Coastal Vulnerability Assessment
Atlantic City, NJ

May 2017

PARTNERS

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Contents

I. Project Introduction 4
Figure 1: Range of Sea Level Rise Estimates (Miller et.al) 4
Figure 2: Tide Gage Data (Miller et.al) 5
II. Community Profile 5
Image 1: View of the ocean, bay, and marsh (Marinalife.com) 6
Image 2: Superstorm Sandy Damage *of the AC Baordwalk* (*LA Times*) 6
III. Municipal Coastal Vulnerability Assessment Methodology 7
CVA Step 1: Identifying Community Assets 7
Table 1. Community Assets 8
IV.Findings and Recommendations 9
Table 2: Coastal Vulnerability Assessment Matrix 9
CVA Step 3: Recommendations 10
Graphic 1: Land Use of Interest in the Bungalow Park Area (Source: Atlantic City) 11
Graphic 2: Land Use of Interest in the Fairmount Ave Area (Source: Atlantic City) 11
Appendices 13
Map 1: Atlantic City, Atlantic County – NJ 14
Map 2: Superstom Sandy Surge Extent 15
Map 3: FEMA Flood Zones 16
Map 4: Zoning (Source: Arc GIS online) 17
Map 5: Study Areas 18
Map 6: Known Contaminated Sites Within the Study Areas 19
Map 7: Vulnerable Sites 20

I. Project Introduction

As stated in the 2011 NJDEP document New Jersey's Coastal Vulnerability Assessment and Mapping Protocol, vulnerability is defined as "the degree of exposure and inability of a human or natural system to cope with the effects of a natural hazard, including changing variability and extremes in weather and climate."

This report aims to assess vulnerabilities to enable communities in the planning for future exposures and develop strategies for mitigating long-term risk, making communities more resilient. To do so, this report assesses community vulnerability to sea level rise projected for the year 2050 along with a category 1 hurricane storm surge.

Figure 1: Range of Sea Level Rise Estimates (Miller et.al)

	Sea-level rise (feet)		
	Global	Bedrock	Shore
2030 central	**0.5**	**0.7**	**0.8**
2030 low	0.3	0.5	0.6
2030 high	0.7	1.0	1.1
2030 higher	0.9	1.2	1.4
2050 central	**0.8**	**1.3**	**1.5**
2050 low	0.5	0.9	1.1
2050 high	1.3	1.8	1.9
2050 higher	1.6	2.1	2.3
2100 central	**2.5**	**3.1**	**3.5**
2100 low	1.4	2.2	2.5
2100 high	4.0	4.6	4.9
2100 higher	4.6	5.5	5.9
2100 collapse	8.7	9.7	10.1

Figure 1 illustrates the sea level rise range of estimates for 2030, 2050, and 2100. This publication calls for a central projection of 1.5 feet of sea level rise along the shore in 2050 and is the projection used in this report.

Figure 2: Tide Gage Data (Miller et.al)

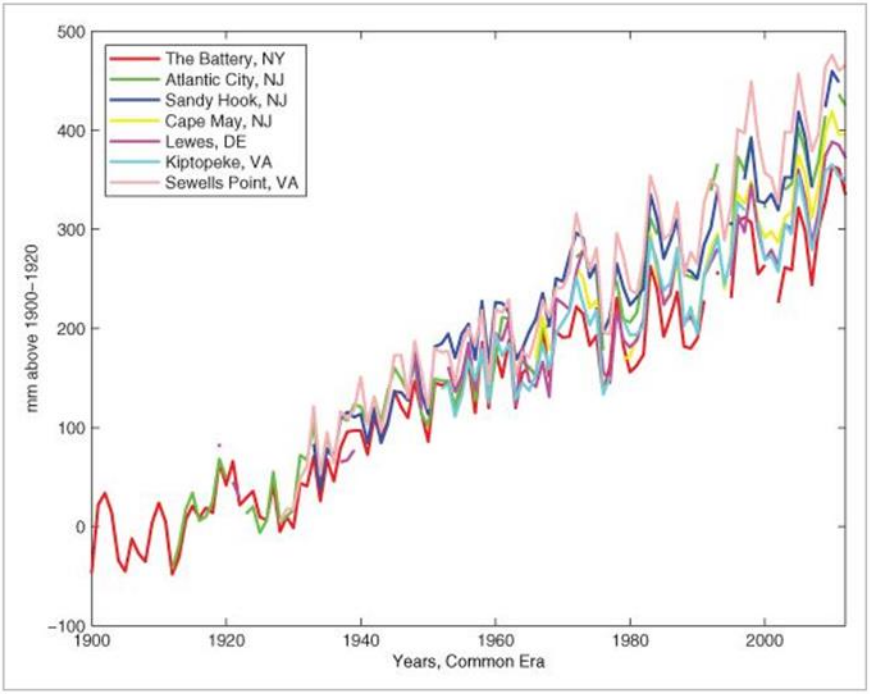


Figure 2 illustrates tide gage data taken along the Eastern seaboard from 1900 to past the year 2000. Miller et.al. attribute a higher rate of rise in the coastal plains to coastal subsidence and groundwater withdrawal and compaction.

Category 1 storm surge data was mapped using the Sea, Lake, and Overland Surge from Hurricanes (SLOSH) data developed by the National Weather Service/NOAA to estimate storm surge heights resulting from historical, hypothetical, or predicted hurricanes, taking into account the atmospheric pressure, size, forward speed, and track data of storms.
According to the National Hurricane Center, Category 1 storm characteristics include:

- Sustained winds of 74-95 mph
- Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters.
- Large branches of trees will snap and shallow rooted trees may be toppled.
- Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.

