Township of Toms River
"Getting to Resilience"
Recommendations Report

Prepared by the Jacques Cousteau National Estuarine Research Reserve

June 2015

Recommendations based on the "Getting to Resilience" community evaluation process.

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Introduction

The Getting to Resilience (GTR) questionnaire was originally developed and piloted by the New Jersey Department of Environmental Protection's Office of Coastal Management in an effort to foster municipal resiliency in the face of flooding, coastal storms, and sea level rise. The questionnaire was designed to be used by municipalities to assist reduce vulnerability and increase preparedness by linking planning, mitigation, and adaptation. Originally developed by the State of New Jersey's Coastal Management Program, the Getting to Resilience process was later adapted by the Coastal Training Program of the Jacques Cousteau National Estuarine Research Reserve (JC NERR), converted into a digital format, and placed on an interactive website. Further improving the questionnaire, the JC NERR added linkages to evaluation questions including the National Flood Insurance Program's (NFIP) Community Rating System (CRS), Hazard Mitigation Planning, and Sustainable Jersey. While this website is publicly available, through the facilitated Getting to Resilience process, JC NERR Coastal Community Resilience Specialists enhance the outcomes of the evaluation by providing community-specific recommendations, guided discussions with municipal representatives, a vulnerability analysis, and municipal plan reviews.

The Getting to Resilience process in the Toms River began after the municipality received a Municipal Public Access Grant from the New Jersey Department of Environmental Protection (DEP). The goal of the grant program is to help municipalities develop plans that improve the public's enjoyment of New Jersey's beaches, bays, and tidal waterways and to make public access points and related facilities more storm-resilient. As part of the grant contract Toms River worked with the Jacques Cousteau National Estuarine Research Reserve to go through the Getting to Resilience Questionnaire. JC NERR staff met with municipal leaders for a discussion of their resilience strengths and challenges. Toms River is located in Ocean County, New Jersey. The Township encompasses a wide variety of low lying areas that may be at risk for flooding. These include two noncontiguous sections of the Barnegat Bay Island, numerous creeks and streams, bays, sections of the Toms River, wetlands, swamps, numerous man-made lagoonal communities, and several bay islands in Barnegat Bay. This large amount of shoreline area and development increases since the 1980's in Toms River has resulted in between 12-13,000 homes in the floodplain. Of that number, 9,800 have flood insurance policies. Toms River sustained heavy damage during Superstorm Sandy and many consider the Ortley Beach section of the barrier island to be the most severely damaged oceanfront community in the State. The oceanfront area is awaiting scheduled beach replenishment to rebuild the heavily eroded beaches and create an engineered dune system. Storm surge (up to 8 feet NAVD88) impacted the bayfront communities.

Toms River has found that Increased Cost of Compliance (ICC) funding is not significant enough for homeowners to mitigate their residences. Officials stressed that funding to deal with coastal resiliency needs to be proactive rather than reactive to events in order to be successful. It was noted that there are between 3,000-4,000 secondary homes in Toms River. numbering. Most of these homeowners did not qualify for some of the funding opportunities available to primary homeowners, creating an

imbalance in recovery. However, there were many donations of goods and services provided by groups such as the Robin Hood Foundation, Hometown Heroes, and others. Toms River even hired a coordinator to help match residents with non-profit groups after the storm. Even with assistance from nonprofits, the rebuilding process has been slow. In some cases, properties have not been touched since the storm, resulting in aesthetic issues for neighbors. Toms River does have a property maintenance code but only enforces it based upon complaints.

Officials expressed concern over the auditing process FEMA will undertake to examine compensation for municipal response during and following Sandy, noting the lack of firm or even conflicting guidance in terms of paperwork from FEMA during the disaster. In addition, Toms River has had issues with the FEMA remapping process, largely stemming from the release of the Advisory Base Flood Elevation maps (ABFE) - specifically base flood elevations and V zone boundaries.

Since Sandy, water lines, gas lines, electric lines, and fire hydrants have been replaced in the hardest hit barrier island communities. Municipal structures have been lifted or outfitted to better withstand storms. Route 35 is still in the process of being rebuilt by the Department of Transportation. Toms River is interested in elevating low lying streets and has included projects in the County's All Hazard Mitigation Plan. However, funding for these projects is still necessary. While Toms River has received state funding for Planning Grants, funding for implementation is lacking. Toms River plans to create a municipal specific Hazard Mitigation Plan and continues to make improvements to emergency response for disasters including updating evacuation planning. Officials noted there were difficulties working with neighboring municipalities during and after the storm. In order to access the barrier island, towns needed to pass through Toms River after the storm. This exemplifies the need for regional collaboration for emergency response and resiliency efforts.

At this time, the Township is not interested in buyout programs, partially due to concerns about increased property taxes elsewhere in the Township. After the storm, Toms River was proactive with tax assessments. While officials found this process necessary, they noted there were negative results. There was a large tax reduction in impacted areas. This resulted in higher property taxes outside of damaged areas. In addition, since property taxes were greatly reduced in areas with high damage, officials felt homeowners had less impetus to quickly rebuild their homes, thereby slowing the overall Township recovery.

Methodology

Toms River Township received a Municipal Public Access Grant from the New Jersey Department of Environmental Protection (DEP). As Toms River works on their Municipal Public Access Plan the DEP will work one-on-one with the Township. The GTR process is included in these efforts. The GTR questionnaire is broken into five sections: Risk and Vulnerability Assessments, Public Engagement, Planning Integration, Disaster Preparedness and Recovery, and Hazard Mitigation Implementation. In order to efficiently answer all of the questions within the questionnaire, participation from a wide array of municipal officials and staff is encouraged. These can include administrators, floodplain managers,

emergency managers, stormwater managers, public works officials, town engineers, and appointed and elected officials. For Toms River this team included Jay Lynch (Planner), Erika Stahl (Assistant Planner), Brendan Weiner (Engineer/GIS), Robert Chankalian (Township Engineer), Wendy Birkhead (Assistant Township Engineer), Louis Amoruso (DPW/Administrator), Paul Daley (OEM Coordinator), and Tom Rodgers (OEM Assistant Coordinator). The questions in the GTR questionnaire were answered collectively by this group with JC NERR staff recording answers and taking notes on the discussions connected to each question.

The Getting to Resilience questionnaire was started with the Township on January 16, 2015. JC NERR staff met with six representatives of Toms River and one representative of the New Jersey Department of Environmental Protection (NJ DEP). A discussion of the Township's resilience strengths and challenges began the meeting and current and future coastal hazard risk and vulnerability mapping was reviewed. Sections one, two, and three of the questionnaire were completed. On January 23rd, the questionnaire was completed with three representatives of Toms River meeting with JC NERR staff.

Upon completion of the GTR questionnaire, JC NERR staff analyzed the answers provided by the Township staff, linkages provided by the GTR website, notes taken during the discussion of questions, various municipal plans and ordinances, and mapping of risks, hazards, and vulnerabilities provided by Rutgers University and the NJ Floodmapper website. After reviewing all of this information, this recommendations report was drafted by JC NERR staff to help assist the Township of Toms River's decision makers as the Township works to become more resilient.

Recommendations

The Community Rating System (CRS) is a FEMA program, designed to reward communities for taking steps to reduce flooding risk. These activities and elements include public information, mapping, regulation, flood damage reduction, and warning and response initiatives. Actions under these categories are eligible for points that are added up to designate where the community is "rated" according to class rankings of 10 through 1. For each class the community moves up, they receive a reduction in flood insurance premiums of 5%. This can result in serious deductions for flood insurance costs for the community and it's residents. Many recommendations in this report are connected to the CRS program as it helps communities save money and become better prepared.

