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Working Towards Resilient Coastal Communities

Town of Hillsboro Beach **Vulnerability to Sea Level Rise Assessment Report**



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Town of Hillsboro Beach Vulnerability to Sea Level Rise Assessment Report for CM238

Working Towards Resilient Coastal Communities



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Report Summary

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

Areas of special interest for the Town of Hillsboro Beach:

15. Dock by Vacant Residential Parcels: FOLIO 484308130010 and 484308130012

* 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 Town of Hillsboro Beach 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 Town of Hillsboro Beach overlaid with the inundation grid for the one and two foot sea level rise scenarios. These maps primary purpose is to aid in the assessment of vulnerabilities to sea level rise.

The following table summarizes the area of land (in acres) vulnerable during both the one and two foot scenarios, as shown in 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 town that is vulnerable. Note that percent values are rounded to the nearest two decimal places.

Town of Hillsboro Beach Vulnerability to Sea Level Rise Table							
Town of Hillsboro Beach	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	
		334.86	9.20	1.66	10.87	14.05	2.56
		2.75%	0.50%	3.24%	4.20%	0.76%	4.96%

TOWN OF HILLSBORO BEACH INUNDATION MAP

One Foot Sea Level Rise



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

TOWN OF HILLSBORO BEACH INUNDATION MAP

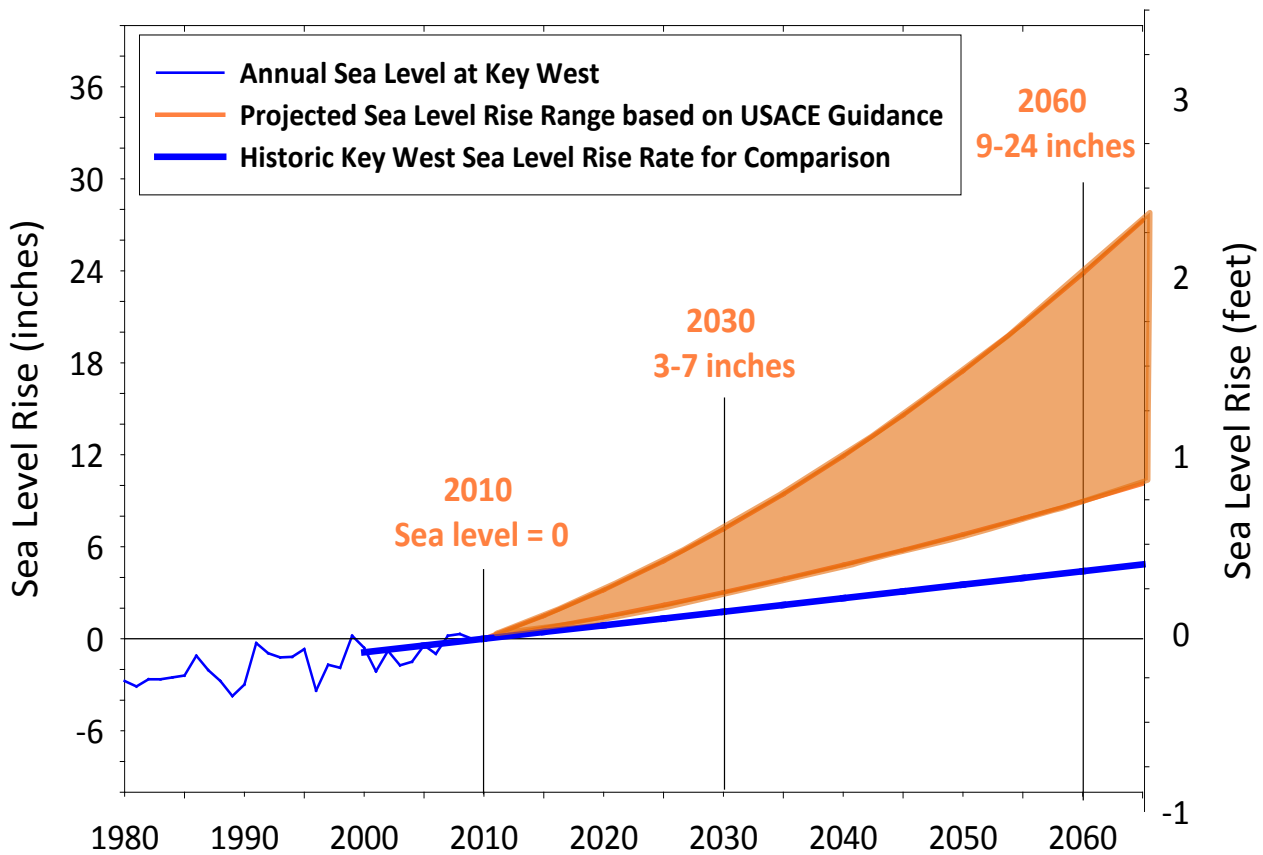
Two Foot Sea Level Rise



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 or 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 assessments performed for each of the Town of Hillsboro Beach municipal infrastructure in the list. Much of the land area at or below projected sea levels in the Town of Hillsboro Beach is located along the shoreline. The only infrastructure found to be vulnerable is Hillsboro Mile. Clearance of navigable bridges may also be impacted. Detailed maps and tables follow.

1. Airports:
There are no airports in the Town of Hillsboro Beach.
2. Bridges:
Included is a graphic that provides the location of the two bridges located in the Town of Hillsboro Beach overlaid by the inundation grid. 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:
During the two foot sea level rises scenario, a 0.17 mile stretch of Hillsboro Mile lies at or below projected sea levels. Included is an overview map of the Town of Hillsboro Beach with the location of the vulnerable segment, a table to assess the vulnerable segment, and large-scale maps of the vulnerable area during the one and two foot sea level rise scenarios.
4. City Hall:
The Town of Hillsboro Beach 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 Town of Hillsboro Beach
6. Regional Parks:
There are no Regional Parks in the Town of Hillsboro Beach
7. Community Redevelopment Areas (CRA)
There are no CRAs in the Town of Hillsboro Beach

8. Evacuation Routes:
There are no evacuation routes in the Town of Hillsboro Beach.
9. Fire Rescue Stations:
