



BUILDING ECOLOGICAL SOLUTIONS TO COASTAL COMMUNITY HAZARDS (BESCCH)

Coastal Vulnerability Assessment: Upper Township, NJ December 2017

Prepared by the Environmental Analysis and Communications Group, Rutgers University,
for the Township of Upper

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I. Introduction

This project was funded by the National Fish and Wildlife Foundation in support of the New Jersey Department of Environmental Protection, Coastal Zone Management Program.

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. By assessing vulnerabilities, communities can plan for future exposures and develop strategies for mitigating long-term risk; making communities more resilient.

This report assesses community vulnerability to sea level rise projected for the year 2050 along with a category 1 coastal storm surge.

The sea level rise projection data used is taken from the publication *A geological perspective on sea-level rise and its impacts along the U.S. mid-Atlantic coast* (Miller et al, 2013). This publication calls for a central projection of 1.5 feet of sea level rise along the shore in 2050.

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 Background

According to the Cape May County Strategic Recovery Planning Report, the permanent population of Upper Township is 12,373, with a summer population of 45,940. A total of 14% of the permanent population is age 65 or older and 4% of the permanent population is below poverty level.¹

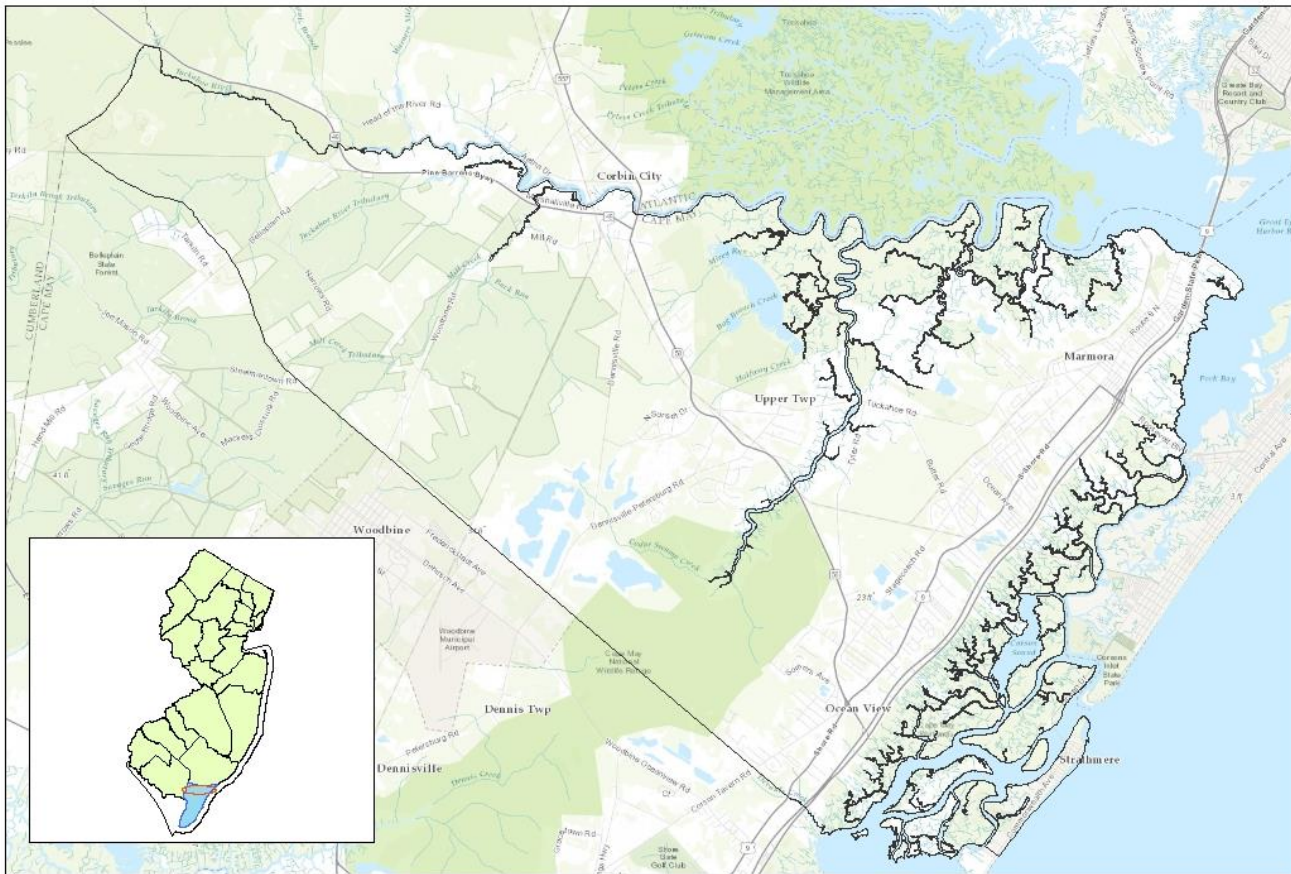
Made up of 10 small villages or towns (Beesleys Point, Marmora, Palermo, Seaville, Tuckahoe, Greenfield, Marshallville, Steelmantown, Petersburg and Strathmere), Upper Township sits along the Atlantic Ocean and its shores also sit alongside the Great Egg Harbor Bay, Corson Sound, Strathmere Bay, and Ludlam Bay.

