

Funded Through: DEP AGREEMENT NO. CM238

Working Towards Resilient Coastal Communities

City of Wilton Manors Vulnerability to Sea Level Rise Assessment Report



Prepared on: March 14

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City of Wilton Manors Vulnerability to Sea Level Rise Assessment Report for CM238

Working Towards Resilient Coastal Communities



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Contents

Report Summary.....	7
Introduction.....	7
Municipal Infrastructure Assessments.....	7
Municipal Scale Inundation Maps	8
Unified Sea Level Rise Projection	11
Vulnerability Assessment Methodology.....	12
Results	12
Conclusion	14
Definitions	14
Bridges.....	15
City Arterial Roads.....	16
Table of Vulnerable City Arterial Roads.....	17
City Hall.....	19
Table of Vulnerability for City Hall.....	20
City Parks	23
Table of Vulnerable City Parks.....	24
Middle River Subdivision	30
Table of Vulnerable Streets in the Middle River Subdivision	31



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Report Summary

The City of Wilton Manors 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 City of Wilton Manors 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

Areas of special interest for the City of Wilton Manors

15. Middle River Subdivision

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

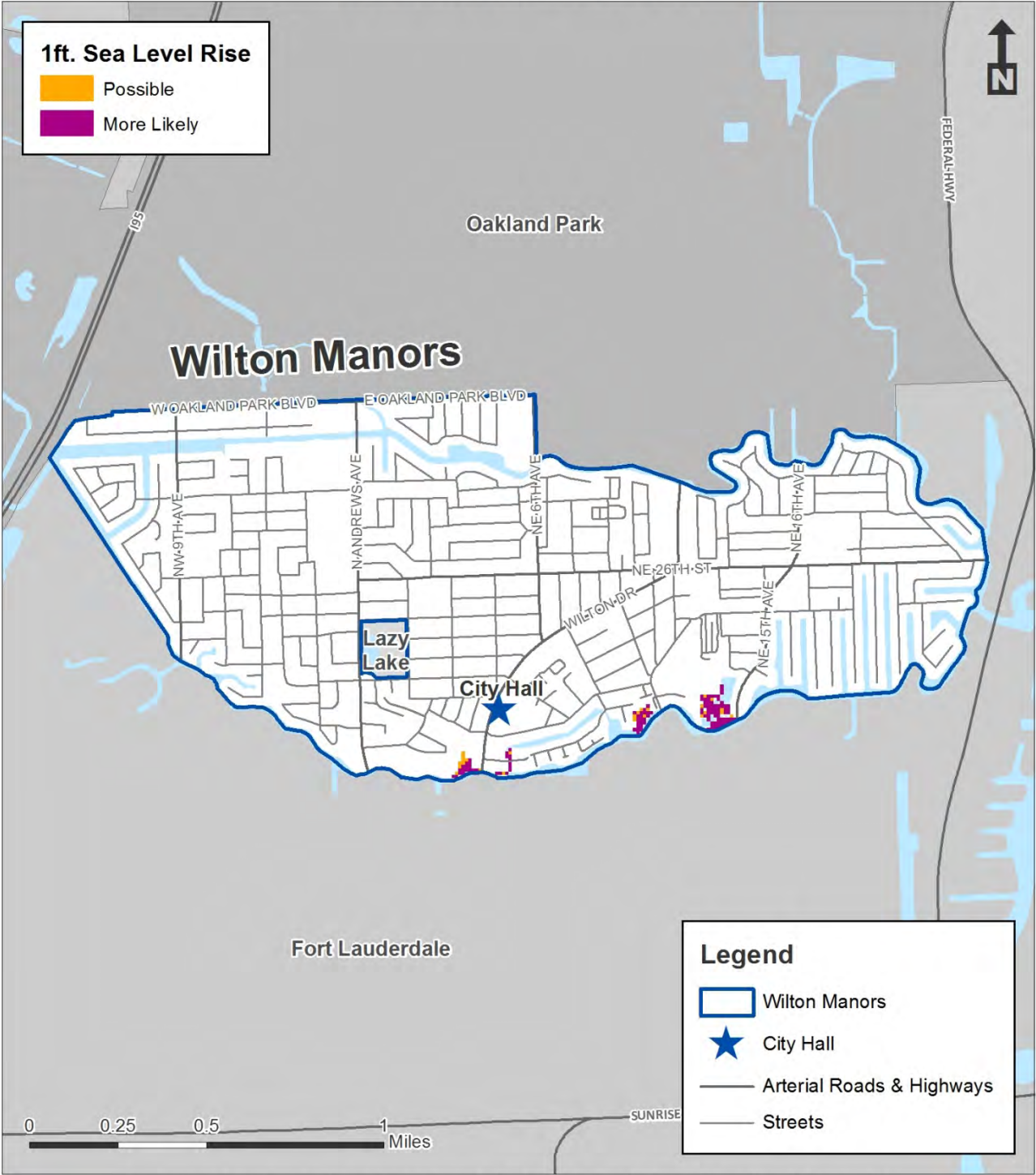
Municipal scale inundation maps provide at-a-glance overviews of areas within the City of Wilton Manors Municipal boundary that are low lying and likely to be vulnerable to flooding associated with sea level rise. The maps on the following pages show the City of Wilton Manors overlaid with the inundation grid for a one and two foot sea level rise scenario. 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) affected 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 city that is vulnerable. Note that percent values are rounded to the nearest two decimal places.

City of Wilton Manors Vulnerability to Sea Level Rise Table							
City of Wilton Manors	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) Feet Scenario (Acres)		Total Area Vulnerable during Two (2) Feet Scenario (Acres)
		More Likely	Possible		More Likely	Possible	
		1256.12	6.37	1.44	7.82	15.31	18.88
		0.51%	0.11%	0.62%	1.22%	1.50%	2.72%

CITY OF WILTON MANORS INUNDATION MAP

One Foot Sea Level Rise



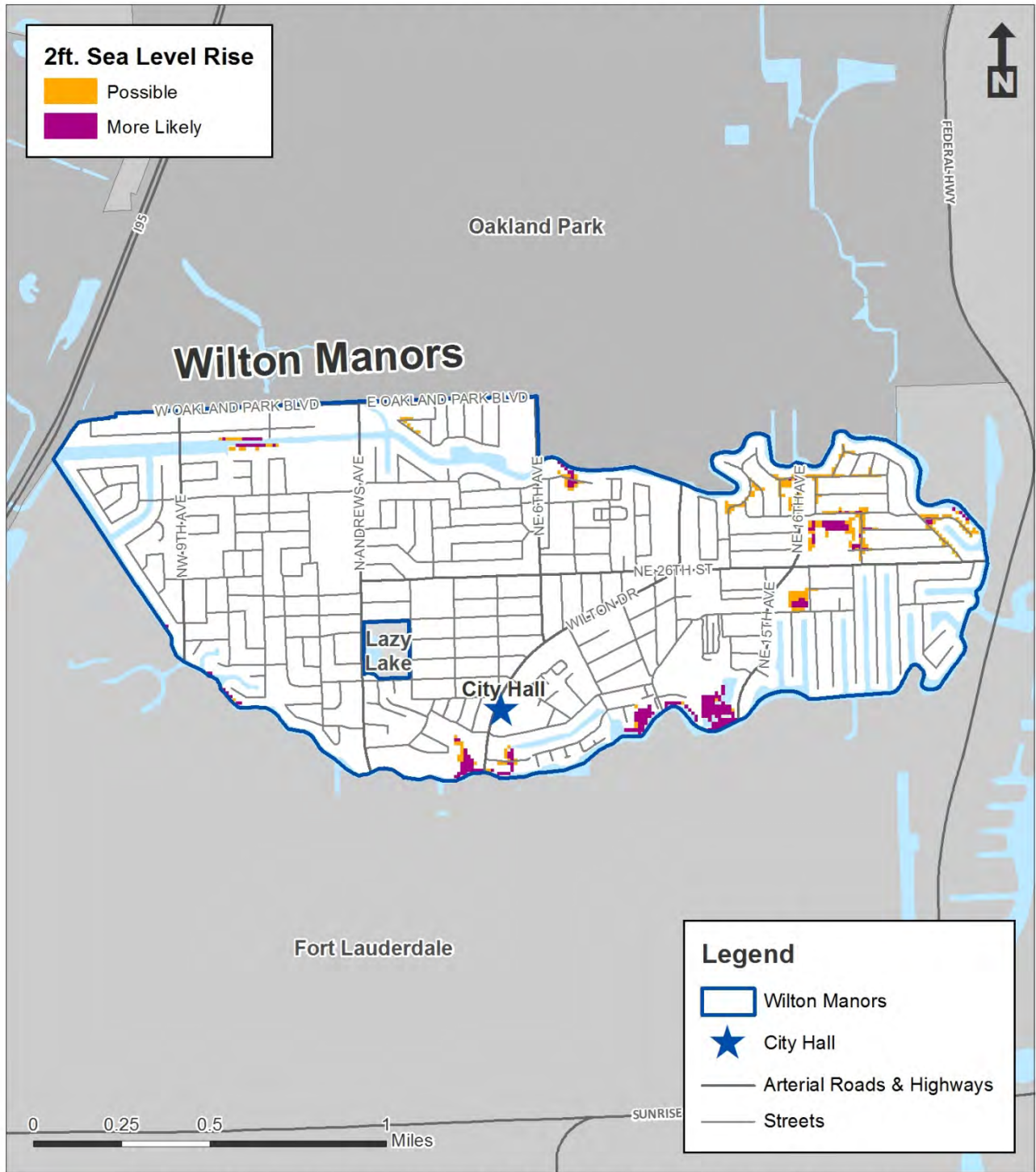
This map is for conceptual purposes only and should not be used for legal boundary determinations.

