



## Appendix 20: City of South Amboy

The City of South Amboy participated in the 2015 Middlesex County Hazard Mitigation Plan (HMP) update. This appendix includes the locally-specific information about the City. The following sections detail the planning process and participants; the current population, building stock, and land development trends; hazards that specific to the City and corresponding risk assessments; the City's mitigation strategy, and a local capability assessment.

### 1. Plan Development

On 6/24/15 the City Administrator signed an "Intent to Participate" letter and assigned a point of contact for the HMP update. This individual worked with other municipal employees, consultants, volunteers, and other stakeholders through the formation of a Local Planning Committee, as listed below. The local planning committee filled out the municipal worksheets included in Appendix E and worked to gather the necessary information to support the plan update.

**Table 20-1: City of South Amboy Local Planning Committee Members**

Name	Title	Organization
Mark Herdman	OEM Coordinator	City of South Amboy
Mark Rasimowicz	City Engineer	City of South Amboy
Camille Tooker	Administrator	City of South Amboy
Angelo Valetutto	Planner	Consultant



## 2. Community Profile

### 2.1 Physical Location

The City of South Amboy has a total area of 2.7 square miles and is located in the east-central region of Middlesex County, New Jersey. It sits adjacent to the Raritan River and Raritan Bay to the north and east, and Sayreville to the landward sides. Perth Amboy lies across the Raritan River from South Amboy.

#### 2.1.1 Hydrography and Hydrology

South Amboy is a small City located at the mouth of the Raritan River. The western and northern third of the site is located in the Raritan River Basin and drains into the Raritan River. The remaining 2/3<sup>rd</sup>s of the City, which encompasses the southern, central, and eastern portion of the City is in the Atlantic Coast Basin and drains into Raritan Bay.

### 2.2 History and Governance

The City of South Amboy was formally incorporated on April 11, 1908 from South Amboy borough, originally formed from Perth Amboy, Monroe, Madison (Old Bridge) and Sayreville. The City is governed under the Mayor-Council form of government, and has an elected Mayor and five Council members. The Mayor is elected directly to a four-year term of office. Town Council members are elected three from wards, two at-large to serve four-year terms on a staggered basis, with three seats (three Council members; two Council members and the Mayor) coming up for election alternately every two years. The City Council holds monthly meetings open to the public where it discusses legislation under consideration.

### 2.3 Demographics

#### 2.3.1 Population Trends

According to the U.S. Census Bureau, the population in 2010 was 8,631.<sup>1</sup> This is a 9.1% increase from 2000. The City of South Amboy has a population density of 5,577 persons per square mile. It is the 7th densest municipality within the County. A summary of major population and household characteristics may be found in the following tables.

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<sup>1</sup> U.S. Bureau of the Census. American Fact Finder "South Amboy City, NJ". <http://factfinder.census.gov/>. Retrieved 8/16/15.



**Table 20-2: City of South Amboy Population Summary Estimates (2010 Census) <sup>2</sup>**

Population	Quantity	Percent of Municipal Population
Total Population	8,631	100
Median Age	39.3	N/A
17 years and under	1,797	20.8
65 years and over	976	11.3
<b>Race</b>		
White	7,459	86.4
Black/African-American	382	4.4
Native American/Alaskan Native	9	0.1
Asian	348	4.0
Native Hawaiian/Pacific Islander	0	0
Other Race (unspecified)	258	3.0
Two or More Races	175	2.0
Hispanic or Latino	1,158	13.4

Population statistics may further reveal potential vulnerabilities in the community. The following table details the distribution of two groups included in vulnerable population analyses (children and the elderly) according to household description. Residents living alone, particularly the elderly, may have fewer coping mechanisms and resource than those in household groups, therefore may constitute a demographic that could require assistance in mitigating their vulnerability.

**Table 20-3: City of South Amboy Household Characteristics Summary Estimates (2010 Census) <sup>3</sup>**

Households	Quantity	Percent of Total
Total Households	3,576	100
Family Households (related)	2,256	66.9
Family Households w children under 18	943	28.0
Non-Family Households (unrelated)	1,116	33.1
Non-Family Households, living alone	900	26.7
Non-Family Households, living alone Male over 65 years	97	2.9
Non-Family Households, living alone Female over 65 years	228	6.8

### 2.3.2 Vulnerable Populations

Vulnerable populations include those groups that may require special assistance, considerations, accommodation or other needs during emergency events to facilitate their effective and safe compliance with emergency instructions. This includes, but is not limited to, those individuals needing mobility assistance (strollers, wheelchairs, etc.), those with financial needs (cannot afford hotel rooms,

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.



food, necessities, during evacuation periods, etc.), those requiring translation or interpretation services to understand emergency information (non-English-speaking populations, Deaf and hard of hearing), persons considered legal minors, those persons with cognitive impairments, persons with specialized medical needs (electric dependent equipment, refrigerated medications, use of Personal Assistants for routine and basic care, medical transportation needs, etc.), and populations with social disadvantages other needs that may require unique considerations during emergency events.

Identifiable vulnerable populations in South Amboy include (but may not be limited to) the following:

**Table 20-4: City of South Amboy Vulnerable Population Estimates (2010)**

Population Type	Population Estimate (2010 Census) <sup>4</sup>
Under 5 years of age	520
Under 18 years of age	1,797
Over 65 years of age	976
Limited English Proficiency (LEP)	770 (equals 9.6% of population over 5 years old)
Institutionalized	0
Living in Group Quarters	0

In addition to these statistics, approximately 7.5% of the population lives below the poverty line. The mean household income is \$86,737, with the per capita income at approximately \$36,778 (2013 estimates).<sup>5</sup>

## 2.4 Land Use and Development

The City of South Amboy is an urban waterfront community with a strong redevelopment trend. The NJDEP Land Use/Land Cover shows that the urban area is still growing and increasing in density, which is also evident from the expected and recent development projects listed below. Nearly 10 percent of the community is still forested, which includes sections of Raritan Bay waterfront. The City has experienced moderate growth in its redevelopment areas since 2010.

**Table 20-5: City of South Amboy Land Cover Summary**

Land Cover Class	Percent of Total Land <sup>6</sup>	2002 (acres)	2007 (acres)	2012 (acres)	Percent Change <sup>7</sup>
Agriculture	0	0	0	0	0
Barren Land	2.35%	69.59	61.91	29.73	-57.28%
Forest	9.21%	174.35	131.90	116.38	-33.25%
Urban	63.85%	700.52	753.23	807.00	15.20%
Water	22.24%	281.04	280.79	281.15	0.04%
Wetlands	2.34%	38.37	36.03	29.62	-22.81%

<sup>4</sup> Ibid.

<sup>5</sup> U.S. Bureau of the Census. American Fact Finder "South Amboy City, NJ". <http://factfinder.census.gov/>. Retrieved 8/16/15.

<sup>6</sup> Percent based on acres of land in 2012

<sup>7</sup> Change is calculated between 2002 and 2012



### 2.4.1 Open Space

The City of South Amboy has approximately 28 acres of open space within the jurisdiction. 13 percent of this preserved land is within the Special Flood Hazard Area. There are a number of underutilized parcels along the waterfront that have not been developed, but are not preserved.

### 2.4.2 Buildings and Development

Of the 3,750 residential units, nearly 12 percent were built after 2000. This number will likely increase as redevelopment efforts within the City continue. The majority of homes in South Amboy were built before the FIRM was adopted. The City has since put in place regulations to minimize risk to future buildings, including adopting the 1-foot freeboard requirement.