II. Community Profile

Atlantic City's boundary is defined on three sides by waterways: Absecon Bay, Lakes Bay, and the Atlantic Ocean. In total, the City has just under 11 sq. mi. of land. (Refer to Map #1)

According to the 2010 US Census, the population of Atlantic City was 39,558, making it the 3rd most populated of 23 municipalities in Atlantic County. The City has a median household income of $30,237 and median age of 36.3 years. The racial makeup of the City is 38.29% Black or African American, 30.45 Hispanic or Latino, 26.65% White, and 15.55% Asian.

Image 1: View of the ocean, bay, and marsh (Marinalife.com)

According to an article published in Forbes Magazine, as of September 2014, the greater Atlantic City area had one of the highest unemployment rates in the county at 13.8%.[1]

Image 2: Superstorm Sandy Damage *of the AC Boardwalk* (*LA Times*)

The Atlantic City boardwalk, which opened in 1870, had its northern end fronting the Absecon inlet destroyed by Superstorm Sandy in 2012. According to modeling done by FEMA, storm surge from sandy inundated most of the City, aside from the area located along Atlantic Avenue (Refer to Map 2).

FEMA has designated the vast majority of land in Atlantic City as Zone AE (refer to Map 3). These areas are subject to inundation by the 1% annual-chance flood event, Base Flood Elevations (BFEs) are shown, and mandatory flood insurance purchase requirements and floodplain management standards apply. Additionally, land immediately adjacent to the water is designated as Zone VE, or coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30 year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.

According to a zoning map obtained from ARC GIS created with data from the Atlantic County Department of Planning and Regional Development, the majority of the waterfront is zoned as the Tourism District, with some residential and conservation areas as well. (Refer to Map #4)

[1] Staff. "The Cities with the Best and Worst Unemployment Rates: No. 10 (Highest Unemployment): Atlantic City-Hammonton, N.J.", Forbes.

III. Municipal Coastal Vulnerability Assessment Methodology

Prior to the first meeting, staff at Rutgers University gathered initial assets to create draft mapping in preparation of the CVA meeting with municipal officials. The CVA meeting was held on November 7, 2016 at town hall with Elizabeth Terenik, City Planner.

The process for completing a CVA is generally done in three steps:

1. Identify Community Assets
2. Establish Vulnerabilities and Consequences
3. Recommendations

CVA Step 1: Identifying Community Assets

When a CVA is completed, community assets from four general areas are indexed in a matrix and then used to support the development of asset mapping, identification of depth inundations, community-led findings, and eventual recommendations. These four asset areas include:

- **Community Resources**: Schools, shelters, storm-related retail, major employers, churches, food banks, etc.
- **Critical Infrastructure and Facilities**: Government operations, utilities, evacuation routes, emergency response
- **Natural and Ecosystem Resources**: Beaches, bayfronts, wetlands/critical habitat, parks
- **Vulnerable Sites and Populations**: Identifiable clusters of senior citizens, low income populations, limited English proficient populations, mobile home parks, contaminated/otherwise hazardous materials/sites

For Atlantic City, project staff received feedback that the City would like to focus on the various vulnerable sites, specifically contaminated sites, located throughout the City.

According to the NJ Department of Environmental Protection, as pf March 2017, there were 130 Known Contaminated Sites in Atlantic City. This list of Known Contaminated Sites may include sites where remediation is either currently under way, required but not yet initiated or has been completed. Not all of these sites are considered Brownfield Sites, but they could be eligible to become Brownfield Sites.

To further hone in on contaminated sites that may be viable for Brownfield Redevelopment, the City chose two specific study areas to focus on: the Bungalow Park Area and the Fairmount Avenue Area. (Refer to Map #5)

The two study areas contain 21 Known Contaminated Sites listed in the table (Refer to Map 6).

Table 1. Community Assets

Asset #	Name	Asset Category	Status
1	AC Sunoco	Vulnerable Site	LSRP Oversight
2	Triangle Properties LLC	Vulnerable Site	LSRP Oversight
3	155 Iowa Ave	Vulnerable Site	Pending
4	Vina Auto Service	Vulnerable Site	LSRP Oversight
5	243 North Texas Ave	Vulnerable Site	Assigned to Program
6	Ocean Auto Body	Vulnerable Site	Pending
7	Deull Fuel Company	Vulnerable Site	Assigned to Program
8	NJ Bell Telephone	Vulnerable Site	LSRP Oversight
9	Corner of N Arkansas & Baltic Aves	Vulnerable Site	LSRP Oversight
10	Adventure Trails Garage	Vulnerable Site	LSRP Oversight
11	CRDA Pitney Village Project	Vulnerable Site	LSRP Oversight
12	Atlantic Ave Stormwater Outfall	Vulnerable Site	Assigned to Program
13	Florida Ave Coal Gas (S&J)	Vulnerable Site	LSRP Oversight
14	Parcel 5 (Block M30 Lot 24)	Vulnerable Site	LSRP Oversight
15	709 Mediterranean Ave in Bungalow Park	Vulnerable Site	LSRP Oversight
16	Texaco Bulk Storage Facility	Vulnerable Site	LSRP Oversight
17	Motor Vehicle Inspection Station	Vulnerable Site	LSRP Oversight
18	Amoco Station (Former)	Vulnerable Site	LSRP Oversight
19	Exxon Company	Vulnerable Site	LSRP Oversight
20	Kammermans Marina	Vulnerable Site	LSRP Oversight
21	Captain Starns Fuel Service Inc.	Vulnerable Site	LSRP Oversight

Sites with “LSRP (Licensed Site Remediation Professional) Oversight” are overseen by a professional to ensure remediation is done by responsible parties on a certain timeline and following certain rules and regulations. Sixteen of the 21 contaminated sites are under LSRP oversight.