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CITY OF WILTON MANORS INUNDATION MAP

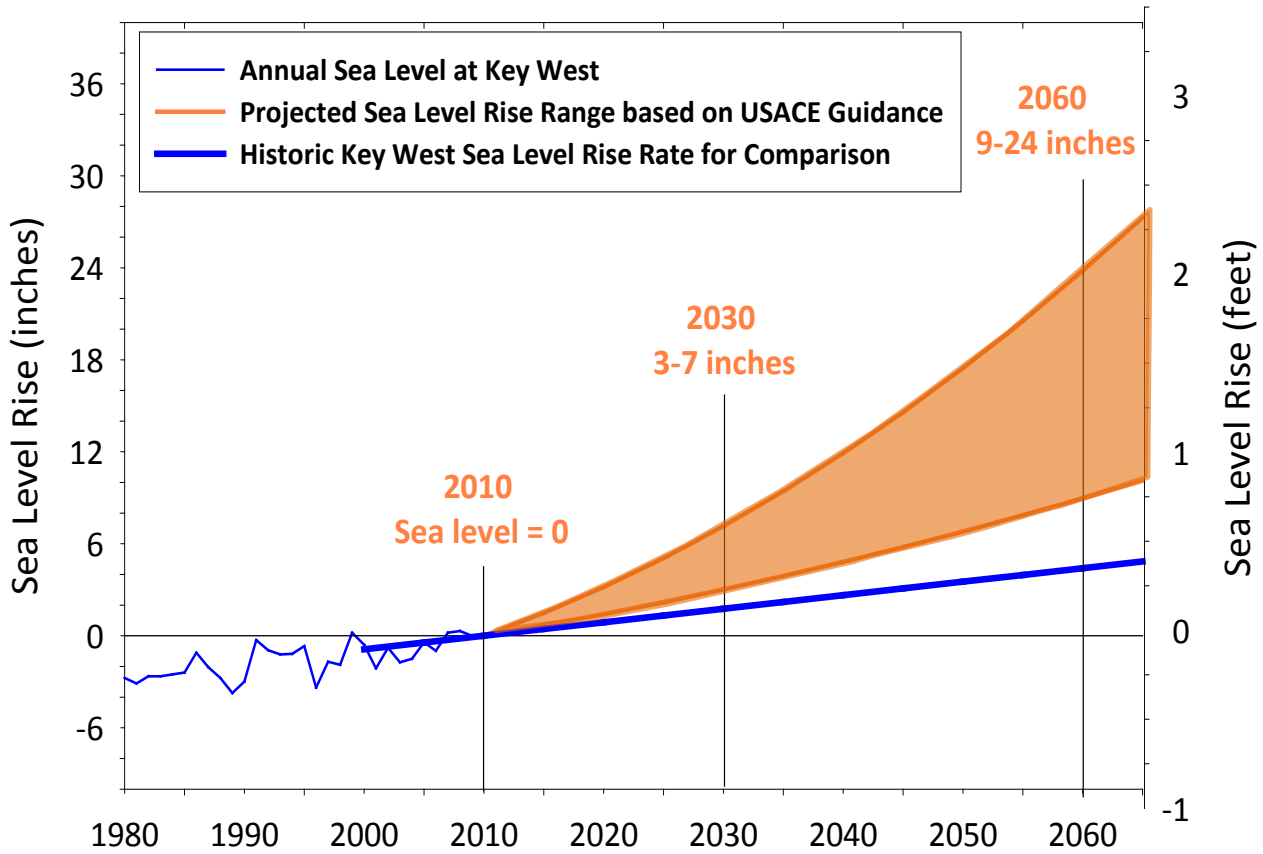
Two Foot Sea Level Rise



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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 a one or two foot scenario. 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 City of Wilton Manors municipal infrastructure in the list. Detailed maps and tables follow.

1. Airports:
There are no airports in the City of Wilton Manors.
2. Bridges:
Included is a graphic that provides the location of all 11 bridges located in the City of Wilton Manors 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. City Arterial Roads:
One arterial road maintained by the City of Wilton Manors was found to be potentially vulnerable to sea level rise. No segments have areas located at or below projected sea levels during the one foot scenario. One segment, NE 16th Ave, showed vulnerabilities during the two foot scenario. Included is an overview map of the City of Wilton Manors with the locations of all vulnerable arterial road segments up to a two foot scenario, a table to assess each vulnerable segment, and a large-scale map of the vulnerable segments.
4. City Hall:
Streets within a 1000-foot radius of the Wilton Manors City Hall may become vulnerable to sea level rise during both the one and two foot scenarios. The vulnerable streets are NE 14th Ave and NE 19th St.
5. City Parks:
A total of three city parks in the City of Wilton Manors were found to have land located at or below projected sea levels. Two parks were vulnerable during the one foot scenario, and three parks were vulnerable during the two foot scenario. Colohatchee Park, the largest vulnerable city park, may have up to 59% of land located at or below projected sea levels during the two foot scenario. Included in this report is an overview map of the City of Wilton Manors with the location of the three vulnerable city parks, a table to assess each vulnerable park, and large-scale maps of each Park.

6. Regional Parks:
There are no regional parks in the City of Wilton Manors.
7. Community Redevelopment Areas (CRA):
There are no CRAs in the City of Wilton Manors
8. Evacuation Routes:
No evacuation routes within the municipal boundary of the City of Wilton Manors showed potential vulnerability to sea level rise during the one or two foot scenarios.
9. Fire Rescue Stations:
No fire rescue stations in the City of Wilton Manors showed potential vulnerability to sea level rise during the one or two foot scenarios.
10. Hospitals:
There are no hospitals in the City of Wilton Manors.
11. Law Enforcement Assets:
No law enforcement assets in the City of Wilton Manors showed potential vulnerability to sea level rise during the one or two foot scenarios.
12. Schools:
No school building footprints in the City of Wilton Manors showed potential vulnerability to sea level rise during the one or two foot scenarios.
13. Potable Water Treatment:
There are no potable water treatment plants in the City of Wilton Manors.
14. Waste Water Treatment:
There are no waste water treatment plants in the City of Wilton Manors.
15. Middle River Subdivision:
The Middle River Subdivision of the City of Wilton Manors has a large number of neighborhood streets located at or below projected sea levels during the two foot scenario. No land within the Middle River Subdivision appears to be vulnerable during the one foot scenario. Included is an overview map of the City of Wilton Manors with the location of the Middle River Subdivision, a table to assess each vulnerable street within the subdivision, and a large-scale map of the vulnerable area.

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 Wilton Manors 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.

