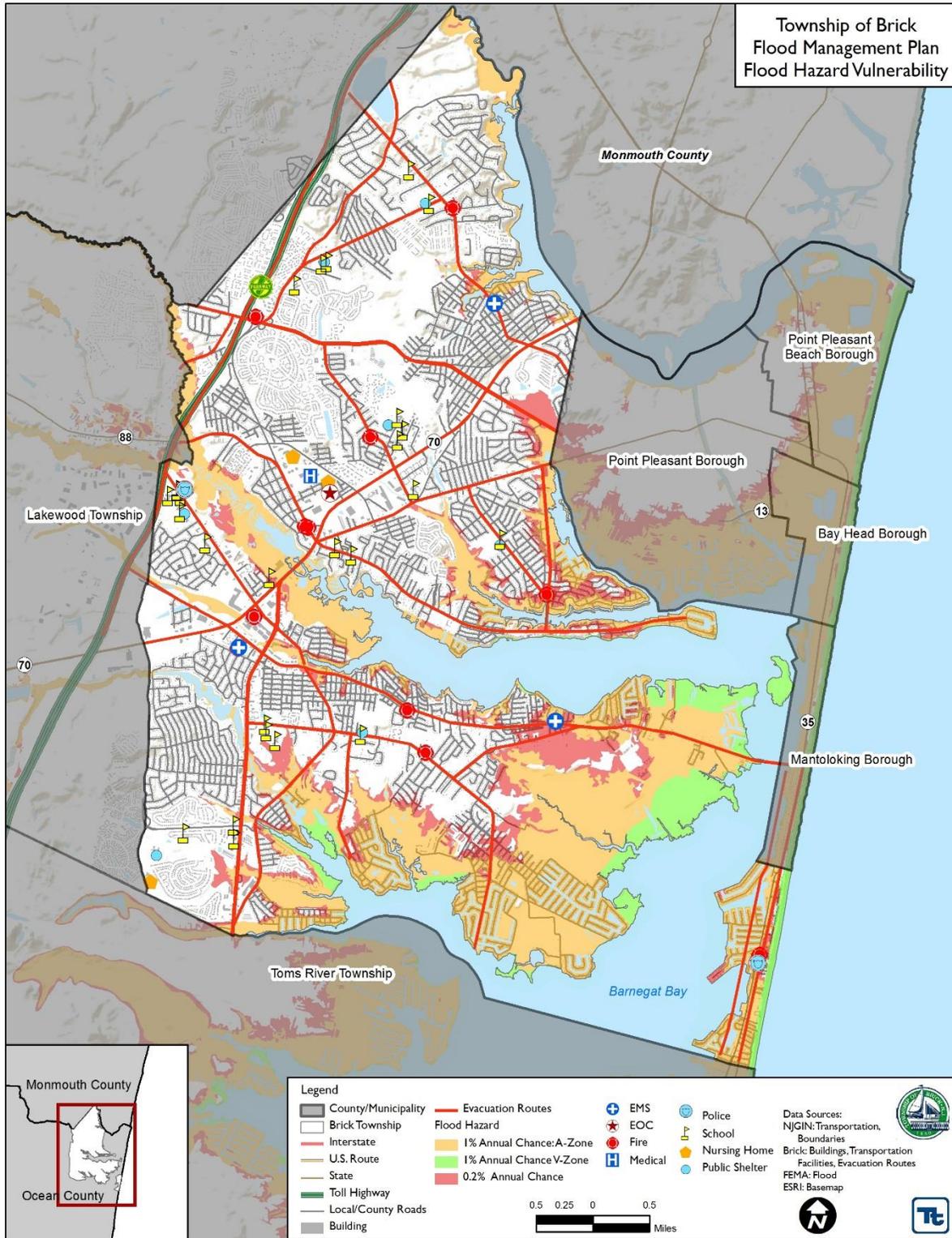




Figure 22. FEMA Flood Hazard Vulnerability to the Township of Brick

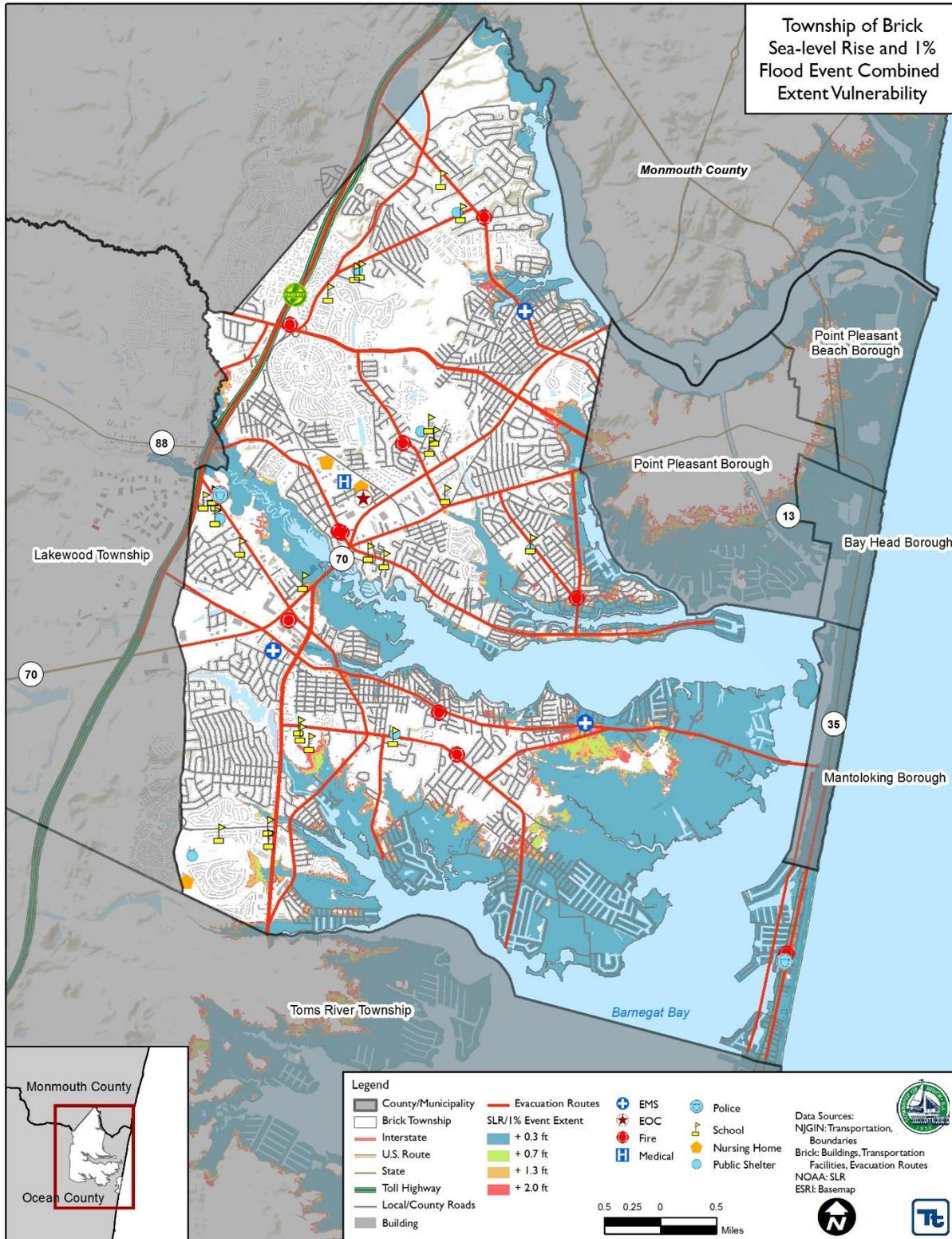


Source: FEMA 2015, Brick Township, NJGIN 2015





Figure 23. Sea-Level Rise Scenario Vulnerability to the Township of Brick



Source: NOAA, Brick Township, NJGIN 2015





Total Area Located in the Hazard Areas

A spatial analysis was conducted to calculate the total area located in the hazard areas. The results are presented in the table below. The total area of the Township of Brick is approximately 16,753.6 acres.

Table 5-9. Total Land Area in the Flood Hazard Areas (Acres)

Hazard	Area (acres)	% of Total
1-percent Annual Chance Flood Event	4,861.2	29.0%
0.2% Annual Chance Flood Event	5,956.1	35.6%
SLOSH Category 1	3,313.3	19.9%
SLOSH Category 2	6,030.5	36.0%
SLOSH Category 3	8,743.1	52.2%
SLOSH Category 4	10,848.9	64.8%
2050 Intermediate-High Scenario Sea-Level Rise	5,220.3	31.2%
2050 Highest Scenario Sea-Level Rise	5,535.8	33.0%

Source: FEMA 2015, NJOEM 2013, NOAA 2012, NJGIN
Note: % - Percent; Cumulative analysis conducted.