**Table 20-6: City of South Amboy Housing Statistics**

Housing Characteristics	Estimate
Total Occupied Housing Units	3,750
Percent Owner-occupied	65.5
Percent Renter-occupied	34.5
Percent built after 2000	11.8
Percent built before 1979	75.0

### 2.4.3 Recent and Expected Development

Project Name	Type	Number of Structures	Locations	Known Hazards	Description/Status
Venetian Health	Healthcare	180			
Bayside S.A.	Residential	50	South Shore Dr	Flood	Preliminary
Manhattan Beach Club	Residential	1750	Radford Ferry Rd	Flood	
Raritan Point	Residential	100	Mixed Use	Storm Surge	



## 2.5 Critical Facilities and Infrastructure

### 2.5.1 Essential Facilities

The City of South Amboy provides a number of services and facilities for residents. The City owns and operates City Hall, 5 Firehouses, senior facility, Emergency Operations Center, Public Library, a Public Works facility, and a Senior Center. One firehouse was damaged in Sandy from flooding, while others had roof damage. Other public buildings have not had reported damage from storms, though the road to the DPW facility frequently becomes flooded forcing the City to relocate its equipment before a storm event.

### 2.5.2 Transportation

Primary transportation routes include Routes 9 & 35, County Route 615, and County Route 684. New Jersey Transit provides bus service to the City. There is a commuter rail in South Amboy: the NJ Transit's North Jersey Coast Line, which provides service northbound (to Newark Penn Station and points beyond) and southbound to shore communities.

### 2.5.3 Critical Utilities and Infrastructure

The City manages the sewer infrastructure and passes the wastewater to the Middlesex County Utility Authority. Similar to other older jurisdictions, much of this infrastructure is aging and is vulnerable to infiltration. As the City redevelops, there is an opportunity to improve this infrastructure, but it also may result in increased stress on the system if these improvements are not made to match population growth and density. One pump station on Lower Broadway flooded during Sandy.

The City is not responsible for the energy or water infrastructure, though it reports that service is generally reliable.



### 3. Hazard Identification and Risk Assessment

This section describes the natural hazards and risks that can affect the City of South Amboy. Like all the other municipalities in Middlesex County, South Amboy is potentially subject to the effects of all the hazards that are considered in this mitigation plan. However, only a few of these hazards have significant impacts that are unique to the community. The remaining hazards are discussed in detail in the County part of this mitigation plan. FEMA mitigation planning guidance requires that County mitigation plans include a risk assessment section that “assess [es] each jurisdiction’s risks where there vary from the risks facing the entire planning area” (44CFR 201.6 (c) (2) (iii)). Because the Middlesex County HMP update includes separate appendices for each municipality, this requirement is met in the appendices, while risks that affect the entire County uniformly are discussed in the County part of the HMP.

#### 3.1 Background and Hazard Rankings

One of the first steps in developing jurisdictional appendices was for participating municipalities to review and prioritize the hazards that can affect them. This was done based on how often a hazard has occurred, how significant effects have been in the past, the difficulty and cost of recovering from such events. The planning team also reviewed hazard-specific data at the jurisdiction level to provide communities with insight about which hazards would be afforded detailed risk assessments. Municipalities ranked the list of hazards as high, medium, low, or no concern.

Table 20-7 shows community hazard rankings. To the extent possible, the level of discussion and detail about specific hazards in this section are based on these rankings. However, in many cases there is insufficient hazard information available at the level of the jurisdiction to allow detailed discussion or risk estimates. For some hazards there is limited

jurisdiction-level tabular data included in the County portion of the HMP, and users should refer to those subsections for more detail. The hazards marked with asterisks in the table above are included in this appendix; the others are included in the County portion of this HMP, but not discussed in detail here. The City listed coastal erosion has high because of the significant level of damage that has occurred along the waterfront after nor’easters and other coastal storms. There is no data available on the extent of this hazard within the City and it is therefore not included in this appendix.

**Table 20-7**  
**City of South Amboy**  
**Hazard Identification and Prioritization**

Hazard	Priority
Coastal Erosion	H
Dam/Levee Failure	L
Drought	M
Earthquakes	L
Extremely High Temps	H
Extremely Low Temps	H
Floods*	H
Hurricanes/Tropical Storms*	H
Nor’easters	H
Power Outages	H
Severe Weather	H
Hazardous Substances	M
Wildfire	L
Winter Storm	H



## 3.2 Flood Hazard

### 3.2.1 Type, Location, and Extent

All of the flood hazard in this jurisdiction appears to be related to the Raritan River and Raritan Bay. As shown in Figure 20-1, not only does South Amboy have areas of 100-year floodplain, much of its coastline is a designated V zone, meaning that it is subject to water velocities that are primarily associated with storm surge (surge is discussed separately below).

Two areas of South Amboy predominate flooding risk (i.e. potential damages). These are both coastal. The first is slightly less than halfway up the coastline from the City's southern border, in an area paralleling North Rosewell Avenue. As described in the NFIP section(s) below, Henry Street in particular appears to be exposed to flooding. The second area is at the southern end of the jurisdiction, along South Shore Drive. It appears from analysis of maps and aerials that flooding may impact the area via a southern path, from Raritan Bay Waterfront Park.

One of the best resources for determining flood risk in a jurisdiction is Flood Insurance Rate Maps (FIRMs), which are produced by FEMA. The FIRM is the official map of a community on which FEMA has delineated both the special flood hazard areas (1% annual chance of flooding) and the risk premium zones applicable to the jurisdiction.<sup>8</sup> At the time the Middlesex County HMP was being updated, the effective FIRM for South Amboy is dated July 6, 2010. While the effective FIRM is the approved map and is used for regulatory purposes, the Middlesex County hazard mitigation plan update was developed in 2015, and the best available flood mapping at that time was the FEMA revised Preliminary Flood Map (released on January 30, 2015). This map is shown below in Figure 20-1. It clearly shows that all the 100- and 500-year floodplain in the jurisdiction is related to the Raritan River and Raritan Bay.