OUTREACH

1. Make sure all outreach programs are quantified and catalogued according to CRS standards.

Toms River is already a member of the Community Rating System at a Class 8. However, Toms River should examine the current number of outreach programs it runs and determine what it would take to gain additional CRS points by adding more or expanding current efforts. Outreach should include information about the natural and beneficial functions of floodplains. Particularly after Sandy, residents throughout the impacted area have been looking for as much information as possible. A well organized

and efficient outreach program can provide validated information from a trusted source and better prepare residents for natural risks. Past outreach efforts should be examined and revisited if they were successful.

It would be beneficial to develop a Program for Public Information (PPI) which would help to organize outreach and continue to include the current methods and avenues for outreach. A PPI is a researched, organized, and implemented program for public outreach that is seen as having a seven step process. These steps are Establish a PPI Committee, Assess the Community's Public Information Needs, Formulate Messages, Identify Outreach Projects to Convey the Messages, Examine Other Public Information Initiatives, Prepare a PPI Document, and Implement, Monitor and Evaluate the Program. If done correctly, a PPI will make outreach initiatives more effective and can gain CRS credits in numerous categories besides outreach. Although a PPI is not eligible for credit on it's own, it acts as a multiplier in many CRS sections if the PPI is used to oversee outreach development. For guidance on establishing a PPI, visit http://crsresources.org/files/300/developing_a_ppi_for_credit_under_the_crs_2014.pdf. For more information on Outreach Projects, visit http://crsresources.org/files/300/outreach_projects_for_credit_under_the_crs_2014.pdf. For more information on Outreach Projects credit requirements, visit page 330-2 of the CRS Coordinator's Manual. http://crsresources.org/files/2013-manual/crs_manual_508_ok_5_10_13_bookmarked.pdf

2. Develop a pre-flood plan for public information projects that will be implemented during and after a flood.

Toms River should consider developing a collection of outreach projects in anticipation of future flooding events. The outreach should cover all necessary information such as evacuation routes, safety procedures, and recovery operations. This action could be undertaken through the PPI and would help Toms River save time and energy leading up to, during, and after a flooding event as outreach will already have been prepackaged and prepared for dispersal. Pre-flood planning should take place with careful coordination with the community's emergency manager. Examples of messages include evacuation routes, shelter locations, "Turn Around Don't Drown," when it is safe to go back, don't enter a flooded building until it has been cleared by an inspector, get a permit for repairs, substantial damage rules, mitigation opportunities during repairs, and information on mitigation grants. Pre-flood planning is eligible for CRS credits under Flood Response Preparations. For more information on Flood Response Preparations credit requirements, visit page 330-9 of the CRS Coordinator's Manual . (http://crsresources.org/files/2013-manual/crs_manual_508_ok_5_10_13_bookmarked.pdf)

3. Make the public talks that took place post-Sandy about flood zones, flooding risk, building recommendations, etc into annual meetings.

After Sandy, Township staff have held talks and discussions on various flood related topics. By continuing to discuss the importance of planning for flooding, the Township can set an example to its residents and businesses that readiness for disaster events should be maintained, even in relatively "quiet" times. A PPI can ensure these talks are well placed and effective. Well publicized and attended

talks can reduce the workload on Township staff that would otherwise need to give numerous one on one meetings. Suggested topics could include science behind storm surge, Base Flood Elevations, and elevating buildings to increase resiliency and reduce flood insurance rates. Additionally, these meetings can become an action in the Hazard Mitigation Plan.

A PPI can ensure these talks are well placed and effective. Well publicized and attended talks can reduce the workload on Township staff that would otherwise need to give numerous one on one meetings. However, continuing to have staff available for one on one meetings is highly recommended as it is highly beneficial and earns CRS credits in the Regulations Administration section. For more information on Outreach Projects credit requirements, visit page 330-2 of the CRS Coordinator's Manual. For more information on the Regulations Administration credit requirements, visit page 430-40 of the CRS Coordinator's Manual.
http://crsresources.org/files/2013-manual/crs_manual_508_ok_5_10_13_bookmarked.pdf

4. Create and maintain a Flood Information section of the Township website through the PPI.

The Toms River website should have a flood related information posted under a Flood Information tab. Currently, the website hosts a Hurricane Sandy Information section. This section would be ideal to build from. It would be beneficial to add and maintain information to highlight flooding and coastal hazard risks according to CRS outreach criteria. For CRS credit for a Flood Information section, the section only needs to be easily searchable through the Township website. However, the more prominent the section is, the more likely the information will reach residents. The PPI should be responsible for this section of the website and should update it with care to ensure eligible for CRS credits in the Outreach section. This tab should also highlight a link to the FEMA Region II website, http://www.region2coastal.com/. This website hosts Flood Insurance Rate Maps and a wide variety of other information that can further educate residents. By directing residents to this site, it can help reduce the workload on Township staff that may have been asked to assist the public with simple items like finding a resident's Base Flood Elevation. The Flood Information section could also include pdf versions of CRS approved outreach brochures as well. The Monmouth County Planning Department has collected and received CRS approval for many outreach materials and they can be found on their website: http://co.monmouth.nj.us/page.aspx?Id=4382. For more information on Outreach Projects credit requirements, visit page 330-2 of the CRS Coordinator's Manual.
http://crsresources.org/files/2013-manual/crs_manual_508_ok_5_10_13_bookmarked.pdf

5. Create a coastal hazard disclosure policy.

Disclosure of known flood, erosion, or other coastal hazard risks at the time of property transfer is an important educational effort consistent with No Adverse Impact (NAI) (http://www.floods.org/index.asp?menuID=460) attitude. Some States (such as Florida and California) have disclosure requirements. If a disclosure is required for property in a flood or coastal hazard area, the seller is required to notify potential buyers of the risks and these risks can be factored into the purchase decision. If there is a shore protection structure on coastal property for sale, a disclosure policy could also require that prospective buyers be made aware of the

issues surrounding such structures—their drawbacks, negative impacts, and the need for monitoring and maintenance. This type of policy can help sellers avoid transferring known adverse impacts that become unpleasant surprises to buyers.

During Getting to Resilience meetings, Township staff noted that some lenders and real estate agents disclose information about hazards associated with properties being considered for purchase. To ensure that this process continues and to establish congruence of methodology regarding these disclosures, a hazard disclosure policy could be established. The Township would then be able to dictate what information must be shared with potential buyers and set guidelines for the education of new residents concerning their flooding risk. Disclosing these risks to the public using various techniques also may result in CRS credits in the Outreach Projects and Hazard Disclosure sections. For more information on Outreach Projects credit requirements, visit page 330-2 of the CRS Coordinator's Manual. For more information on Hazard Disclosure credit requirements, visit page 340-2 of the CRS Coordinator's Manual. http://crsresources.org/files/2013-manual/crs_manual_508_ok_5_10_13_bookmarked.pdf

MITIGATION

6. Utilize sea level rise and storm surge mapping to identify possible roadways at risk to sea level rise.

Sea level rise and storm surge mapping indicates several roadways that may become impassable during flooding events. Some of these roadways may be adequately raised to avoid flooding but others may not. The Township could identify roadways where flooding is indicated and survey for elevation of the road. This information could be used merely for identification of flooding hazards, information that could be used in evacuation planning or flood response, or as a catalyst for road raising infrastructure upgrades.