Natural and Beneficial Floodplain Areas

Although typically associated as a hazard area, floodplains also serve beneficial and natural functions (on ecological/environmental, social, and economic levels). Disruption of these natural systems can have long-term consequences on entire regions; however, this potential impact has only recently been noted. Some of the more well-known water-related functions for floodplains include:

- Natural flood and erosion control
 - Provide flood storage and conveyance
 - Reduce flood velocities
 - Reduce flood peaks
 - Reduce sedimentation
- Surface water quality maintenance
 - Filter nutrients and impurities from runoff
 - Process organic wastes
 - Moderate temperatures of water
- Groundwater recharge
 - Promote infiltration and aquifer recharge
 - Reduce frequency and duration of low surface flows (FEMA)

Areas in the floodplain that typically provide these natural functions are wetlands, riparian areas, sensitive areas, and habitats for rare and endangered species. According to NJ DEP 2015 Land-Use Land-Cover data and 2012 NJDEP Landscape Project Data, Brick Township has several floodplain areas that could serve natural and beneficial functions (Landscape Project contains the endangered species data). This information is summarized in Table 5-9.



Table 5-10. Natural and Beneficial Land in Brick Township

Wetlands	Area (acres)	Forest	Area (acres)	Endangered Species	Area (acres)
Atlantic White Cedar Wetlands	13.75	Coniferous Brush/Shrubland	2.34	Special Concern	752.50
Coniferous Scrub/Shrub Wetlands	9.36	Coniferous Forest (>50% Crown Closure)	65.94	State Endangered	85.71
Coniferous Wooded Wetlands	211.31	Coniferous Forest (10-50% Crown Closure)	35.13	State Threatened	1,859.84
Deciduous Scrub/Shrub Wetlands	42.96	Deciduous Brush/Shrubland	7.74		
Deciduous Wooded Wetlands	241.59	Deciduous Forest (>50% Crown Closure)	4.54		
Disturbed Tidal Wetlands	1.00	Deciduous Forest (10-50% Crown Closure)	8.67		
Disturbed Wetlands (Modified)	4.31	Mixed Deciduous/Coniferous Brush/Shrubland	16.07		
Herbaceous Wetlands	11.41	Mixed Forest (>50% Coniferous With >50% Crown Closure)	33.45		
Managed Wetland In Built-Up Maintained Rec Area	5.76	Mixed Forest (>50% Coniferous With 10-50% Crown Closure)	4.97		
Managed Wetland In Maintained Lawn Greenspace	0.00	Mixed Forest (>50% Deciduous With >50% Crown Closure)	11.71		
Mixed Scrub/Shrub Wetlands (Coniferous Dom.)	44.34	Mixed Forest (>50% Deciduous With 10-50% Crown Closure)	2.45		
Mixed Scrub/Shrub Wetlands (Deciduous Dom.)	106.87	Old Field (< 25% Brush Covered)	14.17		
Mixed Wooded Wetlands (Coniferous Dom.)	392.57				
Mixed Wooded Wetlands (Deciduous Dom.)	214.17				
Phragmites Dominate Coastal Wetlands	216.38				
Phragmites Dominate Interior Wetlands	47.76				
Phragmites Dominate Urban Area	0.15				



Wetlands	Area (acres)	Forest	Area (acres)	Endangered Species	Area (acres)
Saline Marsh (High Marsh)	113.74				
Saline Marsh (Low Marsh)	688.81				
Vegetated Dune Communities	4.24				
Wetland Rights-Of-Way	1.57				

Source: NJDEP 2015; NJDEP 2012

Note: An additional 792.68 acres of land didn't have a joinable ID number. This could be a miscellaneous potential habitat for endangered species. Endangered species listed for Brick Township include but are not limited to the bald eagle, barred owl, black-crowned night-heron, bog turtle, Caspian tern, Cooper's hawk, great blue heron, northern harrier, northern pine snake, osprey, and snowy egret.

Warning and Evacuation

The Township has developed a Flood Warning and response plan to assist the community in ensuring timely identification of impending flood threats and disseminating warnings to appropriate floodplain occupants in addition to coordinating flood response activities to reduce the threat to life and property. Further information may be obtained from the Township Office of Emergency Management.

Impact on Life, Health and Safety

The impact of the hydrologic hazards on life, health, and safety is dependent upon several factors including the severity of the event and whether or not adequate warning time is provided to residents. Exposure represents the population living in or near the hazard areas that could be impacted should an event occur. Additionally, exposure should not be limited to only those who reside in a defined hazard zone, but everyone who may be affected by the cascading impacts of a hazard event (e.g., people are at risk while traveling in flooded areas, or their access to emergency services is compromised during an event).