Of the 16 municipalities in Cape May, Upper Township's 62.146 square miles of land area makes it the second largest Cape May County municipality by land area and the third largest by population.

¹ Cape May Strategic Recovery Planning Report, 2016. Page 8

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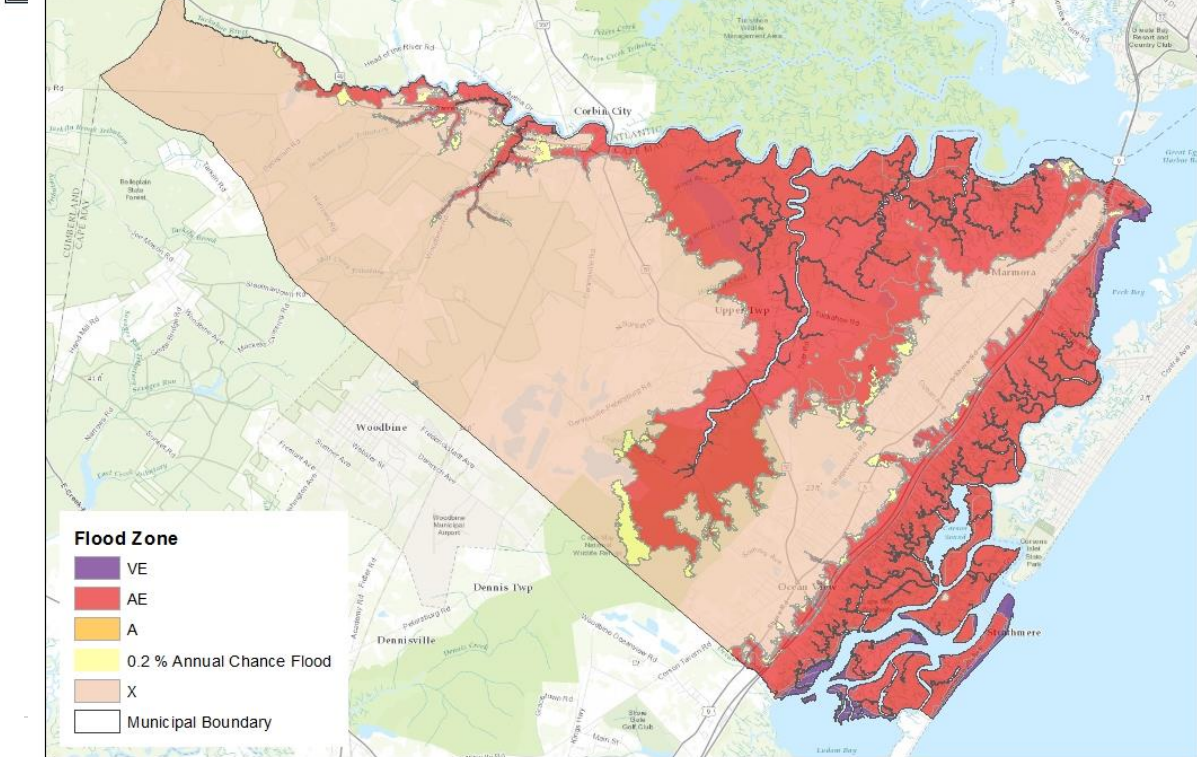
Map 1: Upper Township – Cape May County, NJ