7. Submit the completed repetitive loss area analysis for CRS credit.

Repetitive loss properties can be a large burden on towns over time. By creating a mitigation plan for these areas, the Township may identify new strategies to tackle this issue, pinpoint at what point in time in the future that buyouts of these properties may be prudent, and achieve CRS credits in the Repetitive Loss Area Analysis section if CRS approved steps are taken. Furthermore, enacting mitigation for repetitive loss areas opens up a wide variety of CRS credits. Toms River has already completed a repetitive loss area analysis. This should be submitted for CRS credits if it has not been already. The CRS requires separate reports for each specific area of repetitive loss with an additional reporting requirement. This plan can be included in the municipal annex section of the Ocean County Multi-Jurisdictional Hazard Mitigation Plan if those actions result in identifying projects that would reduce the risk of flooding or other hazards within the Township. This will allow for associated mitigation actions to be eligible for future funding. For more information on Repetitive Loss Area Analysis credit requirements, visit page 510-29 of the CRS Coordinator's Manual. http://crsresources.org/files/2013-manual/crs_manual_508_ok_5_10_13_bookmarked.pdf

8. Consider returning any properties acquired through Blue Acres or other buyout or acquisition programs to natural floodplain functions.

As Toms River nears buildout, there are increasingly limited areas of land left that still have natural floodplain functions, mainly restricted to wetlands. Floodplains can absorb runoff and mitigate flooding issues. Returning lands to natural floodplain function can be done utilizing a variety of techniques including wetlands restoration, planting natural vegetation, reducing sediment compaction, and creating a natural profile. Returning acquired land to natural floodplain functions can achieve significant CRS credits in the Natural Functions Open Space (NFOS) section. Funding for mitigation projects like this could be available by applying for a portion of the funding available through the Federal Emergency Management Agency (FEMA) in two recently announced Hazard Mitigation Assistance (HMA) grant programs: Flood Mitigation Assistance (FMA) and Pre-Disaster Mitigation (PDM). For more information on Natural Functions Open Space credit requirements, visit page 420-13 of the CRS Coordinator's Manual. http://crsresources.org/files/2013-manual/crs_manual_508_ok_5_10_13_bookmarked.pdf

9. Consider planning to rezone upland properties to accommodate possible shift of residents away from high risk flood zones.

As Toms River contains many low lying residential communities that could be threatened by sea level rise and coastal storm damages, it would be beneficial to plan to accommodate citizens who wish to leave high risk areas but remain in the Township. This action could also allow the Township to institute buy out programs with less concern over ratable loss if undeveloped areas are targeted for rezoning to accommodate new residential areas. It should be noted that natural areas are beneficial for rainwater absorption and aquifer recharge. The use of the Ciba-Geigy site for brownfield redevelopment once site restoration is complete may present an opportunity for transfer of ratables away from high risk areas to a remediated site. Buyout programs may achieve significant CRS credits through the Acquisition and Relocation. For more information on Acquisition and Relocation credit requirements, visit page 520-2 of the CRS Coordinator's Manual.
http://crsresources.org/files/2013-manual/crs_manual_508_ok_5_10_13_bookmarked.pdf

10. Toms River should continue to identify, map, and keep data on areas of coastal erosion and consider creating erosion protection programs or instituting higher regulations for building in areas subject to coastal erosion.

Erosion can become a problem in coastal areas. Areas that should be closely monitored could include any waterfront that is not bulkheaded and has experienced erosion. Factors that could amplify erosion such as sea level rise and surge should be defined. The Township should make an effort to identify, document, and quantify areas of erosion. Over the last 150 years, the oceanfront, riverfront, and bayfront shoreline positions have undergone various changes. Acquiring erosional rates and shoreline positions can be done through several avenues including the Stockton Coastal Research Center's beach profile data set (http://intraweb.stockton.edu/eyos/page.cfm?siteID=149&pageID=9) and the USGS Coastal Shoreline Change data set (http://marine.usgs.gov/dsasweb/#). A short erosional dataset review is included in the appendix using these two resources. Identifying erosional hot spots and their potential

impacts on homes and infrastructure can allow for mitigation actions that may prevent erosion from becoming a future problem. Additionally, unwanted deposition from shoaling and runoff can also be problematic for stormwater management near outfall pipes and navigation in waterways. Erosional hot spots could then be monitored for change, allowing for more ability to request funding for shoreline restoration projects. This information should be used to supplement a Shoreline Management Plan. It would be beneficial to explore expanding beach profiling already being done by the Stockton Coastal Research Center.

Ongoing monitoring may also present a stronger case for funders when the Township seeks support for shoreline restoration projects. Keeping information on coastal erosion can result in CRS credit in the Erosion Data Maintenance (EDM) section. In addition, this information will be valuable to monitor the success of any mitigation projects instituted to reduce erosion such as a possible breakwater, sand backpass system, or living shoreline projects. Additionally, erosion monitoring can be included in the capabilities section of a hazard mitigation plan. For more information on the Erosion Data Maintenance credit requirements, visit page 27 of Management of Coastal Erosion Hazards.
http://www.fema.gov/media-library-data/20130726-1755-25045-9869/crs_credit_coastal_erosion.pd

11. Make the commitment to maintain the dune system post-replenishment and bolster it with additional plantings.

"Coastal dunes form the first line of protection for the communities behind them (e.g. uplands and wetlands such as interdunal swales and bayside tidal marshes), by reducing the energy of storm waves. Dunes play a vital role in protecting coastal areas from erosion, coastal flooding and storm damage, as well as sheltering properties and ecosystems behind them from wind and sea spray and protecting the tidal wetlands on the bayside of barrier islands. During Hurricane Sandy, communities protected by larger, more well established (vegetated) dunes suffered much less damage than did those lacking this important defense."
("Dune it Right!" http://gcuonline.georgian.edu/wootton_l/why_are_dunes_important.htm)

The Christie administration has made dune systems a priority for storm protection after their ability to mitigate wave damages was displayed during Superstorm Sandy. While much of the New Jersey coastline had some sort of dune system, continuous dunes with a wide base and significant height were most effective at blocking wave action and overwash. The United States Army Corps of Engineers (USACE) is undertaking an expansive beach replenishment project that will include Toms RIver's oceanfront beaches. An engineered dune system will be included in this project as well as dune grass plantings. However, this dune system will require maintenance after the project is complete. Toms River should plan to bolster it's dune system over time by adding additional species of plants. Dune plants create an expansive root system that helps to hold sand in place and build the dune over time. A greater variety of dune plants will not only allow for a stronger dune system but a diverse dune ecosystem and a more aesthetically pleasing beachfront. Building, maintaining, and strengthening dunes with vegetation are mitigation actions that could be included in a hazard mitigation plan.