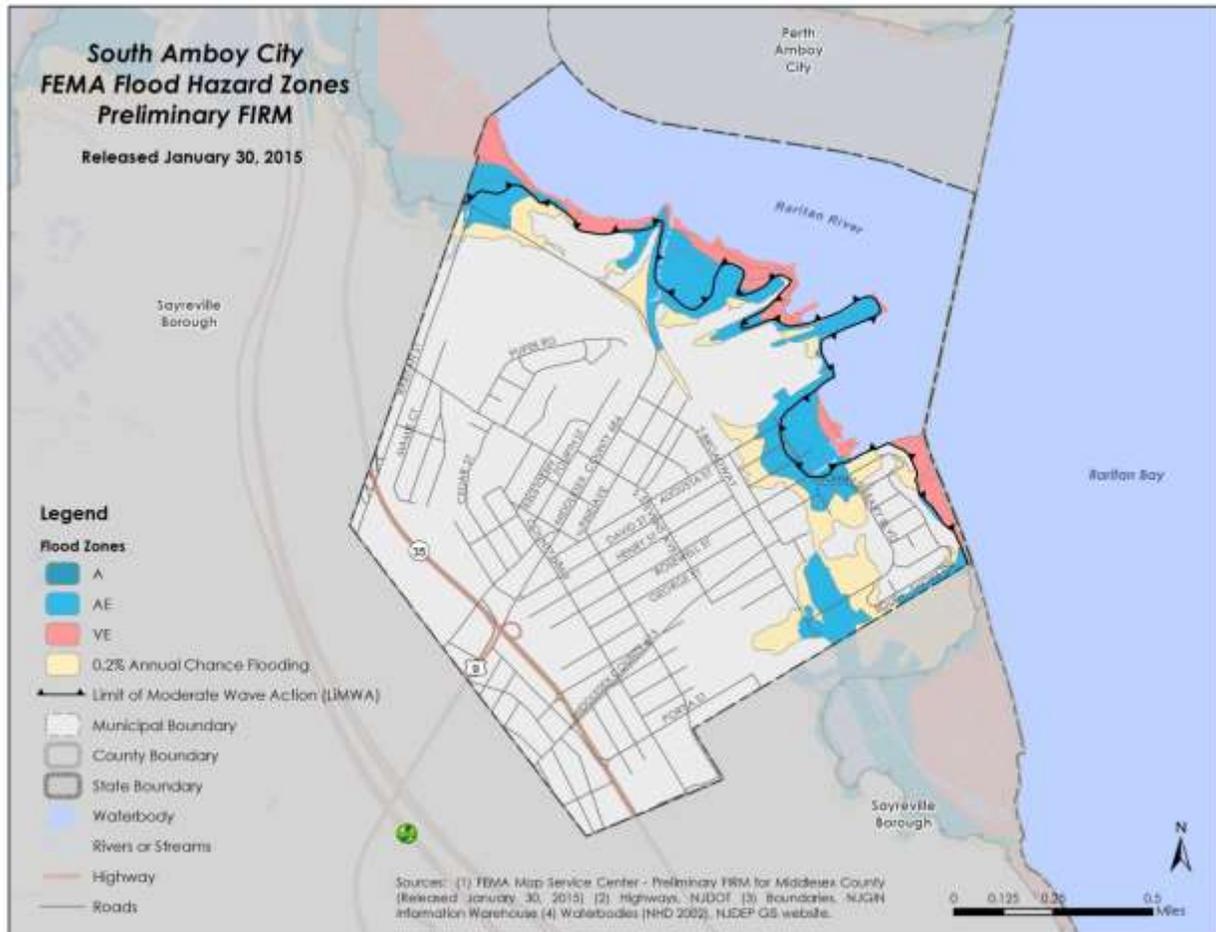
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<sup>8</sup> FEMA online - Floodplain Management. Flood Insurance Rate Map (FIRM) definition

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**Figure 20-1**  
**South Amboy portion of FEMA Revised Preliminary Flood Insurance Rate Map**  
(Source: FEMA Region II, Coastal Analysis and Mapping, Preliminary FIRM, September 19, 2014)



Current FEMA guidance uses the term *extent* as analogous to potential severity. As discussed in the NFIP claims sections below, past flooding in South Amboy has been infrequent. However, though the flooding happens only occasionally and appears to be limited to two areas of the jurisdiction, the potential depth (extent) of flooding in these areas is related to storm surge rather than rainfall. As such, the extent of flooding in the coastal areas of the community is potentially as much as several feet, and possibly more in a significant tropical storm or hurricane, depending on direction and barometric pressure, among other factors.

Table 20-8 provides basic information about floodplain and parcels subject to flooding within the jurisdiction based on the Preliminary FIRM. Note that although a large percentage of South Amboy is within the FEMA Special Flood Hazard Area (SFHA), relatively few parcels are within that zone. This is due to the large industrial area of floodplain at the north end of the jurisdiction. Although the City has a relatively large number of parcels for its size (and a significant amount of floodplain), a very low percentage of them are in the floodplain.



**Table 20-8**  
**Floodplain and Parcel Data for the City of South Amboy**  
(Source: FEMA Region II, Coastal Analysis and Mapping, Preliminary FIRM, September 19, 2014)

Data Type	Value
Jurisdiction area in square miles	1.97
Square miles within 100-year floodplain	0.44
Percentage of jurisdiction within 100-year floodplain	23.30%
Number of parcels in jurisdiction	3,100
Number of parcels with centroids within 100-year floodplain	76
Percentage of parcels with centroids within 100-year floodplain	2.45%

[Note: the table refers to centroids, which are the geographic center of a parcel. This is a better indicator of flood exposure than simple intersection with the floodplain, although it does not necessarily mean that any structures or infrastructure are within the boundaries of the Special Flood Hazard Area].

Current FEMA guidance uses the term *extent* as analogous to potential severity. The extent of the flood hazard in South Amboy appears to be significant but not as severe as some other jurisdictions in Middlesex County. Except for Tropical Storm Irene, flooding has been relatively minor and not of significant depths.

### 3.2.2 Previous Occurrences and the Probability of Future Floods

A review of NFIP claims records reveals that Hurricane Sandy predominates flood damages in this community – nearly all the insurance claims are from that event. The probability of future floods will likely increase with the expected advent of sea level rise, something that particularly affects coastal areas such as South Amboy.

### 3.2.3 Flood Impacts and Vulnerabilities to Flooding

The impacts from past floods in this jurisdiction have been infrequent but significant in specific areas, as described above. The vulnerabilities are significant, and may increase under conditions of sea level rise.

### 3.2.4 National Flood Insurance Program and Repetitive Loss Properties

To provide a sense of the flood risk in a community it is also beneficial to summarize the policies in force and claims statistics from the National Flood Insurance Program (NFIP). There is a discussion of the NFIP in the County section of this hazard mitigation plan. The Borough of Amboy has been a member of the NFIP since 1980.



**Table 20-9  
NFIP Policies and Claims**

<b>Number of Parcels:</b>	
South Amboy:	3,100
Middlesex County:	283,276
<b>Number of Policies In-Force:</b>	
South Amboy:	100
Middlesex County:	4,489
<b>Number of Claims:</b>	
South Amboy:	36
Middlesex County:	3,478
<b>Total Paid Claims</b>	
South Amboy:	\$1,898,906
Middlesex County:	\$109,727,837
<b>Repetitive Loss (RL) Properties:</b>	
South Amboy:	2
Middlesex County:	429
<b>Total Building (RL)</b>	
South Amboy:	\$37,922
Middlesex County:	\$44,015,885
<b>Total Contents (RL)</b>	
South Amboy:	\$0
Middlesex County:	\$5,106,609
<b>Number of Claims (RL)</b>	
South Amboy:	5
Middlesex County:	1,322
<b>Average Claim (RL)</b>	
South Amboy:	\$7,584
Middlesex County:	\$37,158

FEMA NFIP statistics indicate that as of February 2015, federal flood insurance policies were in-force on 100 properties in South Amboy. Between 1978 and 2015, there have been a total of 36 NFIP insurance claims in South Amboy with a total claims value of \$1,898,906.<sup>9</sup> Table 20-9 compares the number of policies in-force and paid claims in the jurisdiction. The Table shows that South Amboy comprises about one percent of the NFIP policies in-force in Middlesex County.

The City of South Amboy is not presently a member of the Community Rating System (CRS), a voluntary program for communities participating in the NFIP. The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. For CRS participating communities, flood insurance premium rates are discounted in increments of 5% based on creditable activities.<sup>10</sup> CRS communities are ranked between 1 and 10, with Class 1 communities receiving a 45% premium discount.