RUTGERS
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of Planning and Public Policy

0 1.5 3 Miles

**Upper Township
Cape May County, NJ**
Project: Upper Township CVA
2/22/16



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0 1.5 3 Miles

FEMA Prelim Firm (1/30/15)
Project: Upper Township CVA
Date: 12/22/16

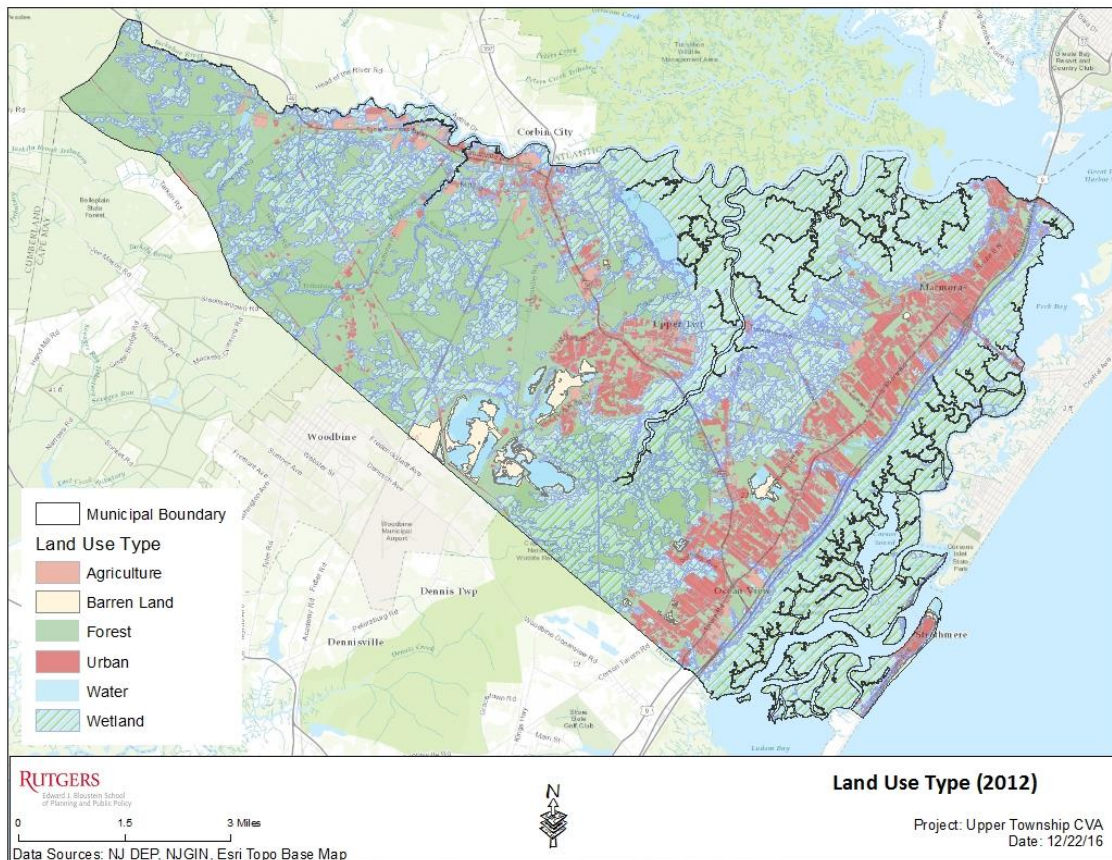
Data Sources: NJ DEP, NJGIN, Esri Topo Base Map

Map 2: FEMA Preliminary FIRM Data

FEMA has designated land in Upper Township's alongside the bays and Ocean as VE, meaning Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with