12. Explore partnering with organizations on living shorelines projects.

A possible solution for wetlands and shoreline migration are living shorelines projects. These projects aim to reestablish natural shorelines to create valuable ecosystems and erosion control features. The lower energy bayfront of Toms River is an ideal location for living shoreline projects and could be a good option for shoreline hardening projects that can sometimes amplify erosional forces. Numerous groups and organizations are searching for municipal partners for such projects and Toms River should remain open to collaboration. Local groups such as the Barnegat Bay Partnership, the Nature Conservancy or Cattus Island County Park would be excellent partners in living shorelines initiatives. Creating living shorelines to mitigate erosion is a mitigation action that could be included in a hazard mitigation plan. NJ DEP's Coastal Management Program has also recently posted an RFP for proposals related to design and construction of ecologically based mitigation strategies.
http://www.nj.gov/dep/grantandloanprograms/

PREPAREDNESS

13. Work with Ocean County and neighboring municipalities to expand sheltering options.

It is vital to have backup plans in the event that the primary county shelters are full, the county is unable to provide the necessary services at those shelters, or routes to those shelters are cut off. Toms River currently has several shelters but officials noted that work can be done to improve on capacity and services. Storm shelters would need to be outside of the floodplain and be built to withstand high winds and other storm hazards. As a large portion of Toms River is classified as a flood zone, these shelters would need to be in placed in areas outside of the reach of potential floodwaters (beyond the limits of the 500 year floodplain where possible). Toms River should be involved in communications with the County and neighboring municipalities to ensure plenty of shelter availability and options during future disaster events. Shelters should have backup power and fuel supplies. Sheltering should include options for special needs, pets, other variables. Sheltering must also take non-natural disaster events into account such as the required Oyster Creek Generating Station evacuation considerations. As Toms River is a connector to the barrier island communities of Seaside Park, Seaside Heights, Lavalette, etc, the Township should anticipate sheltering residents of neighboring communities. Memorandums of agreement may be an effective tool to manage these increased sheltering expectations.

14. Continue to back up all municipal planning documents and other critical materials.

In the event of a disaster, important information and documentation that could be used to guide the Township to recovery needs to be accessible. In order to ensure sustained availability, all municipal planning documents, outreach associated with disaster events, and other critical materials should be backed up at offsite locations or in "cloud" networks.

15. Establish a flood warning system

With the use of mapping information and personal knowledge of flooding events, Toms River has the capability to identify flood prone areas, conditions that result in flooding of those areas, and the severity and reach of flooding during coastal storm events. By combining this information with warning system such as Nixle or reverse 9-1-1, Toms River can target and alert residents in flood zones that flooding is expected in their neighborhood when warnings are released from the National Weather Service or National Hurricane Center. Toms River could also take advantage of the various tide gauges in the area to create an automated system. When the gauge reads predetermined tidal heights, a warning could be triggered in corresponding neighborhoods known to flood during those conditions. A full listing of the United States Geological Survey (USGS) stream and tide guages for the area can be found at http://waterdata.usgs.gov/NJ/nwis/current?type=flow. Such a system could be eligible for credit for Flood Threat Recognition. For more information on Flood Threat Recognition credit requirements, visit page 610-5 of the CRS Coordinator's Manual.
http://crsresources.org/files/2013-manual/crs_manual_508_ok_5_10_13_bookmarked.pdf

16. Maintain efforts to update the special needs database.

While the Township and State have undertaken efforts to identify residents that would need assistance during an evacuation, it is important to revisit these efforts and expand upon them in order to keep the list updated to ensure resident safety. Toms River should continue to refer special needs residents to Register Ready. Once a resident registers they will get email reminders to update their information. Each municipality can receive a login and password to access those who registered in their town. This is usually done by the law enforcement in the town. If Township staff have any questions or issues with the program they can contact Mary Goepfert 609-963-6900 ext. 6074 or lppgoepm@gw.njsp.org. For more information on Register Ready, visit http://www.state.nj.us/njoem/plan/special_needs7.html

17. Work to become designated as a StormReady Community by the National Weather Service.

The National Weather Service has created a community preparedness program to assist towns as they develop plans for a wide variety of severe weather events. This program provides guidance on hazardous weather identification, warning systems, and creating public readiness. This guidance can in turn be used to help inform possible mitigation actions for Hazard Mitigation planning. For more information, visit http://www.stormready.noaa.gov/howto.htm. Becoming a StormReady Community results in CRS credits. For more information on the StormReady Community credit requirements, visit page 610-17 of the CRS Coordinator's Manual.
http://crsresources.org/files/2013-manual/crs_manual_508_ok_5_10_13_bookmarked.pdf

MUNICIPAL ORGANIZATION

18. Transfer personal knowledge, documents, and other records of coastal storm and flooding event damages to digital format and place on a shared Township computer drive to allow for access by multiple municipal departments.

Memories of historical storm events, specifically ones that were not documented by state and federal agencies, are useful tools that can be used to plan for impending storms. However, it is vital that the information from these memories be available for all Township staff. This information can be gathered and documented from current municipal staff, past municipal staff, and public input and may be very useful to identify past surge extents, conditions that caused amplification of storm damages, and vulnerable areas not shown by mapping. Meetings to allow for public input on historic storm damage extents may also earn CRS credits in the Outreach section. Hard copies of documents and other records should also be digitized for preservation and access. Having all storm and flooding related information on a shared drive will help educate the staff and allow for access without having to coordinate an exchange of information. For more information on Outreach Projects credit requirements, visit page 330-2 of the CRS Coordinator's Manual.
http://crsresources.org/files/2013-manual/crs_manual_508_ok_5_10_13_bookmarked.pdf

19. Have Township municipal officials participate in FEMA training courses.

While going through the GTR questionnaire, it was expressed that some Township officials had not taken advantage of FEMA trainings for certification. FEMA offers in person training and independent study programs. To find more information about in person training topics and dates please visit http://training.fema.gov/ and http://www.fema.gov/training-1 and for independant study programs please visit http://training.fema.gov/is/. Through the Coastal Training Program, the JC NERR offers free courses for municipal staff and elected/appointed officials. JC NERR is willing to work with the Township to understand training needs and provide relevant courses when possible. Having municipal officials trained on various topics and techniques can result in CRS credits in the Regulations Administration (RA) section though it may require SID codes. For more information on Regulations Administration credit requirements, visit page 430-40 of the CRS Coordinator's Manual.
http://crsresources.org/files/2013-manual/crs_manual_508_ok_5_10_13_bookmarked.pdf

20. Utilize the Community Vulnerability Assessment Tool, Risk and Vulnerability Assessment Tool, Hazard Assessment Tool, and HAZUS-MH to identify potential hazards, risks, and vulnerabilities and keep mapping information on file.

There are numerous hazard, risk, and vulnerability assessment tools available to municipalities. It is recommended that the members of the municipal staff are familiar with the use of these tools. The importance of identifying hazard, risk, and vulnerability cannot be overstressed. Use of these tools can be beneficial in the CRS, hazard mitigation planning, creating municipal plans, zoning, and writing construction codes.

- The Community Vulnerability Assessment Tool is used to conduct a community vulnerability assessment to a wide range of hazards. It is often used in conjunction with the Risk and Vulnerability Assessment. http://csc.noaa.gov/digitalcoast/training/roadmap
- The Risk and Vulnerability Assessment Tool is used to identify people, property, and resources that are at risk of injury, damage, or loss from hazardous incidents or natural hazards. http://csc.noaa.gov/digitalcoast/training/roadmap

· The Hazard Assessment Tool is a risk assessment process which will help identify hazards, profile hazard events, inventory assets, and estimate losses. http://www.fema.gov/hazard-mitigation-planning-risk-assessment

· HAZUS-MH is a software package that uses models and Geographic Information Systems (GIS) technology for estimating physical, economic, and social impacts from various hazards such as floods and hurricanes. http://www.fema.gov/hazus

· Additional non-regulatory tools are being developed by FEMA and can be accessed on www.region2coastal.com. Included in these tools is a Coastal Flood Risk Assessment which provides estimates of potential flood damage based on the new coastal flood study results using FEMA's Hazus loss estimation software . Draft versions of these tools are currently available by county at http://www.region2coastal.com/community-officials/flood-risk-tools/. For more information about the datasets and product descriptions visit http://www.region2coastal.com/community-officials/flood-risk-tools/tool-descriptions/

21. Formalize emergency management cooperative efforts between neighboring municipalities

An evacuation and subsequent re-entry of the Barnegat Bay Island presents numerous challenges. Residents of Toms River and neighboring municipalities may be required to pass through multiple municipal specific checkpoints in order to reach safety or return home. As sea level rises, the risk of flooding and subsequent evacuation will increase. As many evacuation routes are in danger of flooding, emergency operators need to have coordinated regional plans to ensure safe passage of residents through various municipalities to safety. The breach of Mantaloking during Sandy reinforced this fact as the northern exit from Barnegat Bay Island was impassable for months, resulting in Toms River being the only access point to a portion of Mantaloking, a portion of Brick Township, Lavallette, Seaside Heights, Seaside Park, and a portion of Berkeley Township.