It should be noted that NFIP claims are not a direct or completely accurate proxy for flood risk in a community. The data does not include flood damages to structures that had no flood insurance. Also, in some cases, structures or contents may have been underinsured. The NFIP claims data also does not include any damages to public facilities, which may be insured via other means (such as self-insurance or non-FEMA policies); such damages may also be addressed through other federal programs such as FEMA’s Public Assistance Program.

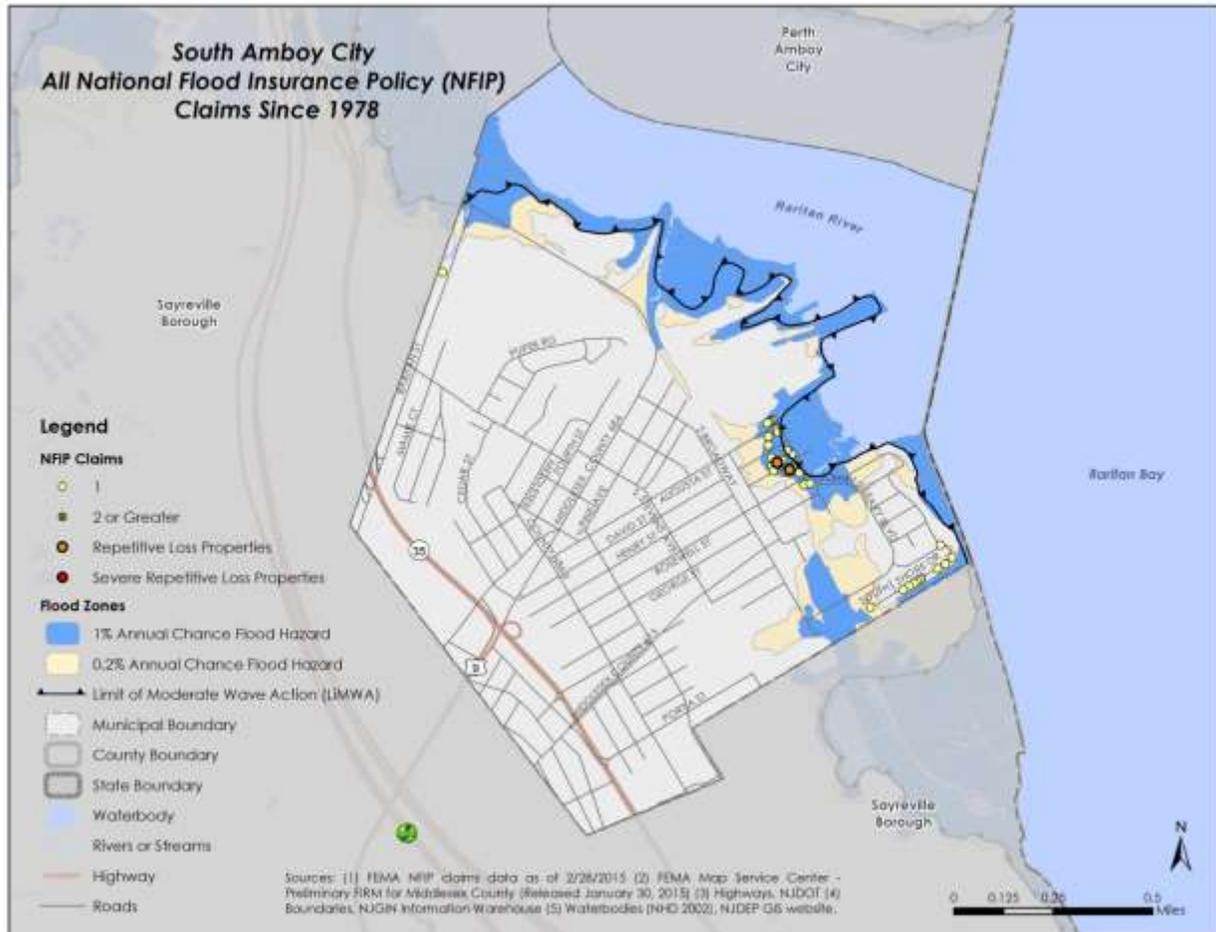
Figure 20-2 shows all NFIP claims in South Amboy between 1978 and 2015. Two areas predominate the claims record – the area immediately east of North Rosewell Avenue and northwest of Raritan Bay Waterfront Park along South Shore Drive.

<sup>9</sup> FEMA – Policy and Claim Statistics for Flood Insurance

<sup>10</sup> FEMA – Community Rating System (CRS).



**Figure 20-2**  
**Map of NFIP Claims in the City of South Amboy (1978 to 2015),**  
**Including Repetitive Loss and Severe Repetitive Loss Properties**  
(Source: FEMA National Flood Insurance Program, February 2015)



### 3.2.5 Flood Risk to Repetitive Loss Properties in South Amboy

FEMA requires a discussion of NFIP Repetitive Loss and Severe Repetitive flood loss statistics in hazard mitigation plans. In 2012, the Biggert Waters act redefined repetitive loss property as a structure covered by a contract for flood insurance made available under the NFIP that has incurred flood-related damage on two occasions, in which the cost of the repair, on average, equaled or exceeded 25% of market value of the structure at the time of each such flood event. This definition is being used to prioritize properties for mitigation funding. The data about Repetitive Loss properties in this subsection are based on the previous definition. Under the revised definition above, South Amboy has no RL properties. See Section 4 of the County portion of this HMP for more details on repetitive loss properties in the County.



The flood risk assessment in this section is based in part on analysis of NFIP data on repetitive flood loss properties. As of February 2015, Middlesex County had 429 such properties based on a query of the FEMA Bureau Net NFIP interface. Of this total, two properties were located within South Amboy; this comprises less than one percent of the County total. Table 20-10 provides a comparison of the residential repetitive loss claims for Middlesex County and South Amboy. The tables below include the number of repetitive loss properties, building and contents damages, the total number of claims, and the average claim amounts.

The two repetitive loss properties in South Amboy were responsible for a total of five insurance claims, totaling \$37,922. Table 20-10 provides summary repetitive loss statistics for the community. Part of the explanation for the very low number of repetitive loss properties in this jurisdiction is that only very significant events (such as Sandy) have caused flooding here in the past. It should also be noted that not only is the total number of RL claims very small, the average amount of the claims is less than 24% of the County average.

**Table 20-10**  
**Repetitive Loss Statistics in the City of South Amboy and Middlesex County**  
(Source: FEMA National Flood Insurance Program, February 2015)

City/County Name	Properties	Total Building	Total Contents	Total Losses	# of Claims	Average Claim
City of South Amboy	2	\$37,922	\$0	\$37,922	5	\$7,584
Middlesex County	429	\$44,015,885	\$5,106,609	\$49,122,494	1,322	\$37,158

The next table provides the results of a simple risk projection for repetitive loss properties. This is done by annualizing past insurance claims and using this as the basis for estimating future losses. This method employs standard FEMA statistical techniques, and may be used for developing a sense of flood risk, i.e. total future losses over the 100-year planning horizon. The results below should be considered general and preliminary. It is possible to complete more accurate risk assessments for specific projects using FEMA software and methodologies, combined with information about sites and facilities.