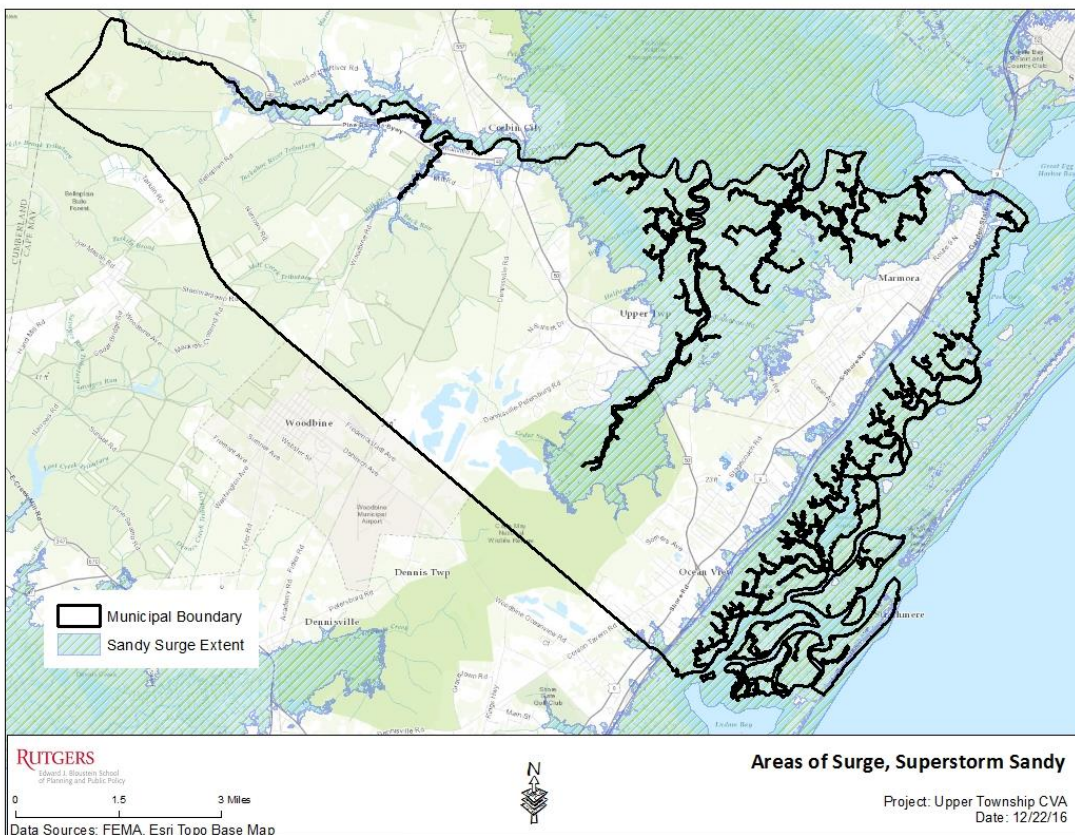
storm waves. These areas have a 26% chance of flooding over the life of a 30 - year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones. The area of most concern in Upper Township in the VE Zone is the Strathmere neighborhood. Connected to mainland Upper Township by the Bascule Bridge over the Strathmere Bay, Strathmere contains residences both on the bay-side and the ocean, bay and ocean beaches, and commercial sites.

Map 3: Land Use



The vast majority of the developed land in Upper Township, denoted in the map above as “urban”, is located along the Route 9 corridor, west of the Garden State Parkway, and is within in the X Zone, or area of minimal flood hazard.

Map 4: Storm Surge: Superstorm Sandy



It is important to note that the extent of storm surge from Superstorm Sandy is very similar to the inundation extent projected for sea level rise 2050 and a category 1 storm (as seen on following map).