Cascading impacts may also include exposure to pathogens such as mold. As a result of repetitive flooding, mold has the potential to develop endangering the health of residents, especially those with already compromised immune systems (e.g., people with HIV infection, cancer patients receiving chemotherapy, and individuals who have received an organ transplant) along with other vulnerable populations, including infants, children, the elderly, and pregnant women. The degree of that impact will vary and is not strictly measurable. Molds can grow in as short a period as 24-48 hours in wet and damp areas of buildings that have not been cleaned after flooding. Very small mold spores can easily be inhaled, creating the potential for allergic reactions, asthma episodes, and other respiratory problems. Buildings should be properly cleaned and dried out to safely prevent mold growth (Centers for Disease Control and Prevention [CDC], 2015).

Molds and mildews are not the only public health risk associated with flooding. Floodwaters can be contaminated by pollutants such as sewage, human and animal feces, pesticides, fertilizers, oil, asbestos, and rusting building materials. Common public health risks associated with flood events also include:

- Unsafe food
- Contaminated drinking and washing water and poor sanitation



- Mosquitos and animals
- Carbon monoxide poisoning
- Secondary hazards associated with re-entering/cleaning flooded structures
- Mental stress and fatigue

Current loss estimation models such as Hazus are not equipped to measure public health impacts. The best level of mitigation for these impacts is to be aware that they can occur, educate the public on prevention, and be prepared to deal with these vulnerabilities in responding to flood events.

To estimate the population exposed to the hazard areas, the 1- and 0.2-percent floodplain boundaries, SLOSH zones, and sea-level rise scenarios were overlaid upon the 2010 Census population data in GIS (U.S. Census 2010). The 2010 Census blocks with their centroid in the hazard areas were used to calculate the estimated population exposed. The total population of the Township of Brick is 75,075 (U.S. Census 2010).

Census blocks do not follow the boundaries of the floodplain, SLOSH, or sea-level rise scenarios and can grossly over or under estimate the population exposed when using the centroid or the intersect of the Census block with these zones. The limitations of these analyses are recognized, and as such the results are only used to provide a general estimate. The calculation of the 0.2-percent annual chance flood event results is cumulative in nature, as the population exposed to the 1-percent flood event will also be exposed to the 0.2-percent annual chance flood event. The SLOSH and sea-level rise analyses for the exposure of population, general building stock, and critical facilities are also cumulative in nature. For example, if a Census block is located within the Category 1 SLOSH zone, it is also located within the Category 2 SLOSH zone. The assumption is that if a Census block is affected by a Category 1 storm it would also be affected by a Category 2 or 3 storm event. For this purposes of this assessment, the population/demographic data presented include only those Census blocks whose geometric centers fall within the identified hazard areas.

Using this approach, it is estimated that 10,565 people are located in the 1-percent annual chance event and 14,543 people are exposed to the 0.2-percent annual chance flood event. It is estimated that 6,230 people are located in the Category 1 SLOSH zone, 17,414 people are located in the Category 2 SLOSH zone, 30,835 people are located in the Category 3 SLOSH zone, and 43,833 people are located in the Category 4 SLOSH zone. There are an estimated 11,470 people who are located in the 2050 Intermediate-High sea-level rise scenario delineated area, and 13,566 people in the 2050 Highest sea-level rise scenario area. Refer to Table 5-11 and 5-12 and Figures 5-23 through 5-25 for the results by hazard.

Table 5-11. Estimated U.S. Census 2010 Population Exposure to All Hazard Areas

Hazard	Total Number Exposed	% of Total
1-percent Annual Chance Flood Event	10,565	14.1%
0.2% Annual Chance Flood Event	14,543	19.4%
SLOSH Category 1	6,230	8.3%
SLOSH Category 2	17,414	23.2%
SLOSH Category 3	30,835	41.1%
SLOSH Category 4	43,833	58.4%
2050 Intermediate-High Scenario Sea-Level Rise	11,470	15.3%
2050 Highest Scenario Sea-Level Rise	13,566	18.1%

Source: FEMA 2015, NJOEM 2013, NOAA 2012, US Census 2010



Note: % - Percent

Table 5-12. Estimated Population Over 65 and Low-Income Population Exposure to All Hazard Areas