Emergency management officials in the Township and neighboring communities of Mantaloking, Brick Township, Lavallette, Seaside Heights, Seaside Park, and Berkley Township should meet to reflect on the evacuation and re-entry process of Sandy and Irene and formalize collaborative emergency management actions for future events. This meeting could result in a specific regional evacuation and re-entry plan, drawing upon the lessons learned of past events. The formalization of this process is necessary to ensure the experiences and knowledge of current officials is not lost over time. This meeting could also spark future regional emergency operations collaborations in the form of partnered projects, outreach initiatives, drills, or a more formalized regional emergency management protocols to deal with region wide disaster events.

FEMA MAPPING

22. Adopt the latest version of FEMA's flood maps as they are released, consider strengthening elevation requirements in the Flood Hazard Areas Ordinance as based upon the most stringent version of FEMA's flood maps, and consider increasing freeboard requirements.

Toms River recently updated the Flood Hazard Areas Ordinance in March 2013. The Township may want to consider writing new requirements as related to the Best Available Flood Hazard Data, as it should allow for change over time as FEMA's maps are redrawn. While it had been decades since FEMA had remapped the FIRMs in our area, the remapping process can be anticipated to take place with higher frequency in the future. Best Available Flood Hazard Data is defined by NJ DEP as the most recent available flood risk guidance FEMA has provided. The Best Available Flood Hazard Data may be depicted on but not limited to Advisory Flood Hazard Area Maps, Work Maps or Preliminary FIS and FIRM. For more information on NJ DEP recommended Flood Damage Prevention Ordinances, visit http://www.nj.gov/dep/floodcontrol/modelords/modelde-bestavail.doc.

By maintaining the language "or the most stringent version of FEMA's flood maps" to this ordinance, higher standards may be instituted that may result in the town becoming more resilient. For example, the Advisory Base Flood Elevation maps may have a more expansive V-zone or higher base flood elevations than future Flood Insurance Rate Maps. By requiring building to adhere to the stricter requirements of the Advisory Base Flood Elevation maps, more homes will be built to higher standards. The current ordinance already discusses using the Advisory Base Flood Elevation maps if they are more restrictive than the FIRM. An amended ordinance may also include some of the newer information coming out on FEMA's maps including the Limit of Moderate Wave Action (LiMWA). That information can also be used to enhance the building standards in the form of higher freeboard requirements (higher freeboard requirements in areas that are within the LiMWA areas). Both actions can result in a large amount of CRS points in the Higher Regulatory Standards section. It is also recommended that Toms River consider exceeding the state's 1 foot freeboard requirement to provide better protection during storm events and to provide a buffer for expected sea level rise. Each additional foot of freeboard requirement will gain additional points in the Community Rating System, to as high as 500 points. The Freeboard credits are located in the section of Higher Regulatory Standards. For more information on the Higher Regulatory credit requirements, visit 430-2 of the CRS Coordinator's Manual. http://crsresources.org/files/2013-manual/crs_manual_508_ok_5_10_13_bookmarked.pdf

23. Ensure the public is aware of any changes to FEMA's flood maps as they are updated and adopted as well as if those updates result in changes to the Township's building requirements.

Ensuring that the information on the maps is understood by all municipal leaders and staff prior to discussions with the public is critical to ensure the correct information disseminated by the Township. For every release of a map update, the Township could make a public announcement to its citizens and detail if any changes were made to the prior map, including if additional information such as the Limit of Moderate Wave Action has been added. Notifying the public of a new map product is an example of outreach that can be done by the Township's PPI, raising the potential for CRS points. Including information on what changes occur when new maps are released on the Township's Flood Information webpage may help to alleviate questions the public may have as each map is updated, thereby reducing the workload on Township staff.

The new RISK map products from FEMA include a GIS layer depicting the "changes since last FIRM" which will help the Township in describing the changes in flood zones on individual properties and for

the Township as a whole. A description of this data set can be found at: http://www.region2coastal.com/community-officials/flood-risk-tools/tool-descriptions/ and the new data layer is being developed as part of the preliminary FIRM process. This data is in draft form now but will be released at the www.region2coastal.com website soon. The more familiar the citizens and businesses are with the maps, the more likely they will take appropriate actions.

24. Make sure all flood maps are available on the Township website, at Township Hall, and at the local libraries.

Toms River has made Flood Insurance Rate Maps (FIRMs) available in the past but must ensure that these maps are accessible and easy to find. Having the most up to date FEMA issued floodplain maps available at numerous locations in different forms of dispersal is critical to ensuring your citizens are informed and has the added benefit of allowing for CRS credits in the Outreach section. Maintaining the link to FEMA's Region II website on the Township website is highly recommended. Some municipalities have trained librarians to direct and lead residents through the FEMA Region II website. For more information on Outreach Projects credit requirements, visit page 330-2 of the CRS Coordinator's Manual. http://crsresources.org/files/2013-manual/crs_manual_508_ok_5_10_13_bookmarked.pdf

PLANNING

25. Update the Evacuation Plan to include more information.

Evacuation Plans are critical planning documents designed to ensure efficient movement of citizens to safe locations prior to and during disaster events. The current Evacuation Plan can be updated to include more information in order to create a more thorough document. Information that could be added includes what evacuation routes are prone to flooding, the necessary time frame to evacuate areas of residents and tourists, and conditions that would spur lane reversal. Emergency managers are already aware of much of this information, requiring only adding this personal knowledge to the plan update. This plan should be updated with input from the County and neighboring municipalities which rely upon the evacuation routes through the Township.

26. Consider creating a Township specific Continuity of Operations Plan.

A Continuity of Operations Plan (COOP) is separate from an Emergency Operations Plan and ensures that primary essential functions continue to be performed before, during, and after a wide range of emergencies. It is developed and maintained to enable each department, agency, and other governmental entity to continue to function effectively in the event of a threat or occurrence of any disaster or emergency that could potentially disrupt governmental operations and services. A COOP can protect essential facilities, equipment, vital records, and other assets. It can reduce or mitigate disruptions to operations. It can facilitate decision-making during an emergency. Toms River officials noted they are interested in creating a Continuity of Operations Plan. JC NERR is able to provide example COP plans from the Borough of Avalon (http://www.prepareyourcommunitynj.org/media/27952/Avalon_COOP_COG.pdf) and Brick Township.

FEMA also provides a Continuity Plan Template (http://www.fema.gov//media-library/assets/documents/90025) that can be used as a starting point for local governments.

27. Focus on including numerous possible mitigation projects in the upcoming Toms River Township Hazard Mitigation Plan and incorporate those projects into the Capital Improvements Plan.