Sites “Assigned to Program” (3/21) are active cases with confirmed contamination.

Two of the 21 sites are “Pending”, meaning remediation is pending and not yet complete.

IV.Findings and Recommendations

CVA Step 2: Establish vulnerability and consequences matrix

After identifying the assets, depth projections were mapped and listed using the chosen project scenario: combined data provided by the New Jersey Department of Protection for the storm surge from a category 1 storm coupled with sea level rise projected for the year 2050. (Refer to Map #7) *Note: projected depths are based on sea level.

Vulnerability was rated at a range from *N/A* to *High* based on the projected inundation depth and the level of development seen on the site using Google Maps. Consequences were rated from *N/A* to *High* based on the status of the site. For example, a site Assigned to Program has confirmed contamination and is therefore ranked with high consequences. The severity of contamination on the site and its ability to impact ground water/public health is not known and would require further study.

Table 2 displays the potential vulnerability and consequences ratings.

Table 2: Coastal Vulnerability Assessment Matrix

Asset #	Name	Address	Ownership	Projected Depth (Ft.)	Vulnerability Rating	Consequences Rating
Fairmount Ave Area						
1	AC Sunoco	101-111 Albany Ave	Private	3	Moderate	Low
2	Triangle Properties LLC	3301 Arctic Ave	Private	3-4	High	Low
3	155 Iowa Ave	155 Iowa Ave	Private	4-5	High	Moderate
4	Vina Auto Service	2401 Arctic Ave	Private	2	Low	Low
5	243 North Texas Ave	243 North Texas Ave	Private	4-5	High	High
6	Ocean Auto Body	2308-2310 Fairmount Ave	Private	3-5	High	Moderate
7	Deull Fuel Company	300 North Georgia Ave	Private	2-4	Moderate/High	High
8	NJ Bell Telephone	315 N Florida Ave	Private	0-1 at building, 0-5 throughout remainder of site	Low	Low
9	Corner of N Arkansas & Baltic Aves	9 N Arkansas Ave	CRDA	2-3	Low/Moderate	Low
10	Adventure Trails Garage	346 N Georgia Ave	State of NJ	3-5	Low	Low
11	CRDA Pitney Village Project	Mediterranean and Mississippi Ave	CRDA	1-4	Low/Moderate	Low

12	Atlantic Ave Stormwater Outfall	Atlantic and Sunset Ave	City	5	Low/Moderate	High
13	Florida Ave Coal Gas (S&J)	Georgia and Sunset Ave	Private	2	Medium	Low
14	Parcel 5 (Block M30 Lot 24)	Corner of Mediterranean and Christopher	State of NJ	1-2 along roadways	Low	Low
Bungalow Park Area						
15	709 Mediterranean Ave in Bungalow Park	709 Mediterranean Ave	CRDS	2-3	Low	Low
16	Texaco Bulk Storage Facility	Absecon Blvd	Private	1-2	Low	Low
17	Motor Vehicle Inspection Station (Former)	820 Wabash Ave	City	2-3	Low	Low
18	Amoco Station (Former)	Vermont and Melrose Ave	City Parks	4	High	Low
19	Exxon Company	New Jersey and Magellan Ave	Private	3-5	Moderate	Low
20	Kammermans Marina	447 Carson Ave	Private	3-5	Moderate/High	Low
21	Captain Starns Fuel Service Inc.	801 New Hampshire Ave	City Parks	3-5	Moderate/High	Low