There are no fire rescue stations in the Town of Hillsboro Beach.
10. Hospitals:
There are no hospitals in the Town of Hillsboro Beach.
11. Law Enforcement Assets:
No law enforcement assets within the Town of Hillsboro Beach showed potential vulnerability to sea level rise during the one or two foot scenario.
12. Schools:
There are no schools in the Town of Hillsboro Beach.
13. Potable Water Treatment:
There are no potable water treatment plants in the Town of Hillsboro Beach. The Hillsboro Beach Water Treatment Plant, located in Pompano Beach, is not vulnerable up to a two foot sea level rise scenario.
14. Waste Water Treatment:
There are no waste water treatment plants in the Town of Hillsboro Beach.
15. Dock by Vacant Residential Parcels: FOLIO 484308130010 and 484308130012
When viewed from the municipal scale maps, these parcels may seem to have land located at or below projected sea levels. Upon closer inspection of the area, only the seawall of the vacant dock has areas located at or below projected sea levels during both the one and two foot scenarios.

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. Understanding that a one foot rise could occur in the next 30 years, adaptation strategies should be developed for locations identified as vulnerable in the first scenario. In addition to the vulnerability of infrastructure identified to lie at or below projected sea levels up to a two foot scenario; the municipality may also 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 Hillsboro Beach 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 is for conceptual purposes only and should not be used for legal boundary determinations.

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 FLORIDA
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 Environmental Protection and Growth Management Department
 Natural Resources Planning and Management Division

Date: 12/9/2013
 DEP Agreement No. CM238 DEP 55-236(08/11)

Arterial Roads Vulnerability Assessment



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

BROWARD COUNTY
 Prepared By: Hannes Ziegler
 Environmental Protection and Growth Management Department
 Natural Resources Planning and Management Division

Date: 12/9/2013
 DEP Agreement No. CM238 DEP 55-236(08/11)

Table of Vulnerable Arterial Roads

The following table provides information on Hillsboro Mile in the Town of Hillsboro Beach. Within Hillsboro Beach, Hillsboro Mile runs 3.08 miles. During the two foot sea level rises scenario, a 0.17 mile stretch of Hillsboro Mile lies at or below projected sea levels, possibly inundating up to 6% of the roadway. There are no vulnerabilities during the one foot scenario.

Hillsboro Mile			Total Miles
			3.08
SLR Scenario	Possible	More Likely	Percent Total
1 Foot	0.00	0.00	0%
2 Foot	0.08	0.09	6%

Hillsboro Mile Two Foot Sea Level Rise Scenario



This map provides a view of a section of Hillsboro Mile during the two foot sea level rise scenario. During this scenario, a 0.17 mile stretch of Hillsboro Mile lies at or below projected sea levels, possibly inundating up to 6% of the entire roadway. Hillsboro Mile is not vulnerable during the one foot sea level rise scenario.

