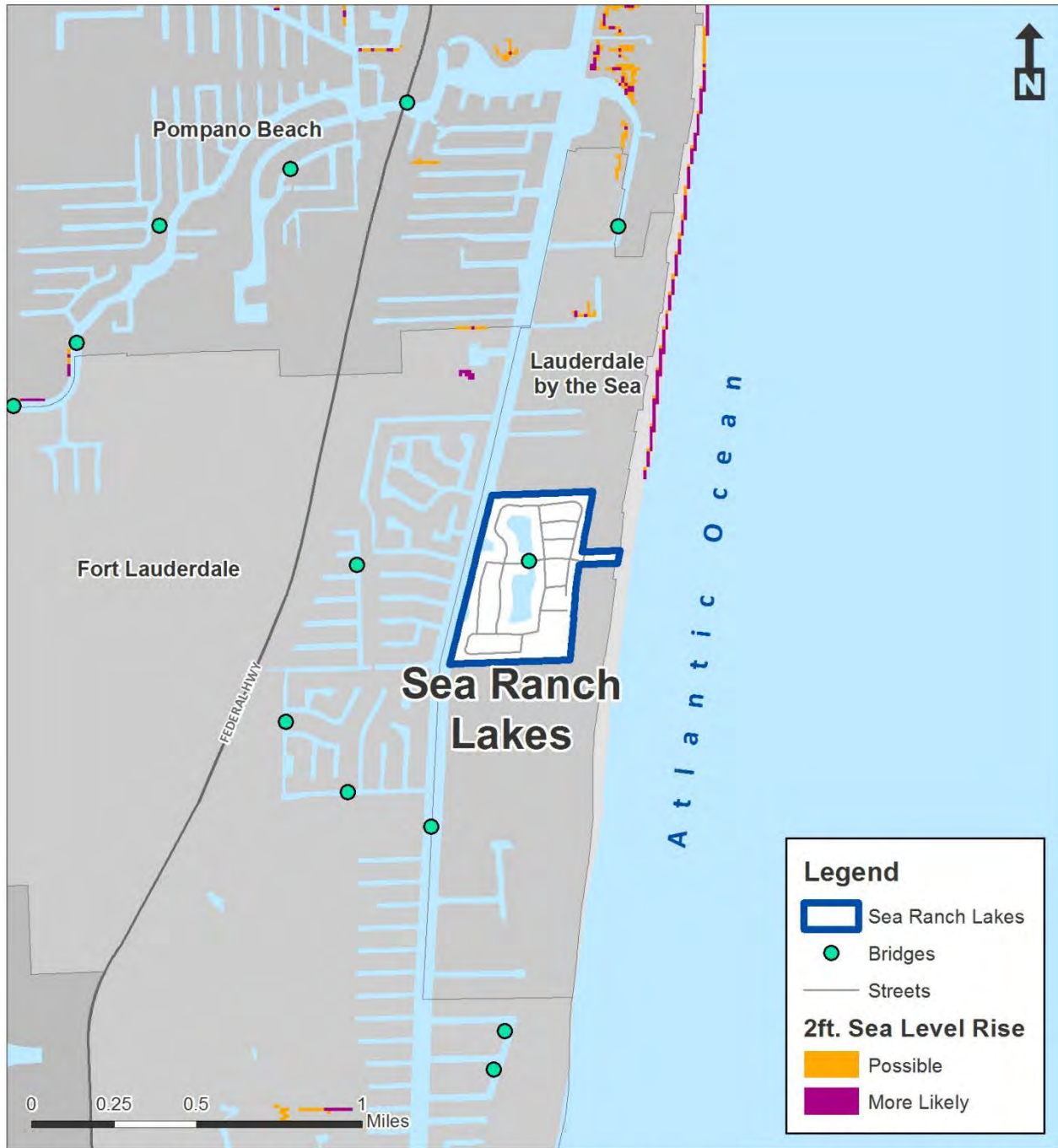
SLR: sea level rise grid

- “More Likely”: areas that have a 75-100% certainty of identifying elevations below the high tide and therefore are “More likely” to be vulnerable
- “Possible”: Orange areas have a 25-74% certainty of being at elevations below the high tide and represent areas of “Possible” vulnerability.

Vulnerable Area: The phrase “Vulnerable Area” as used in this document refers to land elevation at or below a given sea level rise scenario (one to two foot) as determined by the unified sea level rise projection grid.