**Table 20-11**  
**100-Year Risk Projection for NFIP Repetitive Loss Properties in the City of South Amboy**

Data	Value
Period in years	3
Number of claims	5
Average claims per year	1.67
Total value of claims	\$37,922
Average value of claims per year	\$12,641
<b>Projected risk, 100-year horizon</b>	<b>\$180,382</b>

### 3.2.6 Flood Risk to Severe Repetitive Loss Properties in South Amboy

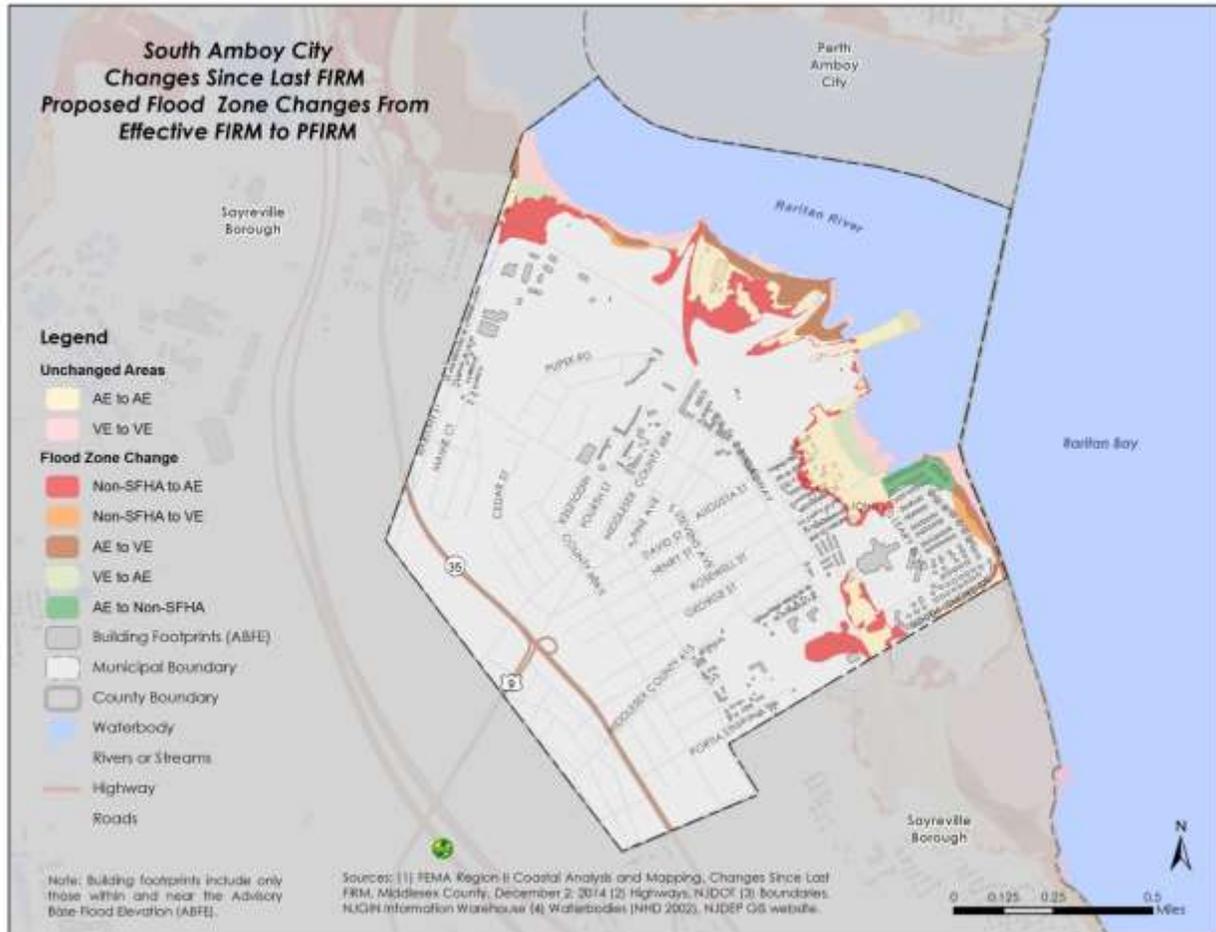
Severe Repetitive Flood Loss was also redefined in the Biggert Waters Act as properties that have “incurred flood-related damage for which four or more separate claims payments have been made under flood insurance coverage under this title, with the amount of each claim exceeding \$5,000, and with the cumulative amount of such claims payments exceeding \$20,000; or for which at least two separate claims payments have been made under such coverage, with the cumulative amount of such claims exceeding the value of the insured structure.” The data about Severe Repetitive Loss properties in this subsection are based on the previous definition. Under the revised definition above, South Amboy has no SRL properties.

### 3.2.7 Changes in Floodplain Boundaries

Prior to Sandy in 2012, FEMA had begun a coastal flood study to update Flood Insurance Rate Maps (FIRMs) and Flood Insurance Study (FIS) reports for portions of New York and New Jersey, including Middlesex County, using improved methods and data to better reflect coastal flood risk. Much of the resulting information is publicly available from the [FEMA Region II Coastal Analysis and Mapping](#) website. Figure 20-3 below indicates changes in various flood zones in South Amboy. The Changes since Last FIRM (CSLF) dataset compares information shown on the preliminary FIRM with that of the effective FIRM. This includes a comparison of the floodplain boundaries and zones, Base Flood Elevation changes, and where applicable, the regulatory floodway. See the main body of the 2015 Middlesex County Plan update (Section 3.3.7) for additional information about the CSLF dataset.



**Figure 20-3**  
**Changes in Floodplain Boundaries in the City of South Amboy**  
(Source: FEMA Region II, Coastal Analysis and Mapping, Preliminary FIRM, September 19, 2014)