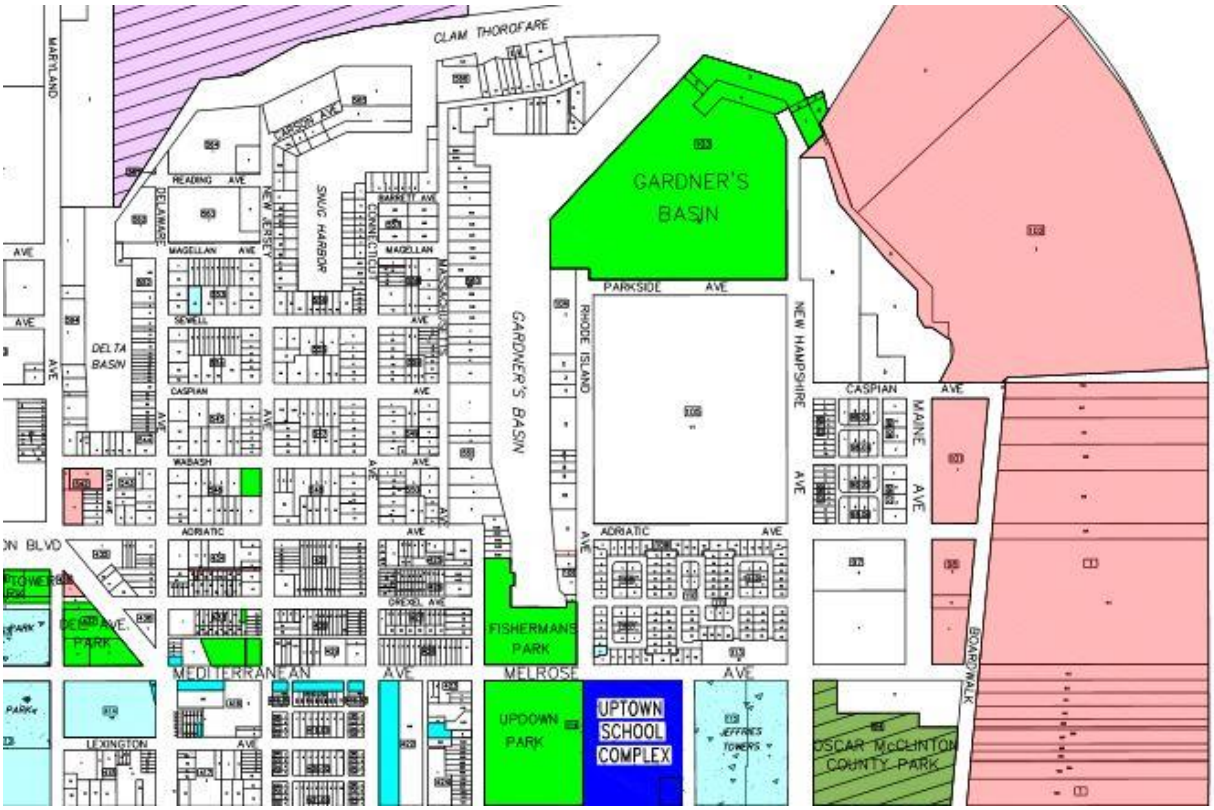
*Ownership based on Land if Interest Map produced by Atlantic City. For informational purposes only.

CVA Step 3: Recommendations

Planning for Redevelopment

Graphics 1 and 2 illustrate where there is public ownership of parcels in the study areas. While most of the contaminated sites are under private ownership, the City can work with land owners on redevelopment opportunities on the sites, including Brownfields designations.

Graphic 1: Land Use of Interest in the Bungalow Park Area (Source: Atlantic City)



Graphic 2: Land Use of Interest in the Fairmount Ave Area (Source: Atlantic City)

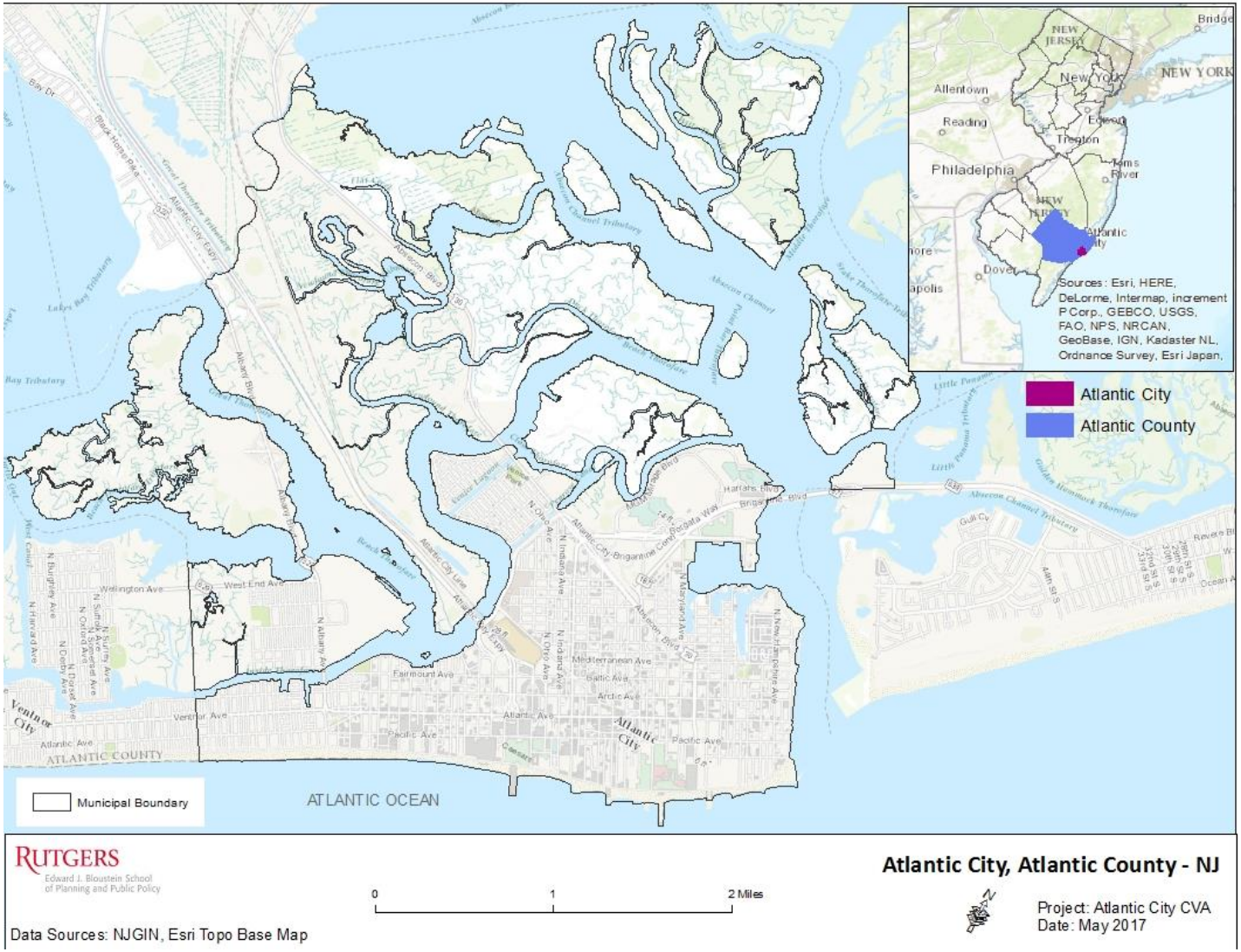
- Further investigations should be done to establish ownership and confirm contamination levels on the sites, which can inform the level of cleanup needed and the timeline for redevelopment opportunities. Information on completing a Phase I Environmental Site Assessment can be found here.
- Existing Brownfield Sites can be found on the Online Searchable Database for Brownfield Properties. These sites can be overlaid with sea level rise and storm surge mapping to determine level of vulnerability as well as suitable future development. Properties can be added to the NJ Brownfield database here.
- Redevelopment and revitalization of contaminated sites should be done in a way that minimizes flood impacts. This can be done by utilizing green infrastructure techniques such as parks and preserved space/community gardens/pocket wetlands, green roofs, permeable