III. CVA Methodology

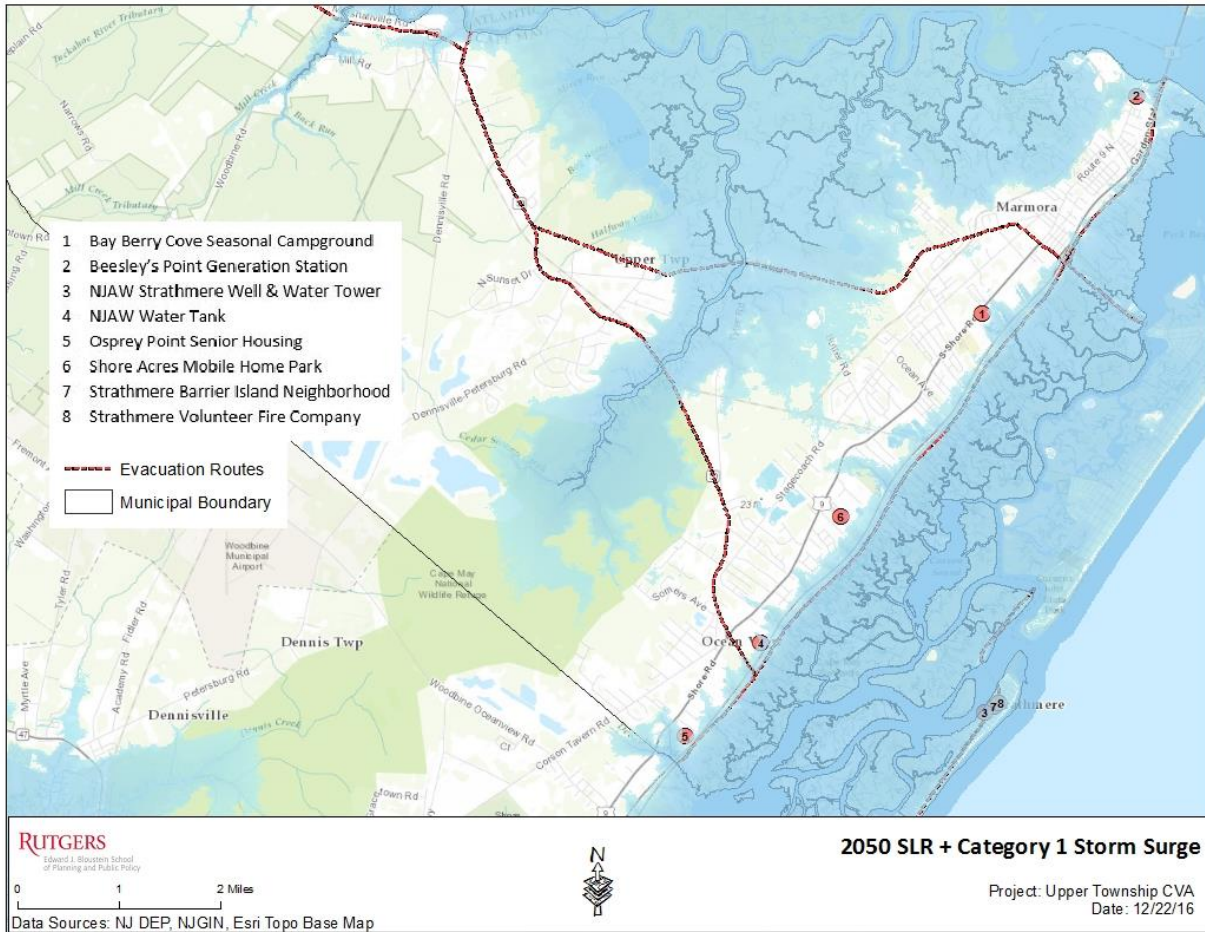
Staff at Rutgers University identified draft assets and created draft mapping in preparation of the CVA meeting with municipal officials. The CVA meeting was held on November 30th at town hall. Municipal personnel in attendance to assist in identifying critical assets and finalizing mapping were Paul Dietrich, P.E., Municipal Engineer, and Scott Morgan, OEM Coordinator.

When a CVA is completed, community assets from four general areas are indexed, these areas include:

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- Community Resources
- Critical Infrastructure and Facilities
- Natural Resources
- Vulnerable Sites and Populations.

After deliberation, Upper Township’s final list of assets consisted of the eight locations and five evacuation routes mapped below.



Map 6:
Vulnerable Assets
with Sea Level
Rise for 2050 and
Category 1 Storm
Surge

After identifying the assets, depth projections were mapped and listed using 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.