Ocean County has just completed and approved a Multi-Jurisdictional Hazard Mitigation Plan update that can provide the base for the creation of the planned Township specific Hazard Mitigation Plan. Sandy has shown the need for numerous potential projects but funding is always an issue. By including these "wish list" projects in the Hazard Mitigation Plan, it leaves the door open for grant programs to fund the projects. Toms River submitted eight projects for the Ocean County plan. A specific Township plan can be expanded to further identify risks and vulnerabilities, elaborate on needs, and explore mitigation actions. Adding additional resilience projects could allow for them to be funded through future Hazard Mitigation funding opportunities. Projects that are not listed in the Hazard Mitigation Plan will struggle to find funding sources. A crosswalk of possible mitigation projects should be included in the Capital Improvements Plan which should be updated during the Master Plan rewrite. Toms River could reference FEMA's "Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards" for mitigation project ideas. https://www.fema.gov/media-library/assets/documents/30627. It is also recommended that Toms River view the worksheets completed by other Ocean County towns in the Ocean County plan for more ideas on what to include.
http://www.oceancountyhmp.com/fema-approved-hmp

28. Create a shoreline management plan and consider a dune protection ordinance

The Township has seen erosion take place on oceanfront beaches and bay beaches. While some small groins currently exist to reduce erosion, they have not been effective. As shorelines are dynamic systems, it is important to have a well researched and documented plan that takes into account the forces at play and the desired uses for the beach and neighboring shoreline areas. Cattus Island County Park has dealt with erosional concerns as well and should be included in the planning process. The shoreline management plan should work in conjunction with the Recreation Master Plan to ensure that the shoreline and beach are able to be utilized for many years without being too costly to maintain. Anticipated beach replenishment, dune construction, dune plantings, and possible beach replenishment upkeep should all be taken into consideration.

In order to protect the dune grass on the new dune system to allow for dune strengthening and growth, the Township should also consider a dune protection ordinance. This ordinance could also allow for signs to be posted with possible fines to keep people off of the dunes. Walkovers should also be limited where possible to encourage maximum vegetation coverage. A list and description of projects such as dune plantings, dune fencing, and replenishment upkeep could be included in the shoreline management plan. In turn, these projects could also be included as actions in the hazard mitigation plan.

29. Create an action plan for precipitation flooding events.

Toms River occasionally receives flooding during heavy rain events. This flooding can prompt street closures and emergency response. By drawing upon the knowledge of past events and topographical information, an action plan could be created to identify how much rain it takes to create flooding at vulnerable locations. When heavy rain events are forecast, the Township would be able to preemptively prepare staff and resources to address the anticipated issues. In addition, the development of this action plan could result in the understanding of the cause for flooding, possibly allowing mitigation of causes such as clogged or undersized stormwater pipes. Such mitigation actions could then be included in the All Hazards Mitigation Plan.

30. Toms River should identify long-term inundation caused by sea level rise as a hazard in municipal plans and consider disclosing hazard risks.

Toms River will experience impacts due to sea level rise and like all potential hazard impacts, this risk should be identified in town plans to ensure proper response. Flooding, storm severity, storm frequency, and sea level rise are combined hazards. Historical rates of sea level rise should be defined as part of this action and future predicted sea levels should be taken into account when making land use decisions, construction standards, etc. The historical rate of sea level rise along the New Jersey coast over the past half century was 3-4 mm/yr (or 0.12 -0.16 in/yr), while projected future rates are expected to increase. In the recent paper entitled "A geological perspective on sea-level rise and its impacts along the U.S. mid-Atlantic coast" Miller and Kopp state that for 2050, the "best" estimate for sea level rise is 1.3 feet along the Jersey Shore. By 2100, the "best" estimate for sea level rise is 3.1 feet along the Jersey coast. "Best" refers to a 50% likelihood of that level of sea level rise occurring, meaning that actual sea levels may be lower or higher than the "best" estimates.

While sea level rise is a monumental challenge to coastal areas, the challenge cannot be tackled until it is properly identified. Ocean County has included sea level rise in their All Hazard Mitigation plan, setting the example that should be followed by Toms River as a municipal specific All Hazard Mitigation Plan is written. Once this takes place, other local plans should reflect sea level rise as a hazard as well. This should include the recommended hazard disclosure policy. Disclosing these risks to the public using various techniques also may result in CRS credits in the Outreach Projects and Hazard Disclosure sections. For more information on Outreach Projects credit requirements, visit page 330-2 of the CRS Coordinator's Manual. For more information on Hazard Disclosure credit requirements, visit page 340-2 of the CRS Coordinator's Manual.
http://crsresources.org/files/2013-manual/crs_manual_508_ok_5_10_13_bookmarked.pdf

31. Examine municipal plans, strategies, and ordinances and consider rewriting sections to include the previous recommendations or reflect the risks, hazards, and vulnerabilities explored in the Getting to Resilience process.

In order to fully embrace resiliency, municipal plans, strategies, or ordinances should incorporate resiliency recommendations and findings. These should include the Municipal Master Plan, All Hazards

Mitigation Plan, Floodplain Management Plan, Evacuation Plan, Emergency Response Plan, Continuity of Operations Plan, Disaster Recovery Plan, Post Disaster Redevelopment Plan, Capital Improvements Plan, Economic Development Plan/Strategy, Coastal Plan, Shoreline Restoration Plan, Open Space Plan, Stormwater Management Plan, Historic Preservation Plan, Zoning Ordinance, Flood Damage Prevention Ordinance, and Building Code. If these plans, strategies, or ordinances do not currently exist, it is highly recommended the Township move to create them. Further content regarding this recommendation can be found below in the section titled, "Coastal Hazard Incorporation in Planning". Rewriting certain planning documents such as Floodplain Management Plans, Evacuation Plans, Stormwater Management Plans could involve the creation of actions that in turn should be included in hazard mitigation plans.

32. Begin the long term planning process to prepare for sea level rise.

Toms River, like most other coastal municipalities, will experience impacts from sea level rise in the form of regular tidal flooding, heightened storm impacts, and saltwater intrusion of aquifers and freshwater systems, requiring mitigation actions. The range of options include buyouts, elevating properties, and hardening techniques to name a few, but the use of these options must be weighed, discussed, and decided upon.

The Blue Acres program is currently being administered by the NJDEP throughout the state and other buyout programs are also available. It would be prudent to look into repetitive loss properties that will also be threatened by sea level rise in the future to determine if buyouts of these properties would be an effective way to plan for sea level rise. If the Township feels that buyouts are not a good option, mitigation strategies should be investigated. However, not only will the individual mitigation options need to be examined, but the time frame of their effectiveness should be a factor. Cost-benefit analysis should accompany all mitigation projects to ensure that the lifespan of the mitigation and effectiveness when compared to rate of sea level rise is weighed against anticipated protection. In some instances, it may be determined that the cost of protecting already flood prone areas against sea level rise will be less effective than property acquisition.

JC NERR recommends Toms River consider learning from the resiliency planning process undertaken by Guilford, CT and described in "Town of Guilford Community Coastal Resilience Plan Report of Options to Increase Coastal Resilience":
(http://www.ci.guilford.ct.us/pdf/Coastal%20Resilience%20Plan,%20Report%20&%20Options.pdf).

The goal of their Coastal Resilience Plan was to address the current and future social, economic, and ecological resilience of the Town of Guilford to the impacts of sea level rise and anticipated increases in the frequency and severity of storm surge, coastal flooding, and erosion. The Town has drafted the report of options for increased coastal resilience as a step toward developing a Community Coastal Resilience Plan.