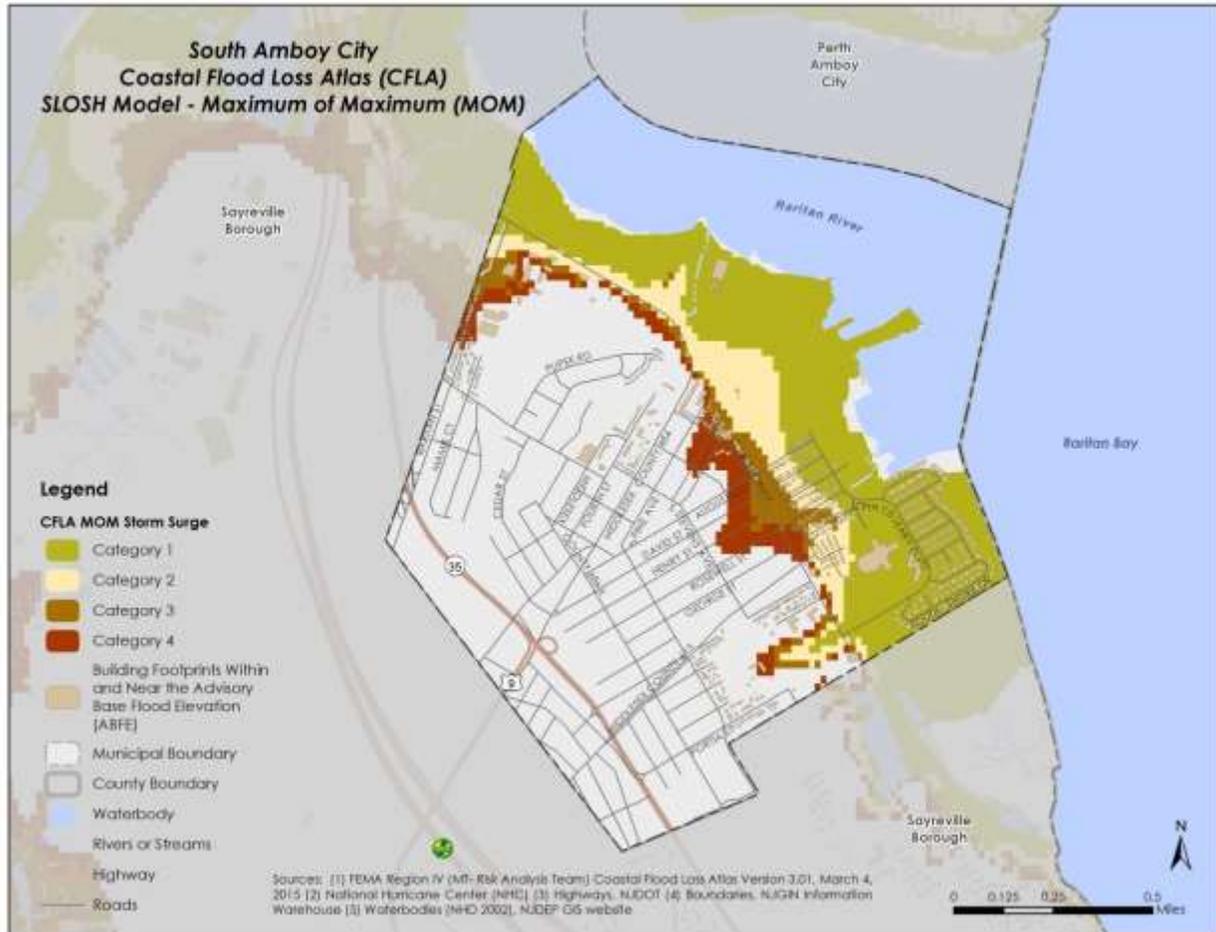
### 3.2.8 Storm Surge

Of the 25 jurisdictions in Middlesex County, 13 have some risk from storm surge. The City of South Amboy is among these, due its exposure to Raritan Bay and the Raritan River. It is useful to discuss statistics that are clearly related to surge. Various studies and GIS analysis provide information about the jurisdiction's exposure to various levels of storm surge. Table 20-12 provides basic information.

Figure 20-4 is a map of storm surge zones 1 through 4 in South Amboy. The map was created using FEMA/CFLA data and overlaying it with topographic GIS information to show areas potential inundated by various surge categories. There is more information about this process in the County part of this mitigation plan. Category 1 events impact an area substantially similar to the Special Flood Hazard Areas, but more densely developed areas further to the west of the river create significant risks in larger (and lower probability) events (Categories 2-4).



**Figure 20-4**  
**Map of Storm Surge Zones, Categories 1-4, City of South Amboy**  
(Source: FEMA Region IV, Coastal Flood Loss Atlas (CFLA) SLOSH – March, 2014)



SLOSH inundation zones from the FEMA Coastal Flood Loss Atlas (CFLA) were used to complete the storm surge vulnerability assessment for South Amboy. The initial analysis included calculating the land area and parcels within Categories 1 - 4 for the jurisdiction. This portion of the risk assessment approach matches the vulnerability assessment completed for the State of New Jersey 2014 Hazard Mitigation Plan. Knowing the land area within each zone can help determine the overall impact to buildings and other infrastructure in the region a result of storm surge.



**Table 20-12**  
**Storm Surge Exposure Statistics for the City of South Amboy**  
(Source: FEMA Region IV, Coastal Flood Loss Atlas (CFLA) SLOSH – March, 2014, County GIS)

Storm Surge Category	Square Miles Impacted	Parcels Exposed
1	0.37	450
2	0.48	532
3	0.36	657
4	0.59	850

There is no reliable open-source information that allows assignment of specific probabilities to surge categories, so certain assumptions must be made in order to complete a risk assessment. The next table shows the assumptions used in a simple risk calculation for storm surge.

**Table 20-13**  
**Assumptions for Storm Surge Risk Assessment, City of South Amboy**

Data Type	Value
Structures per parcel	1
Structure replacement value/s.f.	\$150
Contents replacement value/s.f.	\$75
Assumed square footage of average structure	2,000

The risk assessment is then based on FEMA depth-damage functions, i.e. indications of the percentage damage at a given flood depth for structure and contents. The main section of the mitigation plan includes a detailed description of the methodology. The results are intended only to provide a general sense of potential losses.

**Table 20-14**  
**Flood Risk in Storm Surge Scenarios, City of South Amboy**

	Category 1	Category 2	Category 3	Category 4
Assumed annual probability	2%	1%	0.5%	0.01%
Assumed flood depth (feet)	1	2	3	4
Number of parcels impacted	450	532	657	850
Scenario risk	\$58,725,000	\$69,426,000	\$85,738,500	\$110,925,000
Annual risk	\$1,174,500	\$694,260	\$428,693	\$110,925
100-year risk	\$16,760,115	\$9,907,090	\$6,117,442	\$1,582,900