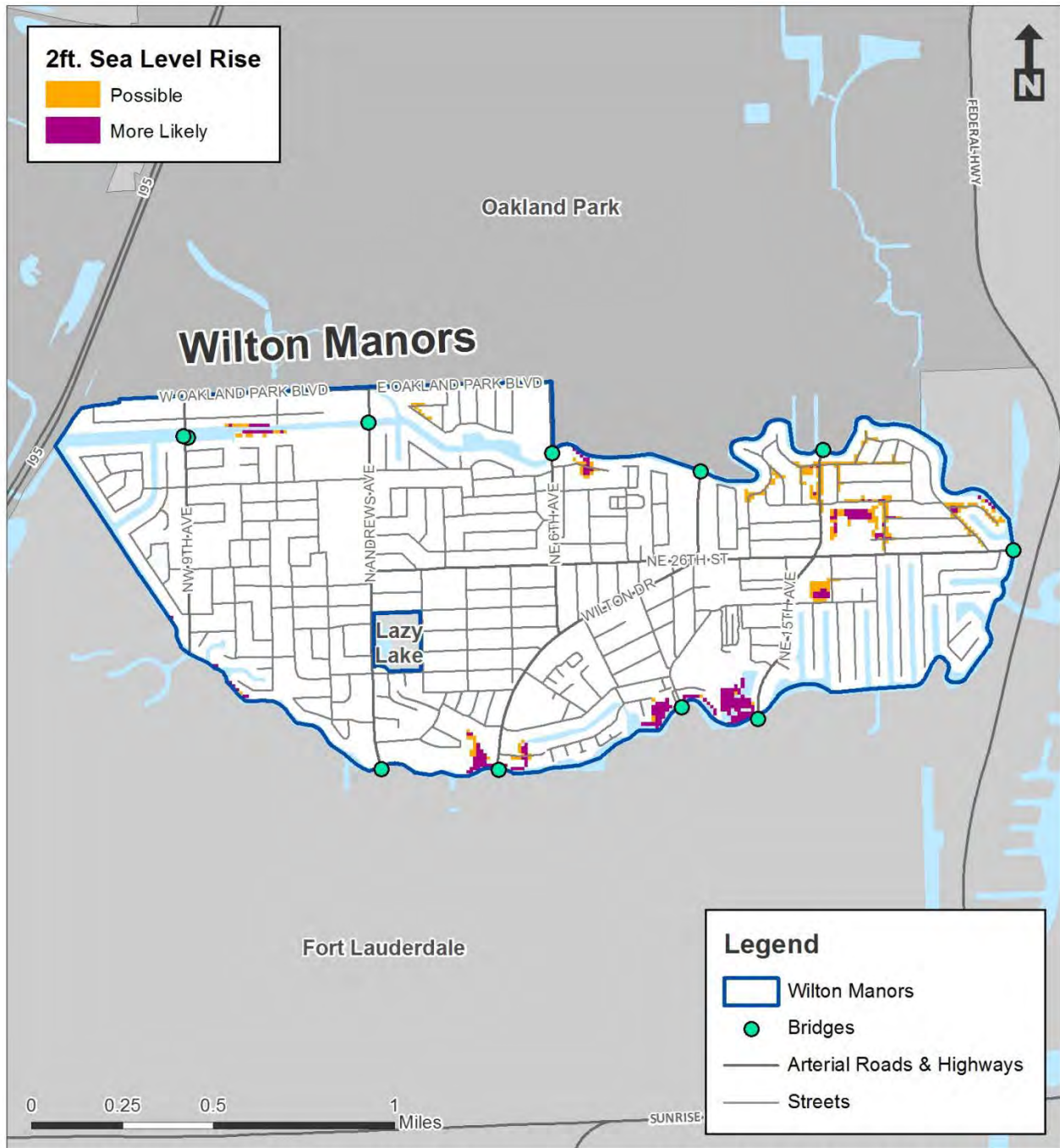
SLR: sea level rise grid

- “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.

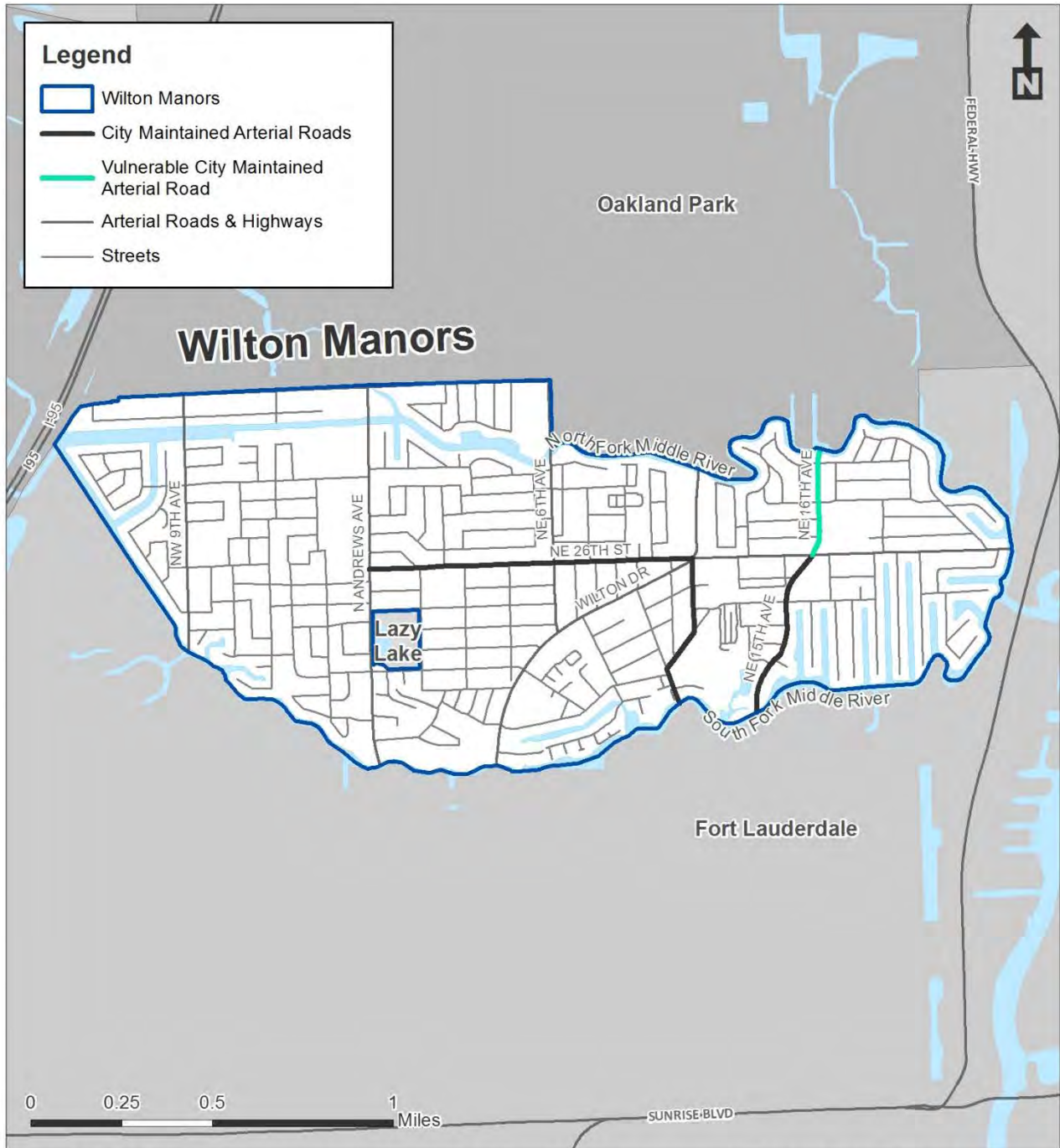
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 Natural Resources Planning and Management Division

Date: 12/23/2013
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City Arterial Roads 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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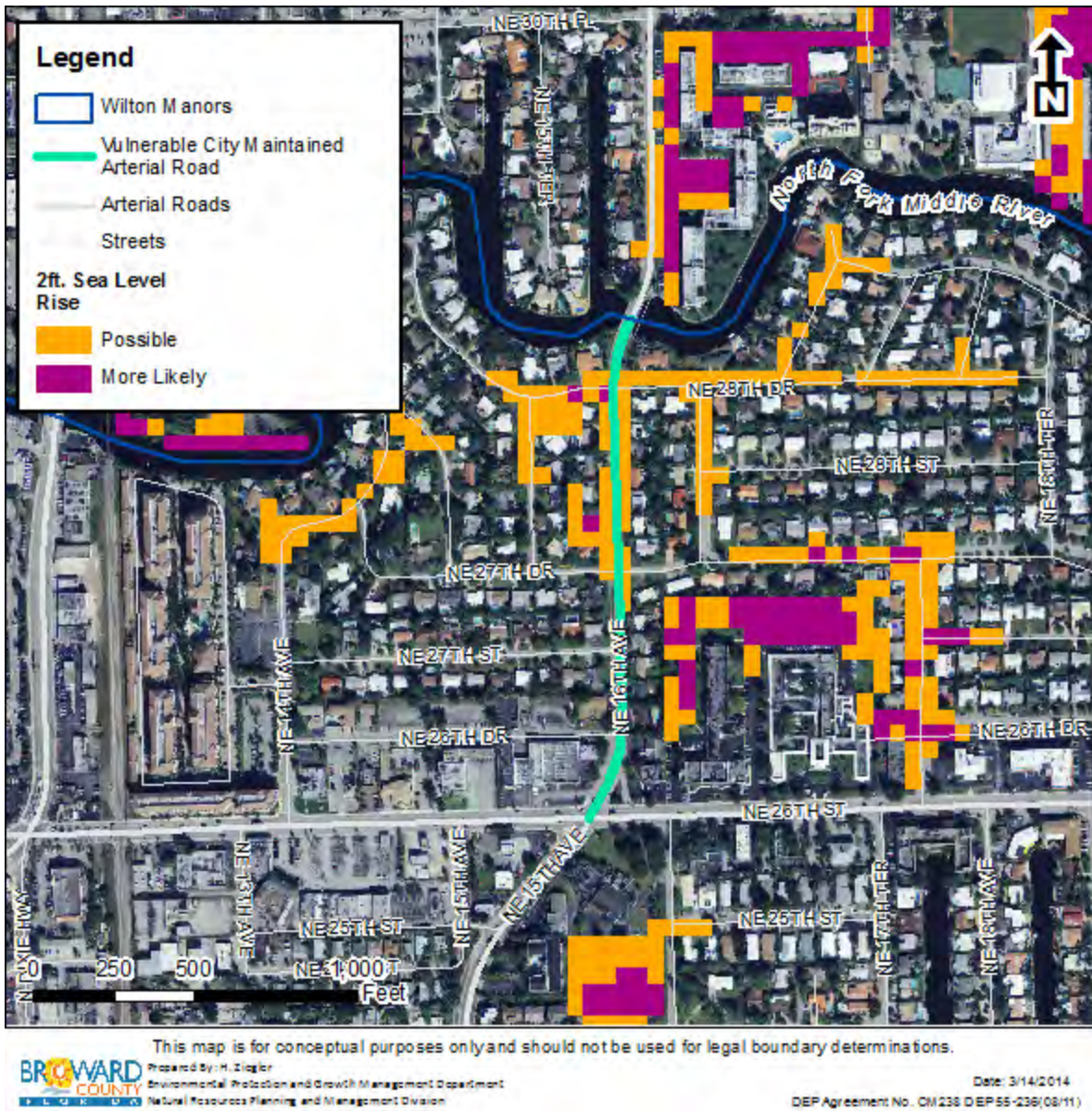
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Table of Vulnerable City Arterial Roads

The following table lists the vulnerable segments of arterial roads maintained by the City of Wilton Manors. For each vulnerable segment, the table provides the miles of vulnerable roadway and the total length of roadway with vulnerability expressed in percent during both the one and two foot sea level rise scenarios.