Vacant Dock and Parcels 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.

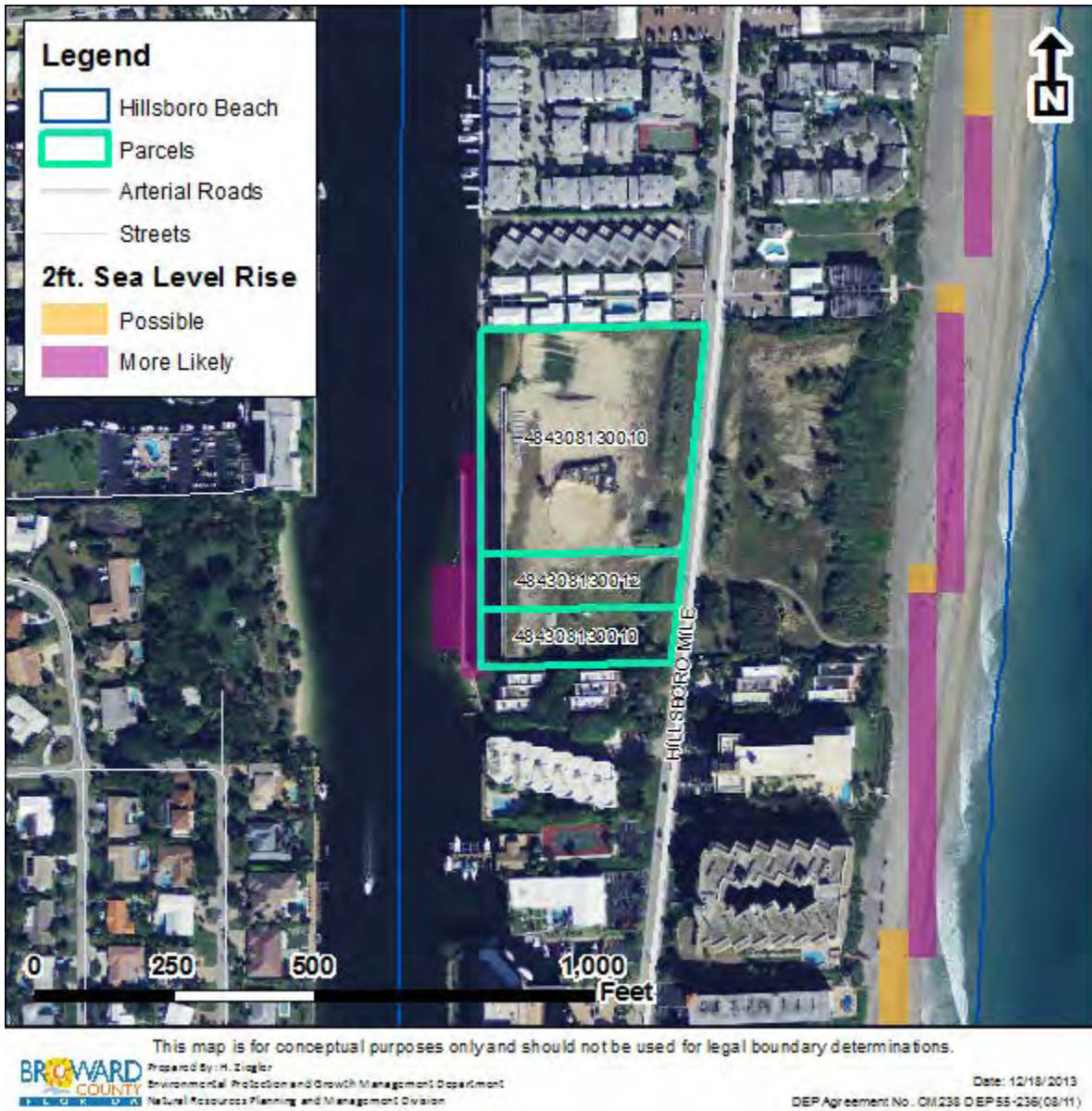
This map is for conceptual purposes only and should not be used for legal boundary determinations.



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Date: 12/18/2013
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Vacant Dock and Parcels Two Foot Sea Level Rise Scenario



This map provides a view of a vacant dock and parcels with FOLIO 484308130010 and 484308130012. When viewed from the municipal scale maps, these parcels may seem to have land located at or below projected sea levels. Upon closer inspection of the area, it appears that only the seawall of the vacant dock has areas that lie at or below projected sea levels during both the one and two foot scenarios.