Table 1: Vulnerable Assets and Depth Projections

Asset Number	Asset Name	Depth Projection
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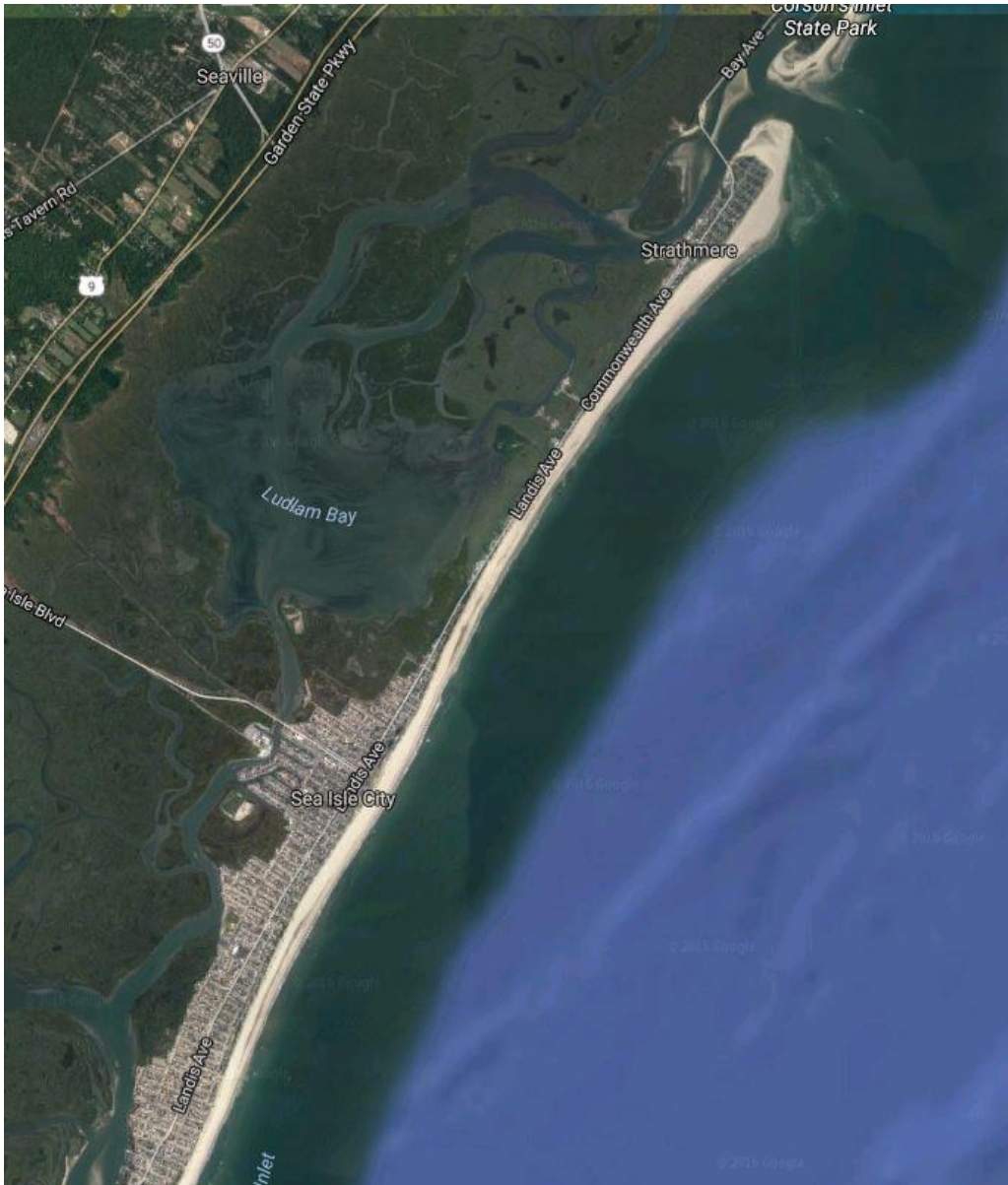
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1	Bay Berry Cove Seasonal Campground	No inundation close to Route 9, parkway side 1-10ft, 2-7ft northeast side
2	Beesley's Point Generation Station	0-1ft at south access roads, 1-7ft throughout developed site with depths deeper closest to water and northeast portion of site
3	NJAW Strathemere Well & Water Tower	5-6ft
4	NJAW Water Tank	0-1ft
5	Osprey Point Senior Housing	0-2ft
6	Shore Acres Mobile Home Park	0-4ft, only in southern most portion of site, increased depth closer to parkway
7	Strathemere Barrier Island Neighborhood	2-7ft, with depths deeper on bayside
8	Strathemere Volunteer Fire Company	4-5ft
	Route 49	1-3ft between Route 50 and railroad tracks, again at water east of Woodbine Rd, and 0-2ft at Tuckahoe Rd Tributary
	Route 50	0-7ft where it crosses water
	Route 619	4-7ft throughout
	Route 623	2-6 throughout
	Route 631	1-5ft where it crosses water
	Route GSP	0-7ft throughout (2-3ft at intersection with route 623, 2-4ft at intersection with Route 50)