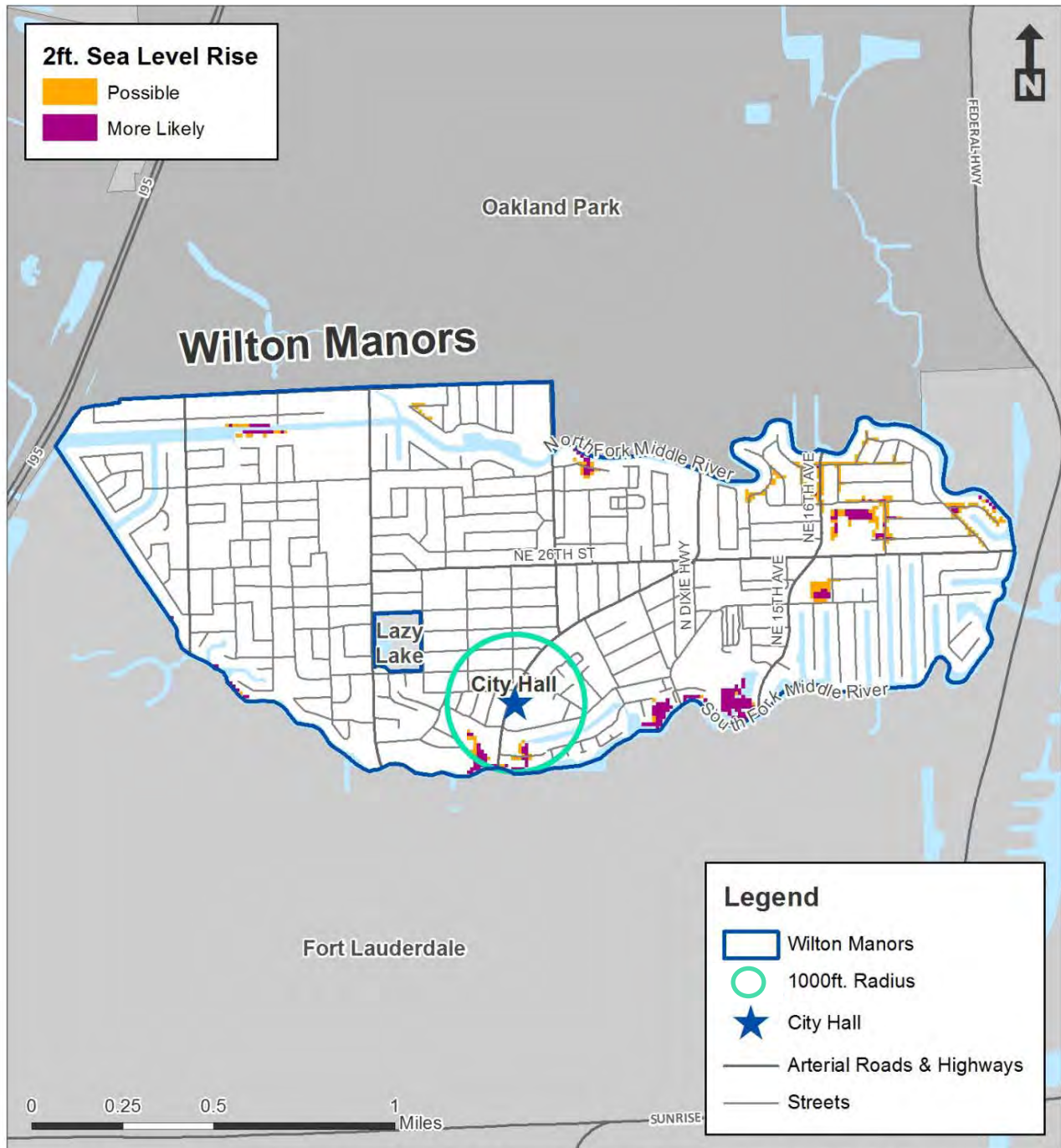
NE 16 Ave, From NE 26th St to North Fork Middle River			Total Miles
			0.30
SLR Scenario	Possible	More Likely	Percent Total
1 Foot	0.00	0.00	0%
2 Foot	0.15	0.01	52%

NE 16th Ave Two Foot Sea Level Rise Scenario



This Map provides a view of the vulnerable NE 16th Ave during the two foot sea level rise scenario. NE 16th Ave runs (within the municipal boundary) 0.3 miles from NE 26th St to North Fork Middle River and has up to 52% of its length located at or below projected sea levels. The roadway is not vulnerable during the one foot scenario.

City Hall 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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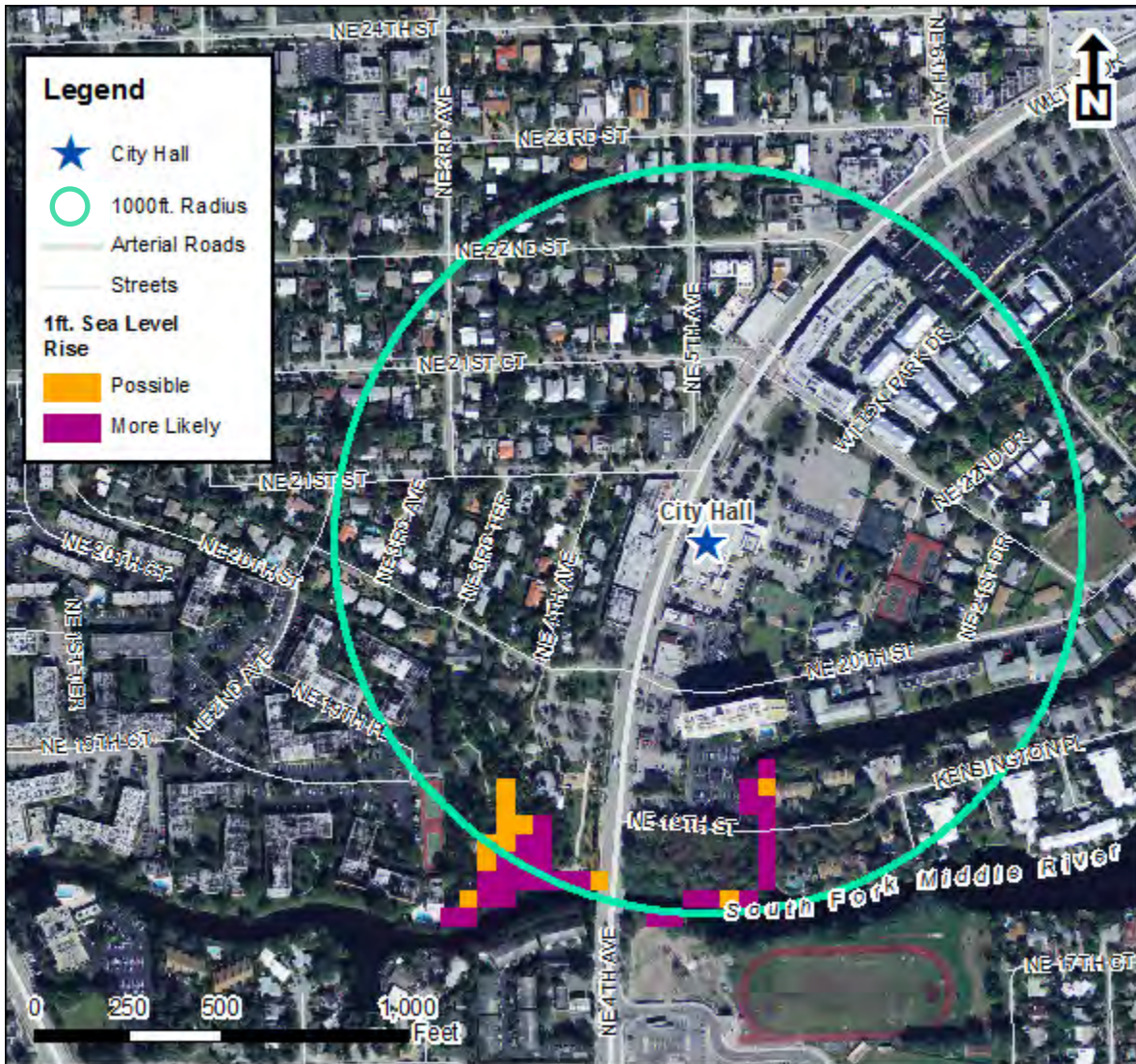
Table of Vulnerability for City Hall

The following table details whether streets within a 1000-foot radius of the Wilton Manors City Hall are vulnerable during the one or two foot sea level rise scenarios. For each scenario, the table entry receives a Y for yes, or an N for no.