The four basic steps of the Coastal Resilience Plan are:

1. Generate awareness of coastal risk;
2. Assess coastal risks and opportunities;

3. Identify options or choices for addressing priority risks and vulnerabilities (short term); and
4. Develop and implement an action plan to put selected options or choices into place (long term).

Similar to Toms River, Guilford's coastal neighborhoods are diverse and it is likely that each will be faced with a combination of vulnerabilities to sea level rise and the increased incidence and severity of coastal storms. A combination of adaptation measures will therefore be necessary in each neighborhood in order to reduce risks and increase resilience. Likewise, neighborhood-scale resilience planning will likely be important. Steps should be taken to evaluate individual adaptation measures and determine how comprehensive solutions can be developed and implemented for building coastal resilience.

A comprehensive risk and vulnerability assessment for Toms River should include the following municipal sectors:

- Social – Residents, business community, and visitors.
- Economic – Residential Properties, commercial/industrial businesses, municipal resources, tourism, and future development.
- Infrastructure – Roads, bridges, stormwater, seawalls, and municipal facilities.
- Utilities – Public and private water supplies, septic systems, telecommunications, and electricity.
- Emergency Services – Fire, police, medical, sheltering, evacuation/egress.
- Natural Systems – Tidal wetlands and other coastal landforms.

When considering options for coastal resilience, the following three types of adaptation responses are typically considered:

- **Protection** involves hard structures such as sea walls and dikes, as well as soft solutions such as dunes and vegetation, to protect the land from the sea so that existing land uses can continue.
- **Accommodation** implies that people continue to use the land at risk but do not attempt to prevent the land from being flooded. This option includes erecting emergency flood shelters, elevating buildings on piles and elevating roadways.
- **Retreat** involves no effort to protect the land from the sea. The coastal zone is abandoned and ecosystems shift landward. This choice can be motivated by excessive economic or environmental impacts of protection. In the extreme case, an entire area may be abandoned.

Included in a 2010 NOAA's Office of Ocean and Coastal Resource Management manual titled, "Adapting to Climate Change: A Planning Guide for State Coastal Managers" is a thorough discussion of adaptation strategies and methods. (http://coastalmanagement.noaa.gov/climate/docs/adaptationguide.pdf). Toms River could consider some of the options presented in this document for long and short-term resiliency planning. Many of these suggestions complement the suggestions provided earlier in this GTR Recommendations report:

Impact Identification and Assessment

- Research and Data Collection – Predict possible social and economic effects of climate change on communities. Calculate cost-to-benefit ratios of possible adaptation measures. Encourage adaptation plans that are tailored to specific industries.
- Monitoring – A comprehensive monitoring program that incorporates multiple tools and considers a variety of systems and processes can provide input to the vulnerability assessment and adaptation strategy.
- Modeling and Mapping – Map which areas are more or less susceptible to sea level rise in order to prioritize management efforts.

Awareness and Assistance

- Outreach and Education – Create scientific fact sheets about climate change addressing community members, visitors, elected officials, businesses and industries. Use multiple forms of communication such as news media, radio, brochures, community meetings, social networks, blogs and websites.
- Real Estate Disclosure – The disclosure of a property's vulnerability to coastal hazards enables potential buyers to make informed decisions reflecting the level of impacts they are willing and able to accept.
- Financial and Technical Assistance – Provide flood insurance discounts for properties that exceed floodproofing standards by one or two feet. Encourage hazard mitigation by providing grants to areas that implement adaptation measures.

Growth and Development Management

- Zoning – Zoning can be used to regulate parcel use, density of development, building dimensions, setbacks, type of construction, shore protection structures, landscaping, etc. It can also be used to regulate where development can and cannot take place, making it an invaluable tool in efforts to protect natural resources and environmentally sensitive areas and guide development away from hazard-prone areas.
- Redevelopment Restrictions – Combining restrictions with acquisition/demolition/relocation programs provides safer options to property owners in the wake of the loss of or damage to their homes or businesses.
- Conservation Easements – A conservation easement is a legal agreement between a landowner and a land trust or government agency that can be used to restrict development in sensitive and hazard-prone areas.
- Compact Community Design – The high density development suggested by compact community design can allow for more opportunities to guide development away from sensitive and hazard-prone areas.

Loss Reduction

- Acquisition, Demolition, and Relocation – The most effective way to reduce losses is to acquire hazard-prone properties, both land and structures, demolish or relocate structures, and restrict all future development on the land.
- Setbacks – Setbacks can protect structures from hazards by keeping the structures away from a property's most vulnerable areas.

- Building Codes – Building codes that regulate design, construction, and landscaping of new structures can improve the ability of structures in hazard-prone areas to withstand hazard events.
- Retrofitting – Existing structures can be protected from hazards through retrofitting.
- Infrastructure Protection – Infrastructure protection entails fortification against the impacts of climate change.
- Shore Protection Structures – Shore protection structures protect existing development allowing it to stay in place. They often damage or destroy other valuable coastal resources and create a false sense of security; nevertheless in some cases, for the purposes of protecting existing development, there may be no other acceptable or practical options.

Shoreline Management

- Regulation and Removal of Shore Protection Structures – To protect the natural shoreline and the benefits it provides, regulations can be used to limit shoreline hardening as well as promote alternative forms of protection.
- Rolling Easements – Rolling easements are shoreline easements designed to promote the natural migration of shorelines. Typically, rolling easements prohibit shore protection structures which interfere with natural shoreline processes and movement, but allow other types of development and activities. As the sea rises, the easement moves or "rolls" landward, wetland migration occurs, and public access to the shore is preserved.
- Living Shorelines – Living shorelines can be effective alternatives to shore protection structures in efforts to restore, protect, and enhance the natural shoreline and its environment. Living shorelines use stabilization techniques that rely on vegetative plantings, organic materials, and sand fill or a hybrid approach combining vegetative plantings with low rock sills or living breakwaters to keep sediment in place or reduce wave energy.
- Beach Nourishment – Beach nourishment is the process of placing sand on an eroding beach, typically making it higher and wider, to provide a buffer against wave action and flooding.
- Dune Management – Dunes may be restored or created in conjunction with a beach nourishment project or may be managed as part of a separate effort.
- Sediment Management – Dredging and placing sediment, building shore protection structures and other structures that trap or divert sediment.

Coastal Ecosystem Management

- Ecological Buffer Zones – Ecological buffers are similar to setbacks (and may be included within setbacks) but are typically designed to protect the natural environment by providing a transition zone between a resource and human activities.
- Open Space Preservation and Conservation – Open space preservation and conservation can be accomplished through the management of lands dedicated as open space through a number of the measures previously discussed, such as zoning, redevelopment restrictions, acquisition, easements, setbacks, and buffers.
- Ecosystem Protection and Maintenance – In the context of coastal adaptation, ecosystem

protection largely involves the protection of tidal wetlands and other ecosystems. The facilitation of wetland migration is an important aspect of this.

- Ecosystem Restoration, Creation, and Enhancement – Similar to the above, ecosystem restoration and creation can replace tidal wetlands that are lost to sea level rise.

Water Resource Management and Protection

- Stormwater Management – Drainage systems may be ill-equipped to handle the amount of stormwater runoff that will accompany the more intense rainfall events expected in the future, and those in low-lying areas will be further challenged by losses in elevation attributed to rising sea levels.
- Water Supply Management – Climate change will negatively affect both water quantity and quality, and coastal populations will continue to grow, so water supply managers must be prepared to respond to associated challenges to water supply.