Findings and Recommendations

Evacuation Routes

Upon discussion with municipal officials, the asset that took priority is the multiple evacuation routes located throughout the township. These routes are crucial in evacuating residents from the Strathmere Barrier Island Neighborhood as well as residential areas between Route 9 and the Garden State Parkway.



Graphic 1: Google Map Screenshot: Strathmere Barrier Island Neighborhood (north) and Sea Isle City (south)

Neighborhoo as well as residential areas between Route 9 and the Garden State Parkway. Aside from the Garden State Parkway (which also experiences flooding at Route 623), these county routes are the main routes inland and away from the areas of coastal flooding in the Township.

Recommendations from the Middlesex County Hazard Mitigation Plan that are in line with the findings and recommendation above

Related roadway mitigation initiatives that were in the 2016 County HMP Update are listed below along with their status. *Note: This does not include recently completed projects and only includes projects where the NFWF project technical team can offer expertise.*

Route 619

- Elevate sections of 619 as needed (in progress)
- Install permanent protection

to CR-619, from the Whale Beach area in Sea Isle City to the Strathmere section of Upper Township, to replace the existing GeoTube installed in the late 1990s. The GeoTube is beyond its design life. – (in progress but no change in update)

- Upgrade existing revetment wall (needs to be extended to the south and existing sections upgraded) and provide additional road protection to CR-619 in Strathmere to Ocean City, and elevate sections of road as needed. – in progress but no change in update
- Install shore protection along Ocean Drive (CR619) at Corsons Inlet in Upper Township and Ocean City (county lead)

Projects critical to the Strathmere Barrier Island Neighborhood are dependent upon Route 619, the County road which serves as the main thoroughfare in and out of the neighborhood onto mainland Upper Township. Inundation mapping showed areas of flooding throughout the length of the roadway, with depths ranging from 4-7 feet. Needed resilience projects would need to be coordinated with Cape May County and should also include Sea Isle City, the barrier island municipality to the south that is also dependent upon Route 619 for evacuating residents.

Graphic 2: Screenshot: Restoration Explorer data for the southern end of the Strathmere Barrier Island



Future work can focus on the best material to use to replace the existing GeoTube, as well as where to locate the project to best protect the Strathmere neighborhood and the residences in Sea Isle City.

The nature Conservancy’s Restoration Explorer, for example, notes that the beach and bayside of Strathmere is conducive to living shorelines, breakwaters, marsh sill, and ecologically enhanced revetments.

Bayview Drive

- *Finish reconstruction of portions of Bayview Dr. with drainage improvements*
- *Strathmere (need future HMG funding to complete)*

Bayview Dr. runs along the Whale Creek

Strathmere Bay and, for those residents living on this road, is the main means of evacuation onto the Bay Ave bridge and onto mainland Upper Township.

Living shoreline projects could be investigated for either end of this roadway.