Vulnerabilities Within 1000 Feet Wilton Manors City Hall		
Name	One Foot Scenario(Y/N)	Two Foot Scenario (Y/N)
Wilton Manors City Hall	Y	Y

Key: For Y/N, Y = Yes, N = No

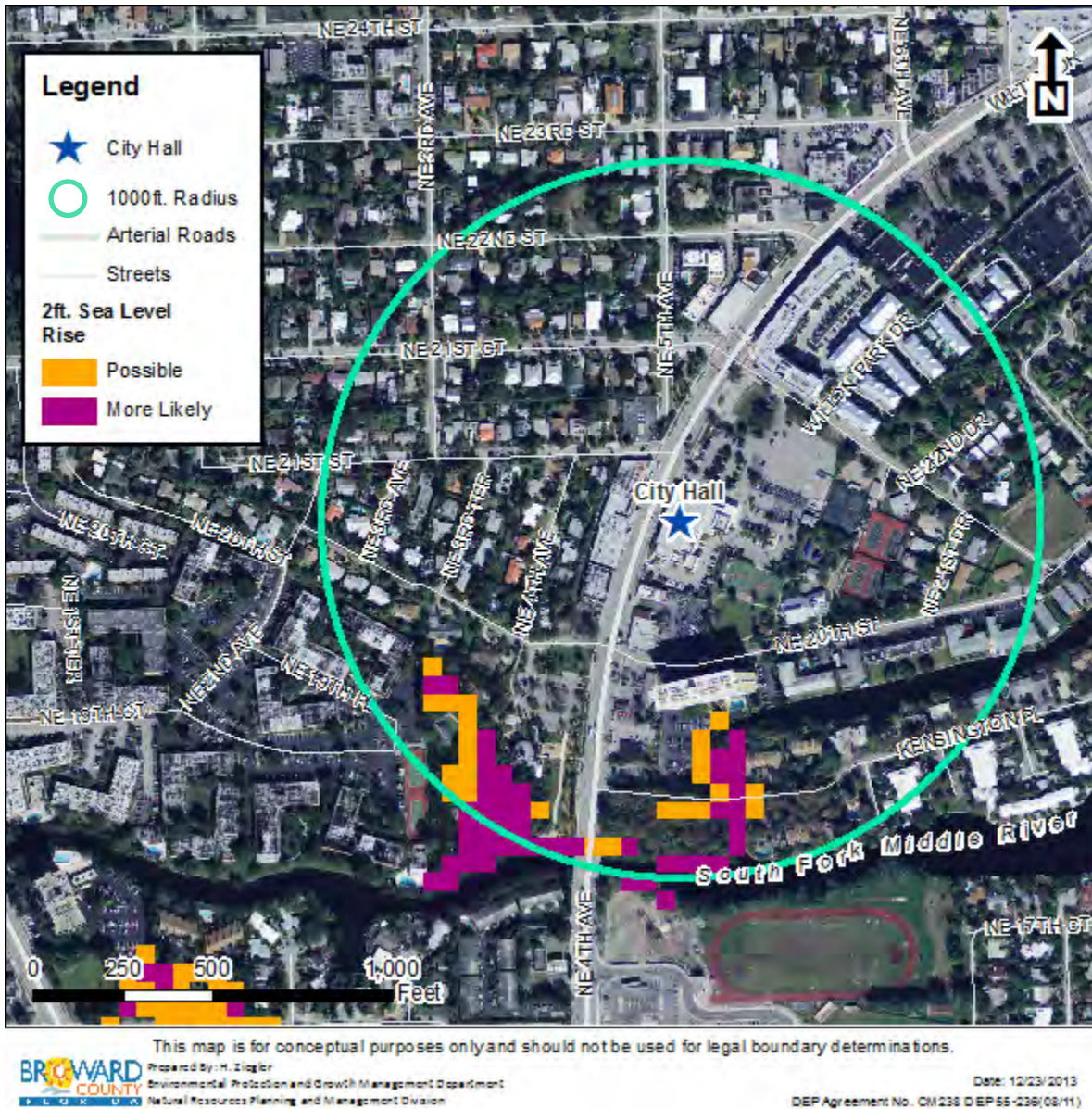
City Hall
2020 Wilton Dr
One Foot Sea Level Rise Scenario



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 Natural Resources Planning and Management Division
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This map provides a view of areas within a 1000-foot radius of the Wilton Manors city hall overlaid by the one foot sea level rise scenario. NE 19th St and a portion of NE 4th Ave have areas located at or below projected sea levels during the one foot scenario. Inundated streets are likely to cause access issues for city hall. Note that vulnerable areas are located near the tidally influenced South Fork Middle River. The building footprint of the Wilton Manors city hall is likely not vulnerable.

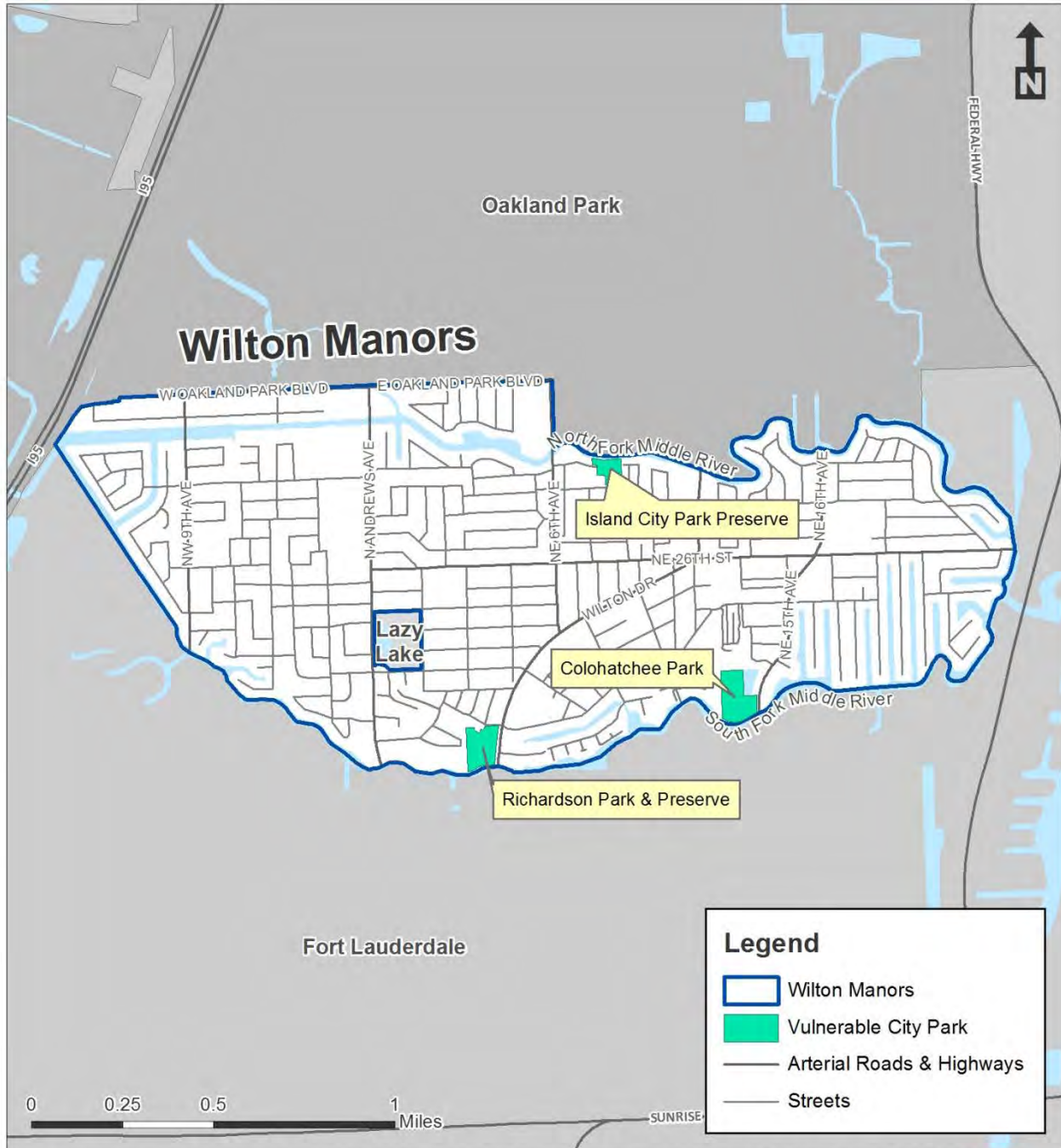
City Hall
2020 Wilton Dr
Two Foot Sea Level Rise Scenario



This map provides a view of areas within a 1000-foot radius of the Wilton Manors city hall overlaid by the two foot sea level rise scenario. NE 19th St and NE 4th Ave have areas located at or below projected sea levels during the two foot scenario. Inundated streets are likely to cause access issues for city hall. Note that vulnerable areas are located near the tidally influenced South Fork Middle River. The building footprint of the Wilton Manors city hall is likely not vulnerable.

City Parks

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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Table of Vulnerable City Parks

The following table lists the three city parks in the City of Wilton Manors with vulnerabilities. Each park was assessed for the one and two foot sea level rise scenarios. Two parks were vulnerable during the one foot scenario, and three parks were vulnerable during the two foot scenario. The largest vulnerable city park, Colohatchee Park, may have up to 59% of land located at or below projected sea levels during the two foot scenario. For each park the table provides the acreage of vulnerable area, and the total area of the park with vulnerability expressed in percent. These estimates are based on the area of the entire park and the inundation grid and do not subtract the area of water bodies within the park to determine the percent value.