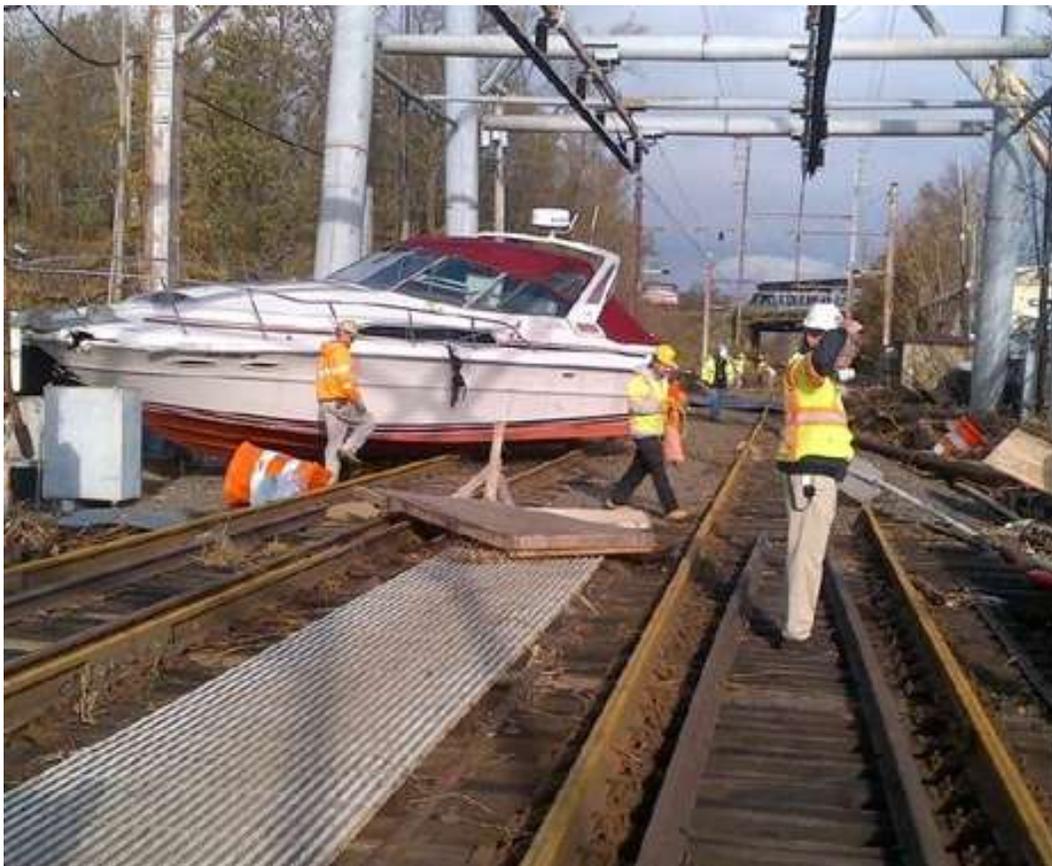
### 3.3 Hurricanes and Tropical Storms

The storm surge from Hurricane Sandy caused extensive damage in South Amboy, particularly along the Raritan Bay waterfront. The streets south of the NJ Transit railroad line were flooded, the power was out for 10 days across the whole town. The greatest damage from Sandy occurred on John, David, Henry, George, Augusta and Rosewell streets, with some houses removed from foundations and in need of demolition due to floodwaters. At least 100 residential buildings, 1 apartment building, and a senior citizen building experienced significant damage. There were 10 houses determined to be substantially damaged.

But despite the losses, all residents were safe and accounted for after the storm. Other property damage was significant — a number of trees fell, including one that hit the Main Street home of Mayor Fred Henry, and many basements were flooded in the Lighthouse Bay community. The waterfront walkway, which has been damaged in other storms, also was destroyed, officials said (quoted directly from ‘Suburban’ newspaper, Jacqueline Durett, undated online article).

Figure 20-5 shows New Jersey Transit workers in South Amboy, clearing debris (including a boat) from the Morgan drawbridge.

**Figure 20-5 Morgan Drawbridge, South Amboy (Photo: New Jersey Transit)**





### 3.3.1 Hurricane Wind Risk Estimates

There are three significant hazards related to hurricanes, tropical storms, and to a lesser extent, nor'easters. These are: floods, storm surge, and high winds. Both floods and storm surge are addressed in the flood section of the present municipal appendix, as well as the County section of the hazard mitigation plan update. This subsection provides a preliminary quantification of hurricane wind risk based that was generated by FEMA's HAZUS-MH software (version 2.1, 2014). The calculations in Table 20-15 show a range of loss categories across the top row versus "occupancy classes" on the first column. The occupancy classes are various land uses that are represented in HAZUS. The last two columns indicate the projected 50-year and 100-year risks, i.e. the total amount of damage over those planning horizons. The figures are based on annualizing losses, then discounting them to present value using the software. There is more detailed information about the calculations and County-wide results in the main section of this HMP update.

### 3.3.2 FEMA Project Worksheets from Tropical Storm Irene and Hurricane Sandy

Following many natural disasters, FEMA engineers and field teams complete formal assessments of damage to community assets, and document these in project worksheets (PWs). The PWs are the basis of FEMA Public Assistance grants for repairs. There are seven categories of damage, indicated by the letters A through G. These are: A – debris removal; B – emergency protective measures; C – roads and bridges; D – water control facilities; E – public buildings; F – utilities, and; G – recreational facilities/other. The categories and amounts of the PWs are listed in Table 20-16 below for Tropical Storm Irene and Hurricane Sandy. Note that in some cases there are multiple different organizations in a community that are applicants for FEMA Public Assistance. In order to simplify the table, the PW amounts for all applicants in a community are combined.



**Table 20-15**  
**Probabilistic Wind Risk in South Amboy, 50- and 100-year Planning Horizons**  
(Source: FEMA, HAZUS-MH version 2.1)

Occupancy Class	Total SF	Building Damages	Contents Damages	Inventory Loss	Relocation Cost	Business Income Loss	Rental Loss	Lost Wages
Residential	4,057,333	\$102,356	\$26,218	\$0	\$7,776	\$3	\$4,550	\$8
Commercial	595,336	\$6,641	\$3,108	\$79	\$1,120	\$822	\$663	\$1,021
Industrial	153,666	\$1,248	\$853	\$87	\$108	\$11	\$14	\$19
Agricultural	4,203	\$45	\$24	\$3	\$7	\$1	\$0	\$0
Religious	84,115	\$1,097	\$423	\$0	\$156	\$71	\$14	\$167
Government	48,965	\$478	\$236	\$0	\$111	\$5	\$34	\$281
Education	68,378	\$723	\$321	\$0	\$132	\$27	\$5	\$64
<b>Totals</b>	<b>5,011,995</b>	<b>\$112,588</b>	<b>\$31,183</b>	<b>\$169</b>	<b>\$9,410</b>	<b>\$941</b>	<b>\$5,280</b>	<b>\$1,560</b>

**Table 20-15**  
**Probabilistic Wind Risk in South Amboy, 50- and 100-year Planning Horizons**  
(Source: FEMA, HAZUS-MH version 2.1)

Occupancy Class	Total Annualized Loss	50-year Risk	100-year Risk
Residential	\$140,912	\$1,944,725	\$2,010,672
Commercial	\$13,454	\$185,684	\$191,981
Industrial	\$2,340	\$32,292	\$33,387
Agricultural	\$80	\$1,102	\$1,139
Religious	\$1,928	\$26,612	\$27,515
Government	\$1,145	\$15,801	\$16,337
Education	\$1,272	\$17,561	\$18,156
<b>Totals</b>	<b>\$161,132</b>	<b>\$2,223,778</b>	<b>\$2,299,188</b>

**Table 20-16**  
**FEMA Public Assistance Expenditures in Tropical Storm Irene and Hurricane Sandy, by Category**  
(Source: FEMA Region II, Public Assistance)

Event Name/Public Assistance Category	A	B	C	D	E	F	G	Total
Tropical Storm Irene	\$14,736	\$26,909	\$0	\$0	\$0	\$52,691	\$20,268	\$114,603
Hurricane Sandy	\$229,282	\$376,992	\$78,491	\$0	\$86,090	\$0	\$2,410,150	\$3,181,005
<b>Total</b>	<b>\$244,018</b>	<b>\$403,900</b>	<b>\$78,491</b>	<b>\$0</b>	<b>\$86,090</b>	<b>\$52,691</b>	<b>\$2,430,418</b>	<b>\$3,295,608</b>



## 4. Capability Assessment

Each community within the planning area has a unique set of capabilities and priorities that affect its mitigation strategy. The following tables detail the capabilities assessed for the City of South Amboy during this plan update.