pavement, street trees, etc. Examples of such techniques and programs that have been used around the country can be found in the EPA document Brownfield Revitalization in Climate-Vulnerable Areas.

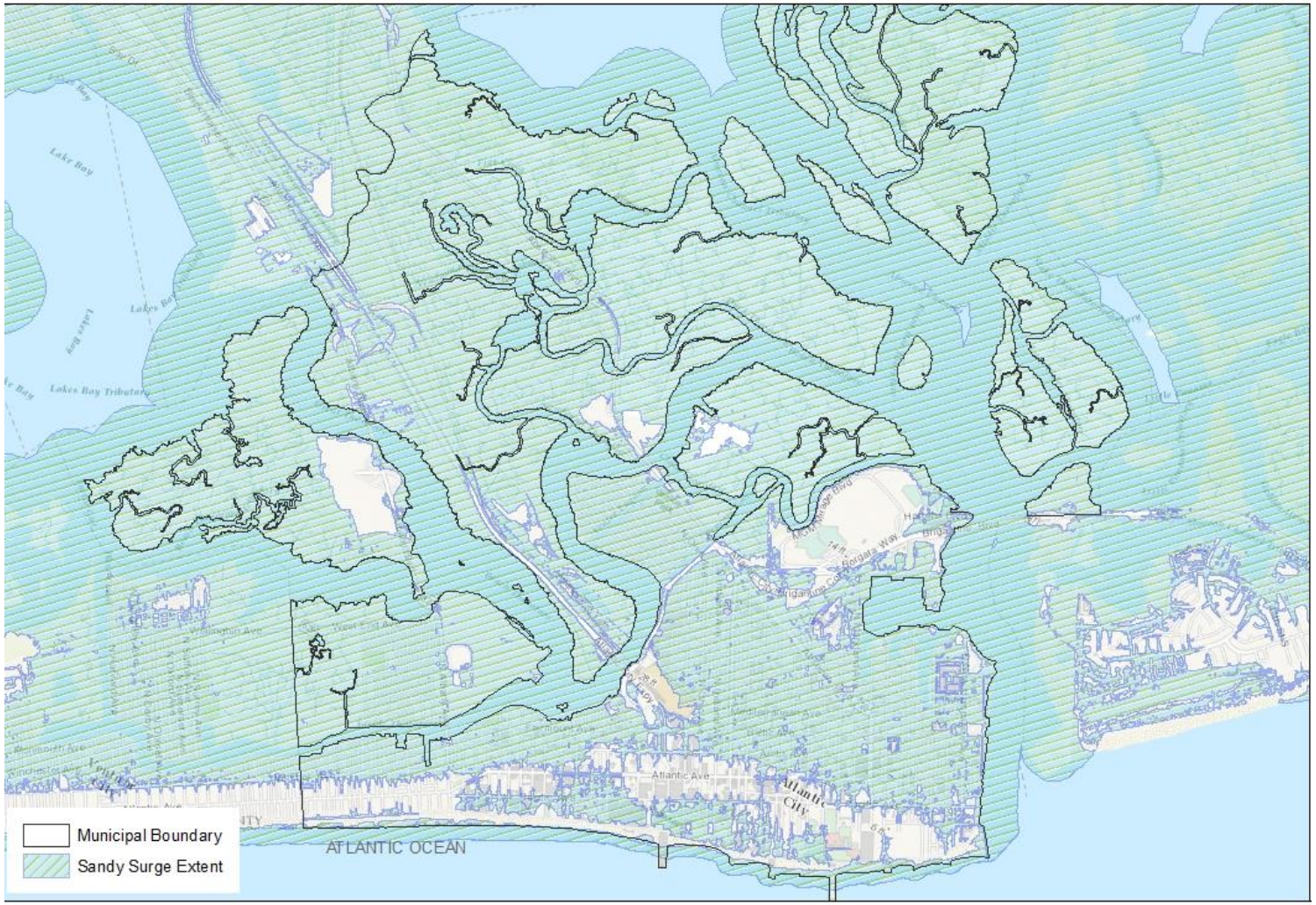
- The Camden County MUA utilized a Brownfield grant to investigate a contaminated site that was transformed into the Waterfront South Rain Gardens. The site is located in a neighborhood amongst commercial, industrial, and residential row homes on a former service station site.