Colohatchee Park, 2050 NE 15th			Total Acres
			6.66
SLR Scenario	Possible	More Likely	Percent Total
1 Foot	0.42	3.17	54%
2 Foot	0.11	3.80	59%
Island City Park Preserve, 823 NE 28th St			Total Acres
			2.82
SLR Scenario	Possible	More Likely	Percent Total
1 Foot	0.00	0.00	0%
2 Foot	0.10	0.00	3%
Richardson Park & Preserve, 1937 Wilton Dr			Total Acres
			5.58
SLR Scenario	Possible	More Likely	Percent Total
1 Foot	0.47	0.75	22%
2 Foot	0.68	1.45	38%

Colohatchee Park
2050 NE 15th Ave.
One Foot Sea Level Rise Scenario



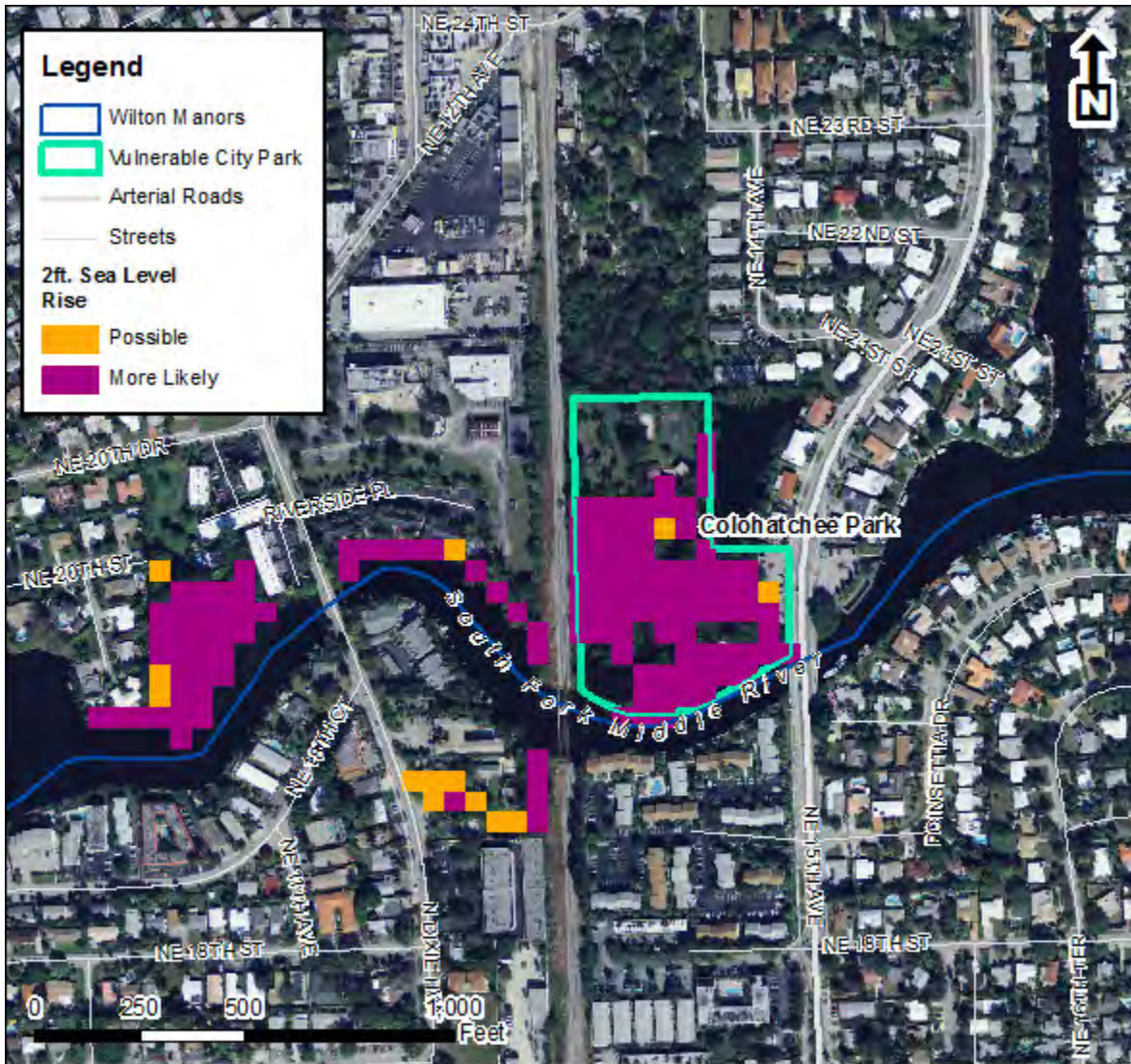
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This Map provides a view of Colohatchee Park during the one foot sea level rise scenario. With an area of 6.66 acres, it is the largest vulnerable city park in the City of Wilton Manors. Colohatchee Park may have up to 54% of area located at or below projected sea levels during the one foot scenario. The park is located near the tidally influenced South Fork Middle River. Note that these estimates are based on the area of the entire park and do not subtract the area of water bodies within the park to determine the percent value.

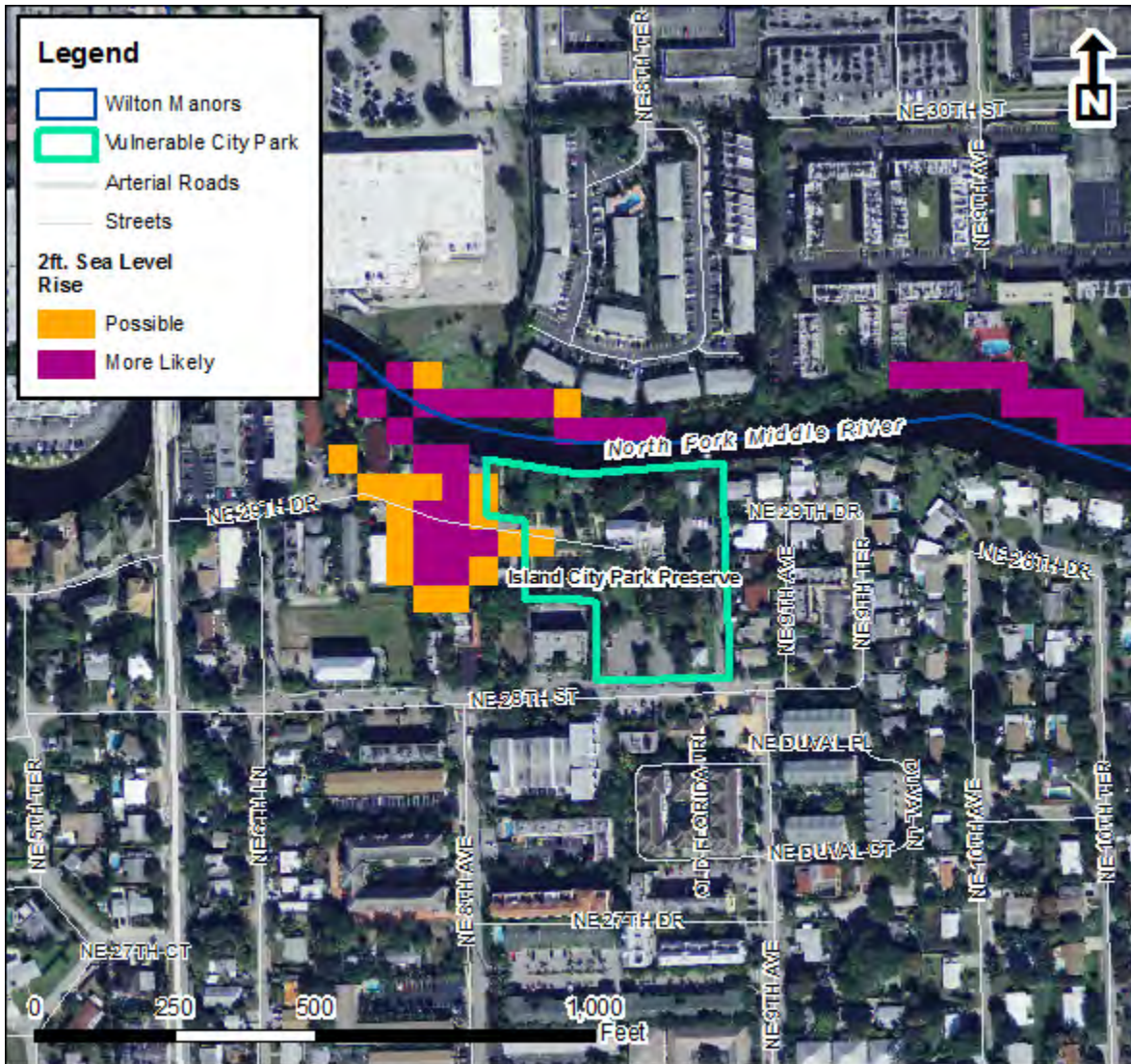
Colohatchee Park
 2050 NE 15th Ave
 Two Foot Sea Level Rise Scenario



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This Map provides a view of Colohatchee Park during the two foot scenario. With an area of 6.66 acres, it is the largest vulnerable city park in the City of Wilton Manors. Colohatchee Park may have up to 59% of area located at or below projected sea levels during the two foot scenario. The park is located near the tidally influenced South Fork Middle River. Note that estimates are based on the area of the entire park and the area of the sea level rise grid, and do not subtract the area of water bodies within the park to determine the percent value.