### 4.1.1 Planning and Regulatory

Tool / Program (code, ordinance, plan)	( Yes/No)	Code Citation and Comments
Master Plan	Y	
Capital Improvements Plan		Capital Budget
Floodplain Management / Basin Plan		
Storm water Management Plan	Y	
Open Space Plan		
Stream Corridor Management Plan		
Watershed Management or Protection Plan		
Economic Development Plan		
Comprehensive Emergency Management Plan		
Emergency Operation Plan	Y	
Post-Disaster Recovery Plan		
Transportation Plan		
Strategic Recovery Planning Report		
Zoning Ordinance		
Subdivision Ordinance		
NFIP: Cumulative Substantial Damages		
Growth Management Ordinances		
Site Plan Review Requirements		
Storm water Management Ordinance		
Municipal Separate Storm Sewer System (MS4)		
Combined Sewer Overflows (CSO)	N	
Natural Hazard Ordinance		
Post-Disaster Recovery Ordinance		
Real Estate Disclosure Requirement		
Other [Special Purpose Ordinances (i.e., sensitive areas, steep slope)]		

### 4.1.2 Education/Outreach and Community Classifications

Program	Do you Participate in/Use this Program (Yes/No)	Classification (if applicable)	Date Classified (if applicable)
Community Rating System (CRS)	N		
Building Code Effectiveness Grading Schedule (BCEGS)	N		
Public Protection (ISO Fire Protection Classes 1 to 10)			
Storm Ready	Y		
Fire wise	Y		
Disaster/Safety Programs in/for Schools			
Organizations with Mitigation Focus (advocacy group, non-government)			



Program	Do you Participate in/Use this Program (Yes/No)	Classification (if applicable)	Date Classified (if applicable)
Public Education Program/Outreach (through website, social media)			
Public-Private Partnerships			

### 4.1.3 Fiscal Capabilities

	Yes/No
Do you have a line item in your operating budget for mitigation project funding?	N
If no, will you look at mitigation actions when allocating funding in the future?	Y
Do you have a line item in the Capital Improvement Budget for mitigation project funding?	N
Have you provided funding for mitigation projects identified in the hazard mitigation plan?	N
Does your town have the authority to Levy Taxes for specific purposes?	Y
Does your town have user fees for water, sewer, gas or electric service?	Y – sewer
Do you impose impact Fees for homebuyers or developers of new development/homes?	N
Does your community have an open space acquisition fund?	Y
Do you use bonds to finance projects (general obligation bonds, special tax bonds, private activity bonds)	



## 5. Mitigation Strategy

This section describes what projects, initiatives, and other actions the City has undertaken or plans to implement to reduce risk and loss within its jurisdiction. This includes the status of previously identified actions and any other projects that have been completed since the 2010 Plan was adopted. The additional actions were determined by the LPC based on self-determined priorities and experience.

### 5.1 Past Mitigation Actions

The table below lists the mitigation projects and actions that were included in the original 2010 Plan. The ~~strickethrough~~ indicates this action is not part of the ongoing municipal strategy.

Mitigation Action	Responsible Party	Status	Review Comments
<del>South Amboy 1: Upgrade Sewage Pump Station storm water capabilities on Rosewell Street.</del>	Municipal Engineering Department	This is a MCUA owned pump station and is outside of the capability of the City	

### 5.2 Other Mitigation Activities

The City has rebuilt the waterfront walkway that was damaged from Sandy. The seawall was engineered to withstand greater wave action for future events. The City has also secured grants for the Resource Center and Sanitary Sewer Pump Stations.

### 5.3 Proposed Mitigation Actions

The table below details the mitigation initiatives the City of South Amboy would like to pursue to minimize future effects of hazard events. These actions have been determined through a local assessment of current risk and needs. The LPC met with the Plan Consultant to review all hazard and risk assessment data and evaluate the strategy. These initiatives are dependent upon funding and may change based on municipal priorities and future hazard events.

For each new mitigation action, the City has ranked as 'High', 'Medium', or 'Low', based on the evaluation criteria outlined in Section 5.

Proposed Action	Anticipated Benefits	Responsible Party	Funding or Implementation Mechanism	Timeline	Priority
Install generators at senior facility, YMCA, public library	Maintain power at warming/cooling centers and shelters	OEM	Grants/capital		



Elevate pump station on Lower Broadway	Prevent flooding of pump station during storm events	Engineering	Capital Improvement		
Elevate or relocate firehouse	Reduce vulnerability to critical facility and maintain emergency response during storm event	Engineering	Capital Improvement		
Upgrade warning system	Allow effective communication of hazards to public	OEM	Capital Improvement		
Elevate roadway to DPW or relocate facility	Allow passage of equipment during and after storm events	DPW/Engineering	Requires cooperation from Sayreville		



## 6. Plan Implementation

The LPC shall document, as needed and appropriate:

- Hazard events and losses in South Amboy and the effects that mitigation actions have had on impacts and losses,
- Progress on the implementation of mitigation actions, including efforts to obtain outside funding for projects,
- Any obstacles or impediments to the implementation of actions,
- Additional mitigation actions believed to be appropriate and feasible,
- All public and stakeholder input and comment on the Plan that has been received by the City.
- Copies of any grant applications filed on behalf of the City

### Continued Public Input

The City of South Amboy is committed to incorporating public input into its ongoing hazard mitigation planning. The public will have an opportunity to comment on the Plan prior to any changes and during the 5-year plan update. The annual progress reports will be posted on the County mitigation website in addition to the adopted Plan.

All public comments and input on the plan will be recorded and addressed, as appropriate. Opportunity to comment on the plan will be provided directly through the County's website. Public comments can also be submitted in writing to the County's HMP Coordinator. All public comments shall be addressed to: Middlesex County Office of Emergency Management c/o All Hazards Pre-disaster Mitigation Plan Coordinator, 1001 Fire Academy Drive, Sayreville, NJ 08872.

The City of South Amboy's LPC shall ensure that:

- Copies of the latest approved Plan are available for review at City Hall along with instructions to facilitate public input and comment on the Plan.
- Public notices are made as appropriate to inform the public of the availability of the Plan, particularly during Plan update cycles.
- For minor changes to this appendix, the City of South Amboy will post a notice on the City's website and invite the public to review and comment.
- For major changes involving City Council approval, the City will use its standard public notice procedures inviting the public to review the document and provide feedback.

### Plan Adoption

On [insert date] Middlesex County submitted the initial draft of the 2015 Plan Update to NJOEM for review and comment. After addressing NJOEM comments in the document, the HMP was resubmitted for final consideration and approval by NJOEM and FEMA. FEMA approved the plan on [insert date],

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and the Plan update was forwarded to the Middlesex County Board of Chosen Freeholders for adoption, which occurred on [insert date].

The City Council approved the plan on [insert date]. The City resolution for adoption is provided below, the County's adoption resolution is provided as Appendix F of the 2014 HMP update. Following adoption, the plan update was resubmitted to FEMA for final approval, which occurred on [insert date]. The FEMA approval letter is included as Appendix G.

## Plan Maintenance

The City of South Amboy will review this Appendix of the County's hazard mitigation plan appendix each year and give the County's HMP Coordinator an annual progress report. The OEM Coordinator is responsible for convening the LPC, initiating the plan review, and submitting the annual progress report. The LPC may use worksheets #1 and #3 in the FEMA 386-4 guidance document, to facilitate the review and progress report. FEMA guidance worksheets are provided in Appendix H. Local progress reports shall be provided to the County HMP Coordinator at least two weeks prior to the annual plan review meeting.

Additionally, the LPC will convene and review the plan when major hazard events impact the jurisdiction, potentially yielding opportunities for mitigation grant funding, or when new information suggests that plan elements do not accurately reflect the community's risk or its mitigation priorities.

If necessary, the OEM Coordinator will convene a meeting of the LPC to review and approve all changes. The City retains the discretion to implement minor changes to the document without formal procedures involving the City Council subject to local policies and regulations.

In addition to the annual progress report, the City of South Amboy will provide Middlesex County with a copy of the written notice of any changes to the jurisdictional appendix at the time such changes are implemented.