Appendices

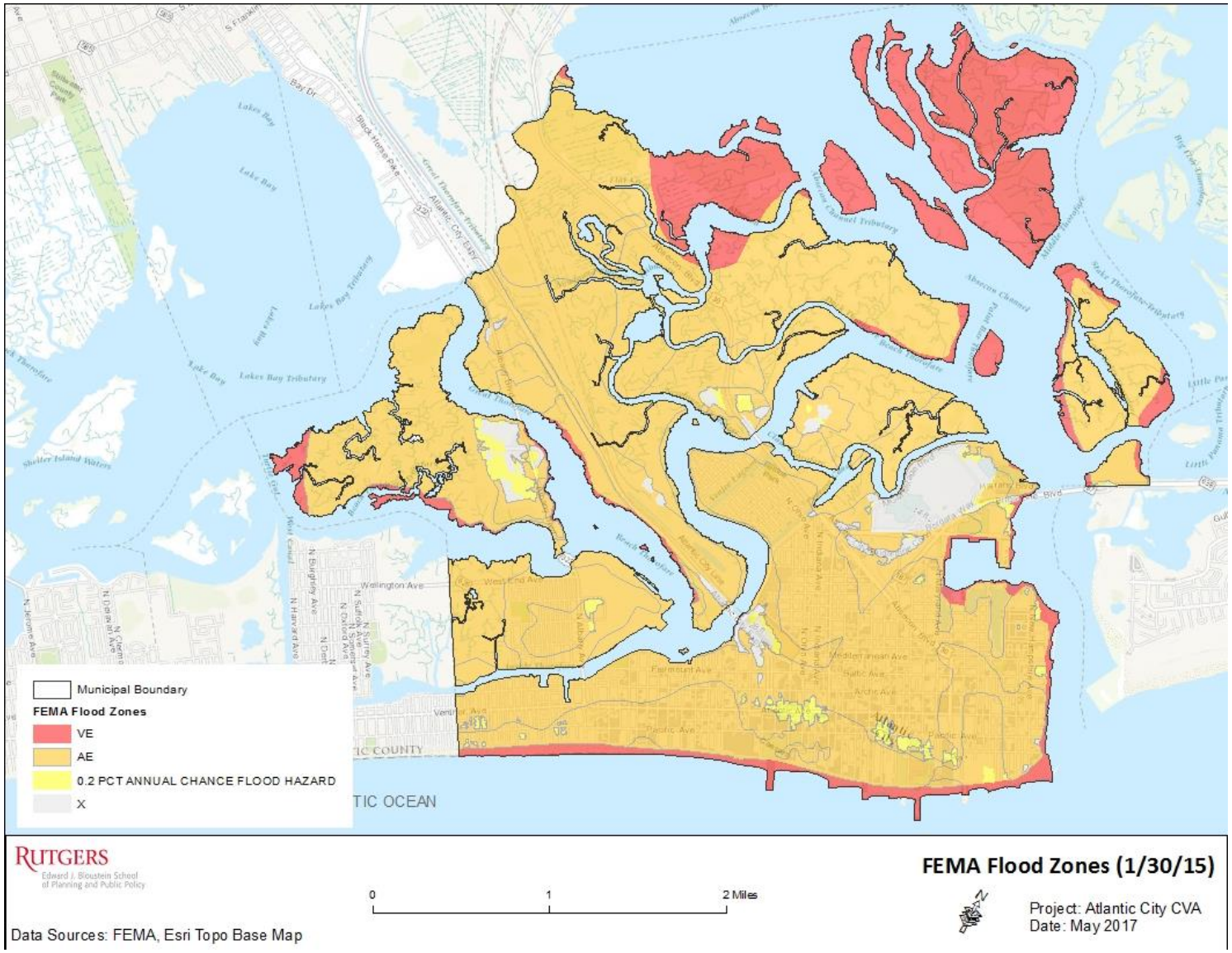
Map 1: Atlantic City, Atlantic County – NJ