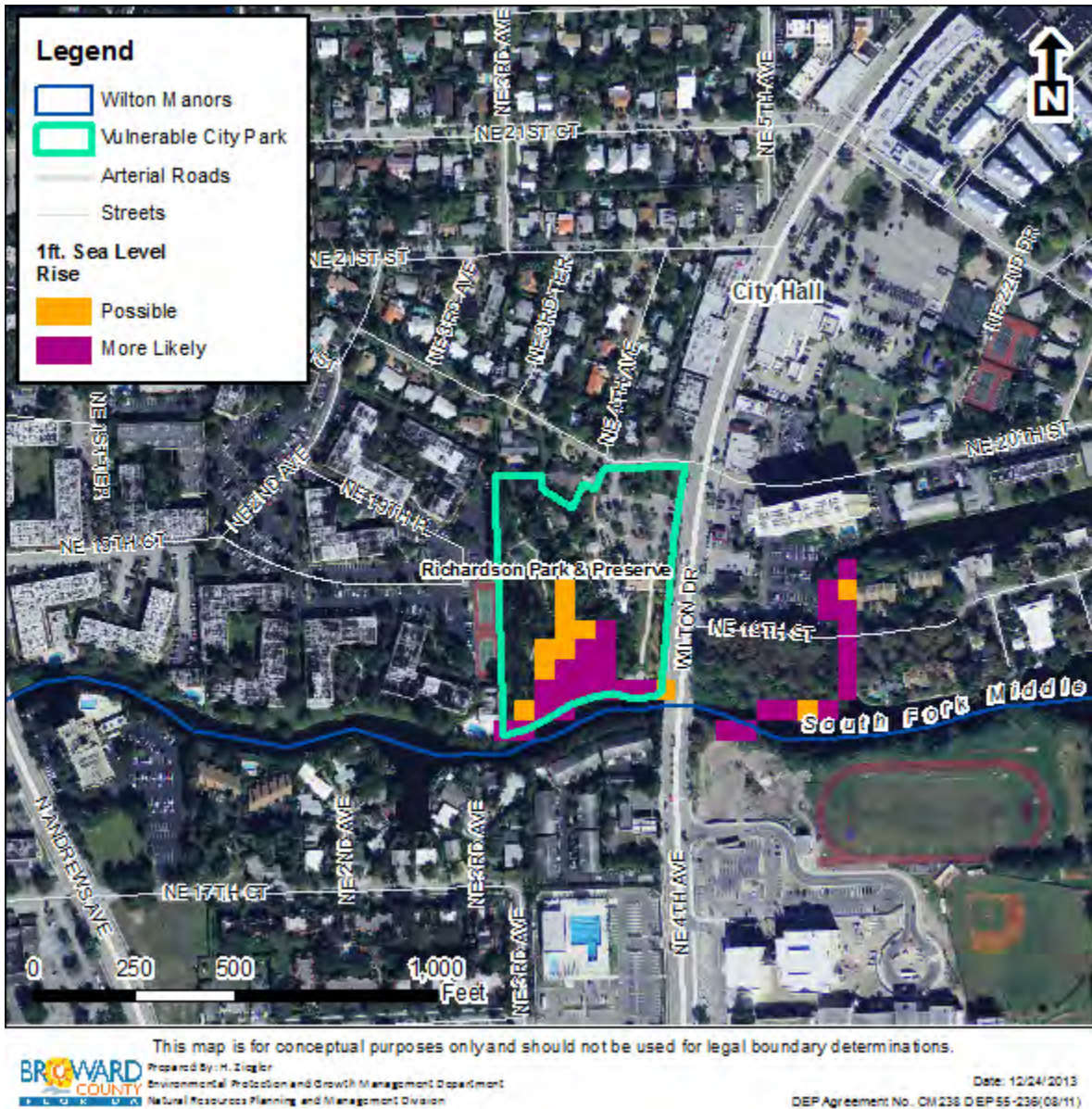
Island City Park Preserve
823 NE 28th St
Two Foot Sea Level Rise Scenario



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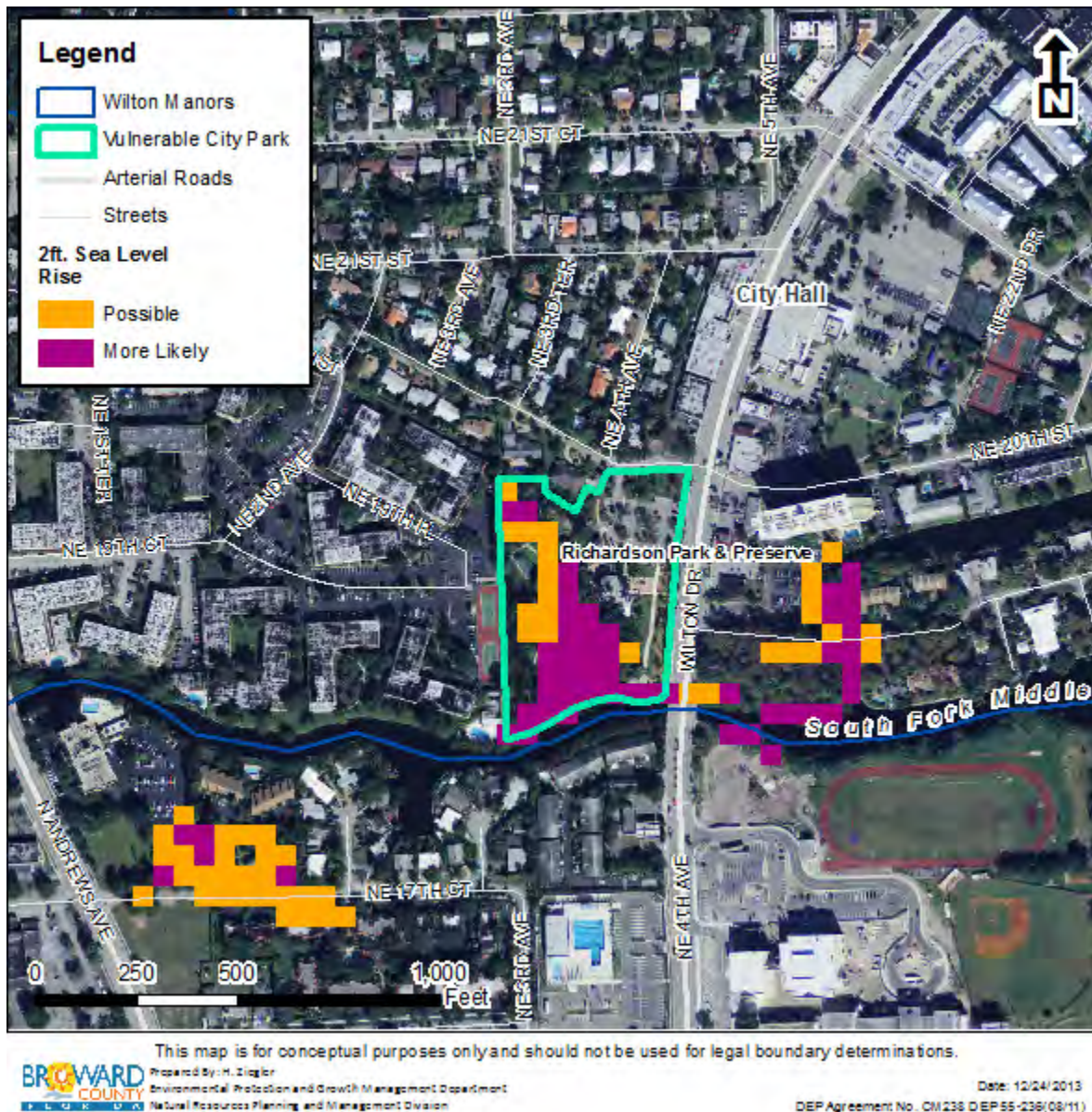
This Map provides a view of Island City Park Preserve during the two foot sea level rise scenario. During the two foot scenario, the park may have up to 3% of area located at or below projected sea levels. During the one foot scenario, no land is vulnerable. The park is located near the tidally influenced North Fork Middle River. Note that estimates are based on the area of the entire park and the area of the sea level rise grid, and do not subtract the area of water bodies within the park to determine the percent value.

Richardson Park & Preserve
 1937 Wilton Dr
 One Foot Sea Level Rise Scenario



This Map provides a view of Richardson Park & Preserve during the one foot scenario. During the one foot scenario, the park may have up to 22% of area located at or below projected sea levels. The park is located near the tidally influenced South Fork Middle River. Note that estimates are based on the area of the entire park and the area of the sea level rise grid, and do not subtract the area of water bodies within the park to determine the percent value.