Route 623 (Roosevelt Boulevard)

- *Intersection of Roosevelt Boulevard (CR-623) and the Garden State Parkway (Upper Township) – Roosevelt Boulevard Elevate roadway and ramps, which will first require elevation of the Parkway bridge overpass. – in progress but no change in update, County designing drainage improvement*
- *Elevate Roosevelt Boulevard (CR-623) from the Parkway into Ocean City proper. (no progress)*

Route 623 is 1 of 3 highways in and out of Ocean City, and therefore critical to the evacuation of Ocean City. When leaving Ocean City traveling into Upper Township, Route 623 crosses under the Garden State Parkway and into the Marmora section of the township. In this area, both residential and commercial sites, including a large grocery store, are present. Inundation depths on this roadway are projected to range from 2-6 feet in the future.

Municipal officials stated that in order to properly mitigate flood issues in this area, the Garden State Parkway ramp would need to be elevated. Proper plantings and green infrastructure opportunities could be identified at this site in the event that the parkway ramp is raised and construction is done on Route 523.

Route 50

- *Work with the State DOT to address vulnerabilities on SR-50 along Cedar Swamp Creek. (no change)*

Route 50 is critical to the evacuation of residents in the Seaville section of the Township. It is also a main route for residents of Petersburg to reach retail and amenities on the Route 9 corridor. There are flooding issues where the highway crosses over the Cedar Swamp Creek, which can impede evacuation efforts from the Seaville area. The future projected inundation depth in this area is anywhere from 0-7 feet. Similar to the area of the future parkway construction, proper plantings and green infrastructure techniques could be identified for use at this site.

Route 650 and 671

- *Develop an engineering solution for severe flooding problems along CR-650 and Hope Corson Road (CR-671). County has design work on this project, except for drainage issues at western end of Route 50. (Spring 2016 completion?)*

While not a long roadway, Route 671 is a predominately residential road with access to Route 9 to the east and Route 50 to the west. Green/gray infrastructure techniques should be identified for use at this site that would focus on stormwater management for a low - medium density residential area.

Other recommendations from the Cape May County Hazard Mitigation Plan are listed below along with comments from the CAV process:

- *Purchase or relocate residents as part of the Blue Acres Program*

During the CVA process it was stated that there is no interest by homeowners in participating in buyout programs. Municipal officials had reached out to residences in Strathmere but there was no response.

- *Continue participation in beach replenishment projects*

Multiple beach replenishment projects have taken place in recent years. The Strathmere and Whale Beach portion of a federal beach replenishment project was completed on July 19, 2015. Beaches in Upper Township, Sea Isle City and southern Ocean City participated in an additional beach fill project to replenish sand depleted from Winter Storm Jonas in January 2016.

- *Have developed a local bulkhead ordinance but need to Conduct bulkhead study to determine substandard (lower than 7.5') or missing bulkheads as well as implement projects to install/improve – no progress, need funding and later, permitting from NJDEP*

The 2014 zoning revisions require bulkheads to be built when there is new construction or substantial improvements to homes on the ocean and bay. Bulkheads are required along the Strathmere Bay, Great Egg Harbor, the Tuckahoe River and the ocean. On the Strathmere Bay, bulkheads must have a minimum elevation of 7 feet (NAVD88). Along the Great Egg Harbor, minimum elevation is 10 feet; along the Tuckahoe River requirements are either 9 feet or 1 foot above the existing bank along the spring high tide line. Oceanfront bulkheads are required along the Atlantic Ocean and extending Corson's Inlet to the Corson's Inlet Bridge at a minimum elevation of 11 feet.

National Flood Insurance Program (NFIP) and Community Rating System (CRS)

Upper Townships participates in the National Flood Insurance Program (NFIP), with 519 policies in force, and had a Community Ratings System (CRS) Class 6 rating, meaning that there is a 20% discount for policy holders in the special flood hazard area (SFHA) and a 10% discount for policy holders outside of the SFHA. There are 17 Repetitive Loss Properties and 2 Severe Repetitive Loss Properties located in the Township.

There are CRS points available for special structural and nonstructural efforts to solve existing flooding problems related to coastal erosion. This can include implementing coastal erosion, dune, and beach regulations in areas such as the Strathmere neighborhood. Wetland protection measures as well as open space preservation can also garner CRS points.