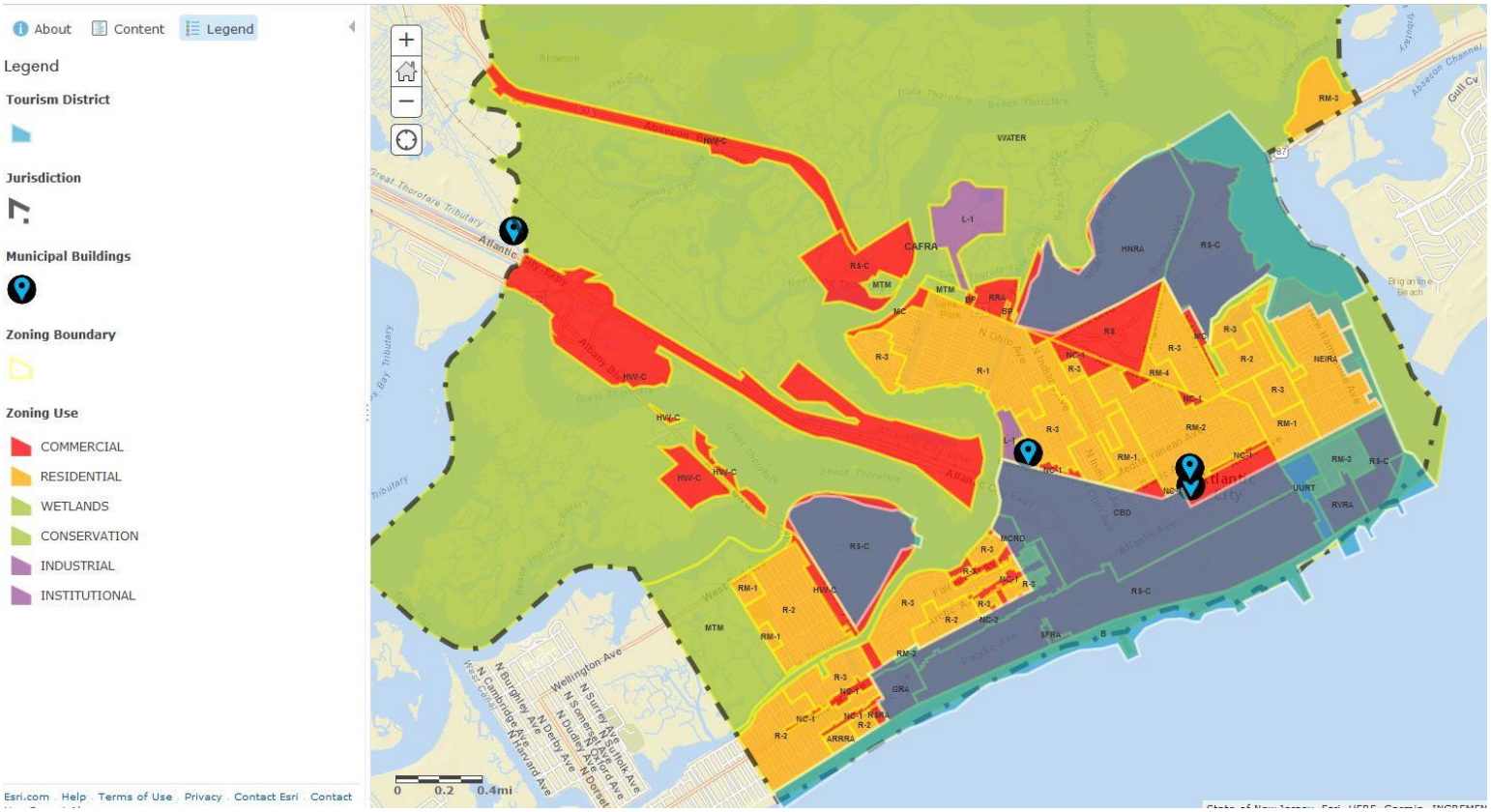
Map 2: Superstorm Sandy Surge Extent



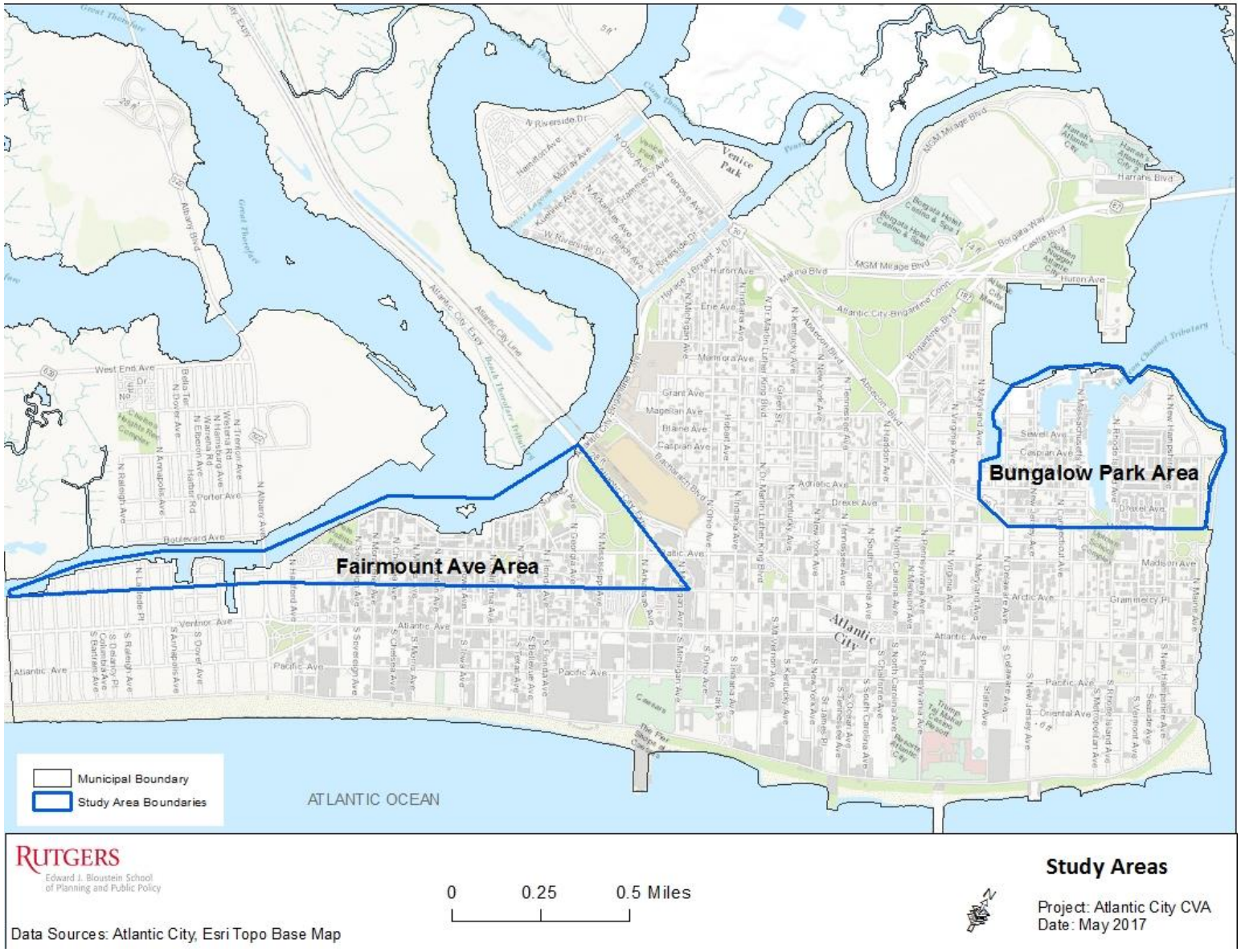
Map 3: FEMA Flood Zones