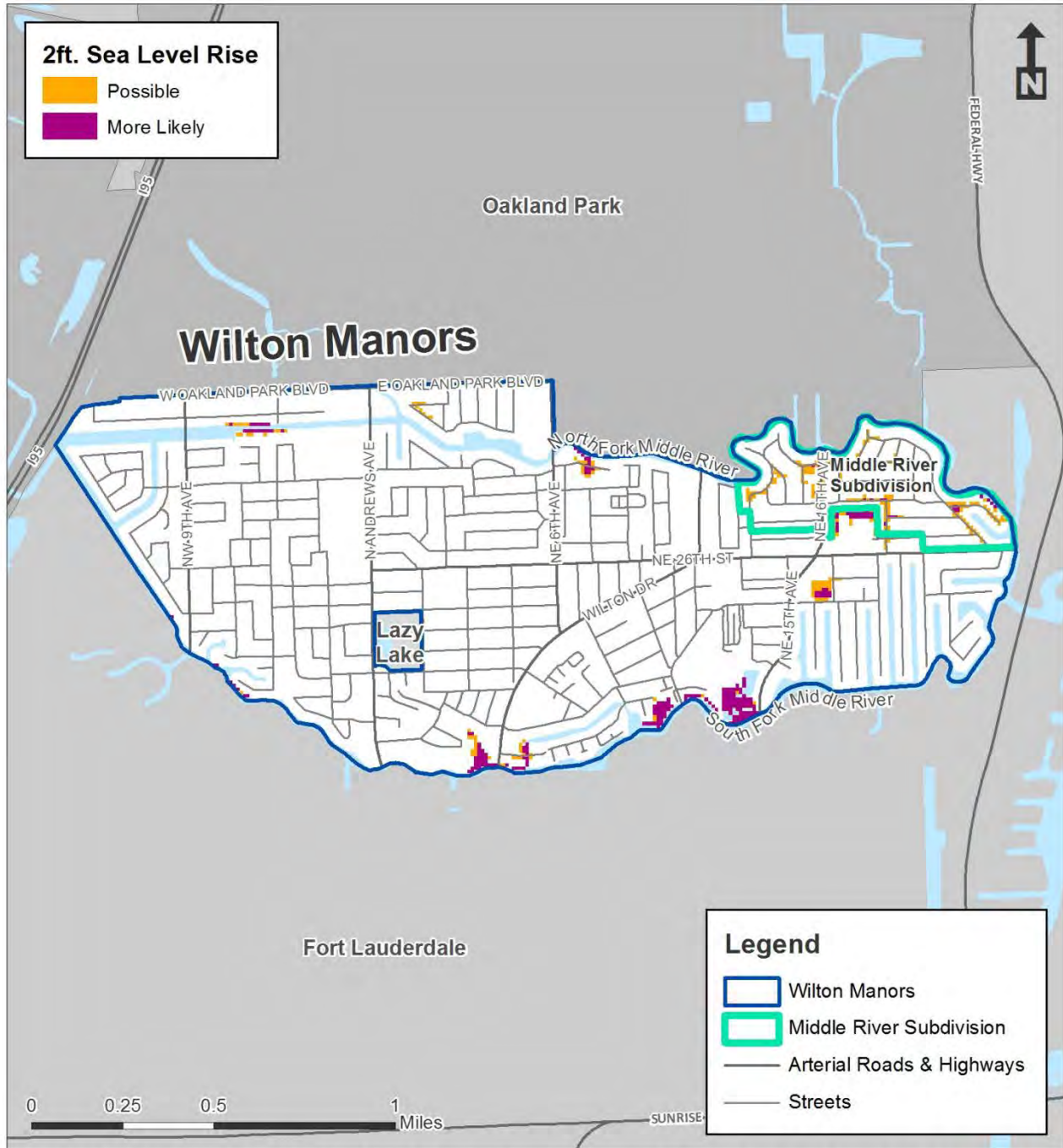
Richardson Park & Preserve
 1937 Wilton Dr
 Two Foot Sea Level Rise Scenario



This Map provides a view of Richardson Park & Preserve during the two foot scenario. During the two foot scenario, the park may have up to 38% of area located at or below projected sea levels. The park is located near the tidally influenced South Fork Middle River. Note that estimates are based on the area of the entire park and the area of the sea level rise grid, and do not subtract the area of water bodies within the park to determine the percent value.

Middle River Subdivision

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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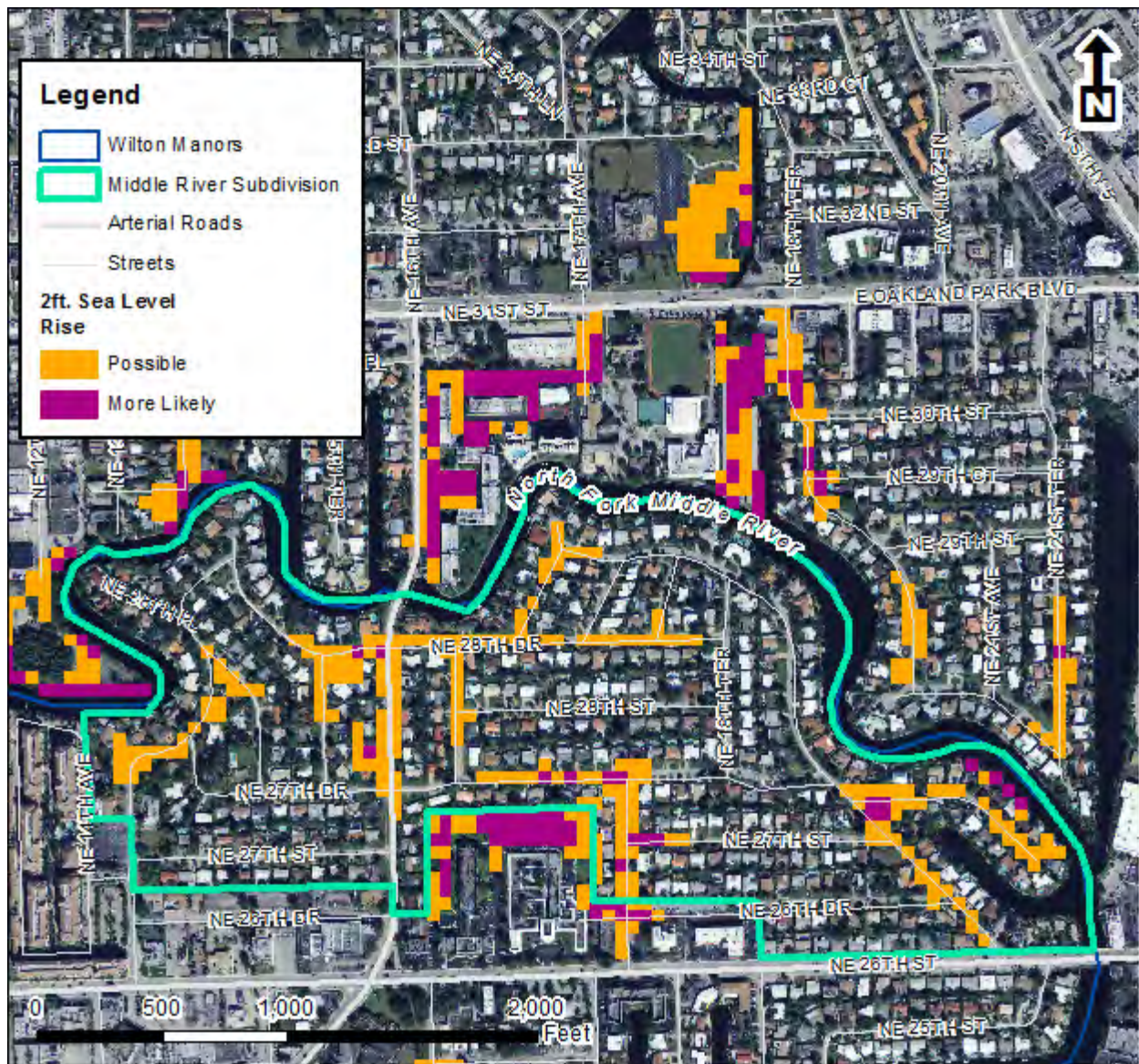
Table of Vulnerable Streets in the Middle River Subdivision

The following table provides a list of neighborhood streets within the Middle River Subdivision of the City of Wilton Manors that have land located at or below projected sea levels. For each scenario, a table entry receives a Y for yes, or an N for no.

Vulnerable Streets within the Middle River Subdivision City of Wilton Manors		
Street	One Foot Scenario(Y/N)	Two Foot Scenario (Y/N)
CORAL GARDENS DR	N	Y
NE 14TH AVE	N	Y
NE 15TH AVE	N	Y
NE 16TH AVE	N	Y
NE 16TH TER	N	Y
NE 17TH AVE	N	Y
NE 17TH TER	N	Y
NE 18TH AVE	N	Y
NE 26TH DR	N	Y
NE 27TH DR	N	Y
NE 27TH ST	N	Y
NE 28TH DR	N	Y
NE 28TH ST	N	Y

Key: For Y/N, Y = Yes, N = No

Middle River Subdivision Two Foot Sea Level Rise Scenario



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

Date: 12/23/2013

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This Map provides a view of the Middle River Subdivision during the two foot sea level rise scenario. This neighborhood is located adjacent to North Fork Middle River and contains a large number of streets located at or below projected sea levels during the two foot scenario. No land within the Middle River Subdivision is located at or below sea levels during the one foot scenario.