Bridges

Vulnerability Assessment



This Map identifies areas at increased risk of inundation up to a two foot sea level rise scenario, projected to occur as soon as 2060.

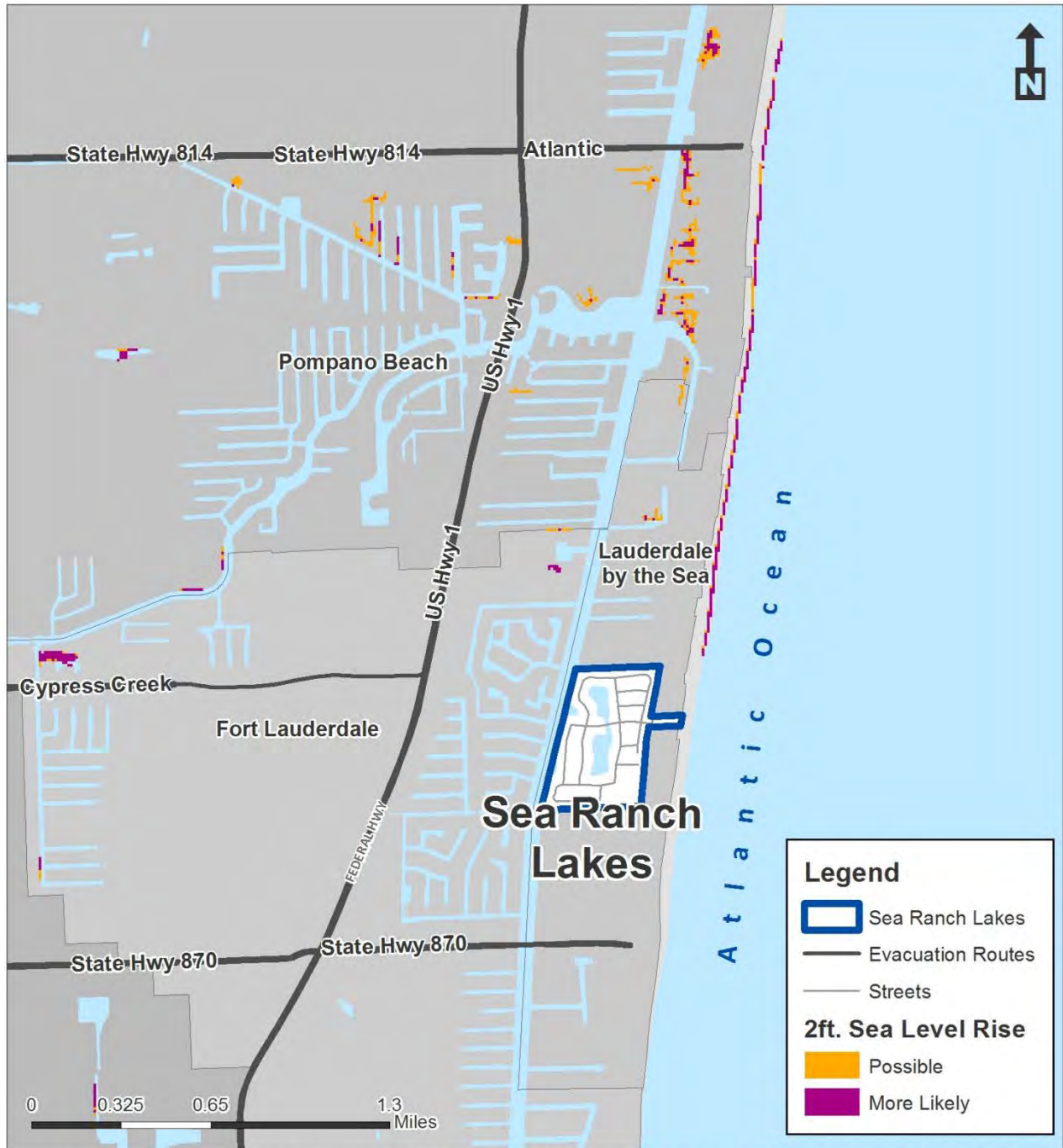
This map is for conceptual purposes only and should not be used for legal boundary determinations.



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Evacuation Routes Vulnerability Assessment



This Map identifies areas at increased risk of inundation up to a two foot sea level rise scenario, projected to occur as soon as 2060.

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