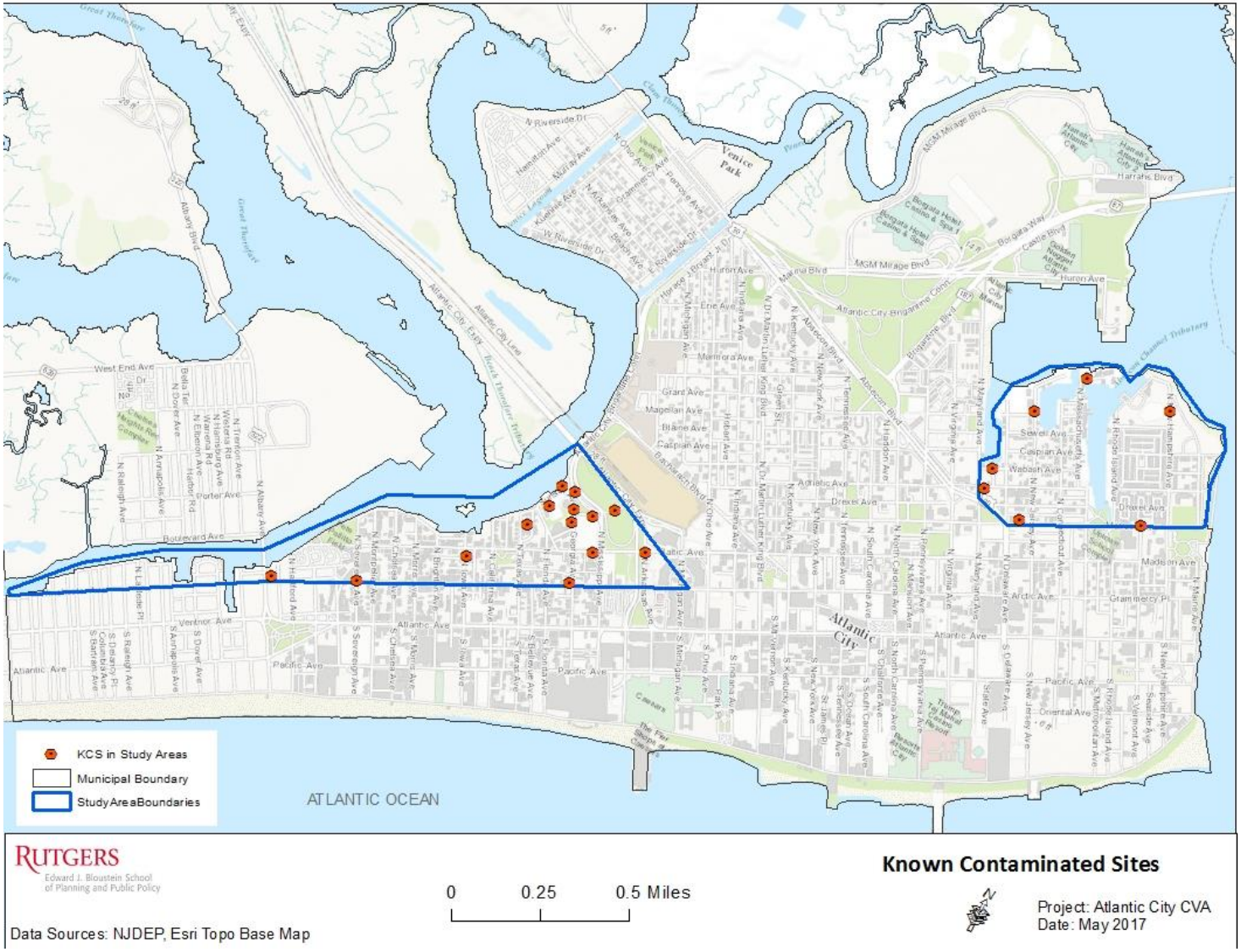
Map 4: Zoning (Source: Arc GIS online)



Map 5: Study Areas



Map 6: Known Contaminated Sites within the Study Areas



Map 7: Vulnerable Sites