Hazard	Total Elderly Population	Total Number Exposed	% of Total	Total Low-Income Population	Total Number Exposed	% of Total
1-percent Annual Chance Flood Event	13,468	1,958	14.5%	3,360	332	9.9%
0.2% Annual Chance Flood Event	13,468	2,429	18.0%	3,360	435	12.9%
SLOSH Category 1	13,468	1,186	8.8%	3,360	188	5.6%
SLOSH Category 2	13,468	2,830	21.0%	3,360	530	15.8%
SLOSH Category 3	13,468	5,043	37.4%	3,360	1,104	32.9%
SLOSH Category 4	13,468	7,133	53.0%	3,360	1,724	51.3%
2050 Intermediate-High Scenario Sea-Level Rise	13,468	1,918	14.2%	3,360	335	10.0%
2050 Highest Scenario Sea-Level Rise	13,468	2,143	15.9%	3,360	392	11.7%

Source: FEMA 2015, NJOEM 2013, NOAA 2012, US Census 2010

Note: % - Percent



Figure 24. Estimated Population Exposure to Flood Hazard Areas

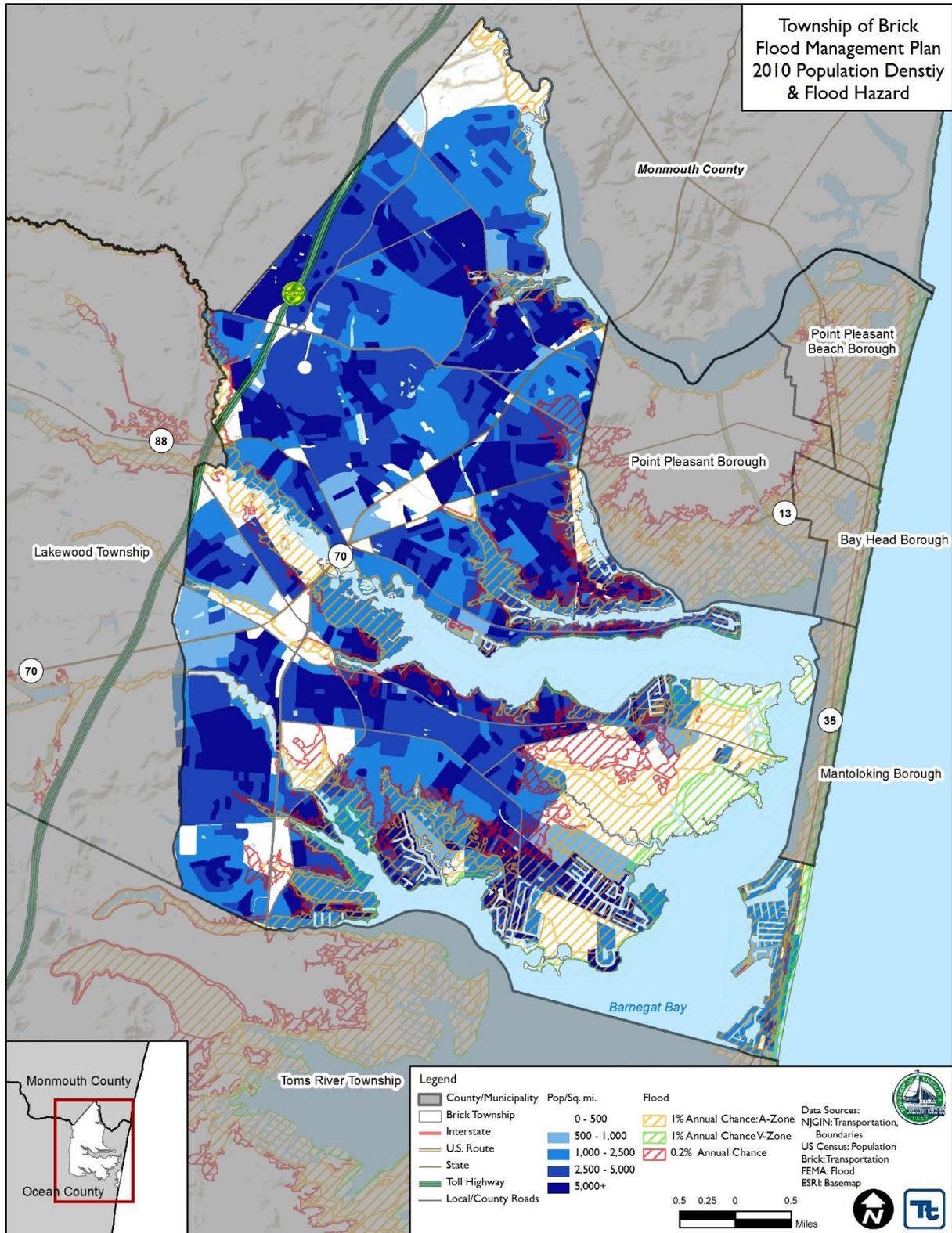




Figure 25. Estimated Population Exposure to SLOSH Hazard Areas

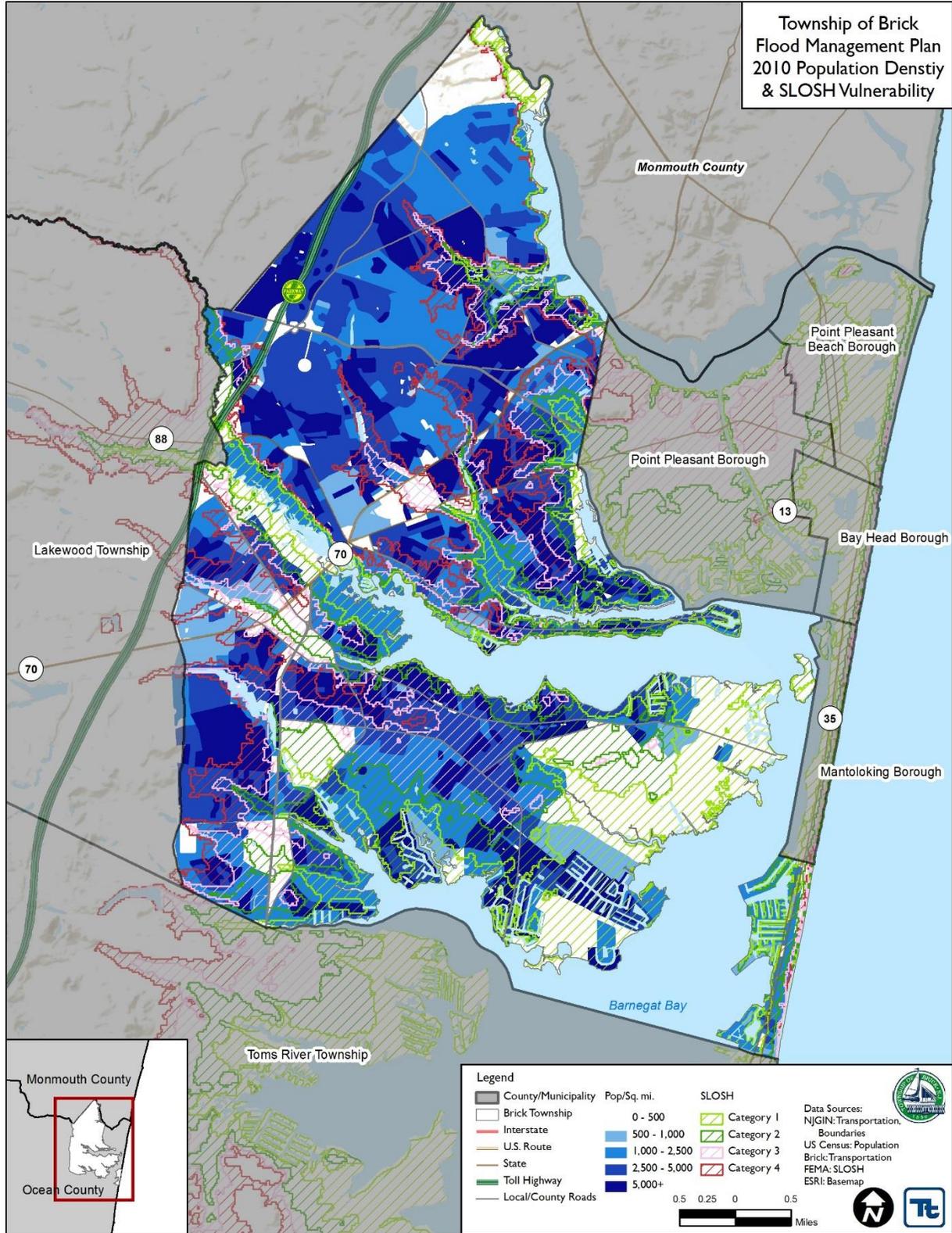




Figure 26. Estimated Population Exposure to Sea-Level Rise Hazard Areas