Examples of adaptation measures considered in Guilford's plan include management of coastal real estate and structures, shoreline protection and management of coastal and nearshore lands, roadway alterations, and protection or replacement of water supply wells and septic systems. All these adaptation measures are presented with a variety of options for consideration.

Toms River may also gain some planning insight from the public participation process associated with Guilford's resiliency planning. Guilford found their public believes that physical changes are needed to address sea level rise and increase coastal resilience, but that there are societal and institutional obstacles. Common themes noted from the public comments included:

- Coastal resilience planning – and many of the solutions that are implemented – may be best accomplished at the neighborhood scale; and neighborhood planning groups may need to be organized to begin looking at appropriate solutions;
- The tax base associated with coastal properties would need to be preserved in the short term and then some of the tax base may need to be shifted in the long term;
- Education and technical assistance are needed and desired by homeowners, and education could also be accomplished in the schools;
- Comprehensive solutions will be needed such as: addressing water and wastewater at the same time in neighborhoods where these systems will struggle or fail; ensuring that roadway improvements in one location are effective because improvements are also made elsewhere in the transportation network; and working on coordinated roadway and railroad improvements.

In thinking of their own public participation in resilience planning, Toms River could likely expect similar themes to emerge and could be prepared to offer the long-term planning options that may be under consideration by the municipality.

Coastal Hazard Incorporation in Planning

Incorporation of coastal hazards into municipal planning is highly recommended to accurately reflect the risks of coastal living. Life in coastal communities largely revolves around weather and water conditions and planning should include consideration for current and future coastal hazards. While including information on coastal hazards in Emergency Response Plans and Evacuation plans is an easy connection to make, the path to incorporation of coastal hazards into documents such as a Master Plan may be more challenging to realize. However, to foster a community of resiliency, it is important to keep hazards in mind throughout all planning documents. The Master Plan should be used to catalogue and document the goals of all other planning documents. The following is an example of how identification of coastal hazards can be introduced to a Municipal Master Plan through the Floodplain Management section. This sort of language and related content can be utilized in various other planning documents and then rediscussed in the Master Plan under the corresponding sections. Toms River will be undertaking the required 10 year update of their Township Master Plan in 2016. This represents a timely opportunity to incorporate coastal hazards.

Municipal Master Plan Example

The following excerpts are adapted from a comprehensive plan for Worcester County in Maryland, the equivalent to a municipal master plan. This comprehensive plan incorporates coastal hazards throughout the entire document to form an integrated approach to resiliency. Coastal hazards are often identified in the document as "current and anticipated challenges". Individual sections (such as the Floodplain Management section given in this example) identify objectives and recommendations that should be mirrored in individual plans (a Floodplain Management Plan in this example). In doing so, all municipal plans are organized under the master plan and share the same language and goals. Many of the recommendations in this municipal master plan example are closely tied to goals already addressed in the current Township Master Plan. If choosing to update the Floodplain Management Plan, it is highly recommended to do so by following the guidelines set in Section 510 of the CRS which can result in large CRS credits. Refer to the following link for the Worcester County Comprehensive Plan for more ideas and examples of a planning document drafted with resiliency in mind.
http://www.co.worcester.md.us/cp/finalcomp31406.pdf

> ***Sample Introduction***
> *Realizing that air, water, and land could be overused and despoiled, the plans organized within this document increasingly moved toward resource protection. If such damage occurred, local residents' quality of life and tourism, the economic linchpin, would suffer. Preserving the Township's natural resources and character will therefore, continue to be this plan's main purpose.*
>
> *The plan's purpose is to provide the following:*
> *1. An official statement of goals, objectives, policies and aspirations for future growth, development and the quality of life;*

2. A set of guidelines for the government and private sectors to maximize the Township's quality of life;
3. A strategy addressing current and anticipated challenges ; and
4. Sufficient policy guidance to effectively manage natural, human and financial resources.

Sample Floodplain Management Section
Floodplains, lands along waterways subject to flooding, locally have low relief and sedimentary soils. Floodplains are defined by how often they flood. A 100-year floodplain has a 1% probability of flooding in a given year and is not tidally influenced. Local flooding can occur in major storm events. Many areas of the Township of Toms River's 100-year floodplain are highly developed. Residential, industrial, and commercial uses exist within this floodplain. Most of the time a floodplain is available for use. However, during floods they can be dangerous. Superstorm Sandy reinforced this fact. Floods injure people physically and emotionally and cause economic damage. Beyond this, emergency personnel are put at risk when called upon to rescue flood victims. In Toms River, flooding must be taken very seriously. To protect public safety and property, limiting future building in floodplains and stringent construction standards will help reduce injuries and property damage. Federal, state, and local policies should be consistent to implement this approach.

Objectives
The Township's objectives for floodplain protection are:
• Limit development in floodplains
• Reduce imperviousness of existing and future floodplain development where possible
• Preserve and protect the biological values and environmental quality of tidal and non-tidal floodplains, where reasonable and possible to do so.

Developed floodplains have a reduced capacity to absorb stormwater, resulting in increased flooding. For example, development results in new impervious surfaces (roads, sidewalks, roofs, etc.), which limit the effectiveness of the floodplain by reducing the land's absorption capacity. This increases the potential for flooding. It is therefore important that the natural floodplain character be maintained, wherever reasonable, to promote public safety, to reduce economic losses, and to protect water quality and wildlife habitat.

Toms River faces additional flooding issues. Several areas of the Township commonly flood during storms with heavy precipitation. Sea level rise will increase flooding hazards as stormwater systems will become less effective. New Jersey is particularly vulnerable to sea level rise. During this century, as sea level rises, shorelines could retreat significantly in parts of the Township. Narrow river beaches, bay beaches, and wetlands at low elevations, all important habitats, would be lost to even a modest rise in sea level and erosion would increase. Oceanfront beaches would also narrow and experience greater erosional rates. Currently, the state recognizes a right to protect shores with hard structures (e.g. riprap). As sea level rises, these hard structures will prevent "migration" of beaches and wetlands, and these natural features will be lost.

Programs and Policies

Flooding from coastal storms is a serious threat to life and property with the potential for extensive damage and disruptions. To reduce potential damage, the county is developing a hazard mitigation plan. This first step will provide guidance for pre-disaster activities. The second phase of addressing disasters is to develop a post disaster plan. Confusion and rapid decision-making follow a disaster. Advance planning can position the Township to reduce its exposure to future disasters and reduce the need for ad hoc decision-making. Superstorm Sandy has taught us that effective post-disaster planning is necessary for an effective recovery process.

Recommendations

1. Work with federal and state agencies to regularly update the Township floodplain maps, with first priority being areas that are mapped as 100-year floodplain without base flood elevation established.
2. Limit new development and subdivisions in the floodplain.
3. Promote uses, such as open space easements, natural areas, and recreational open space to reduce impervious surfaces in floodplains.
4. Work to acquire properties in the lowest lying portions of the 100-year floodplain, and return them to a natural state.
5. Reevaluate the effectiveness of the current floodplain protection regulations.
6. Discourage the location of new homes and roadways in the "V" or wave velocity zone and the 100-year floodplain.
7. Work with the county to complete a hazard mitigation plan for flooding, wildfire, and other natural hazards.
8. Develop and implement a post-disaster recovery and reconstruction plan to facilitate recovery and to reduce exposure to future disasters.
9. Consider code changes that will limit impervious surfaces.
10. Develop a sea level rise response strategy (including a two foot freeboard requirement for properties exposed to flooding and discourage further shoreline hardening).

Mapping

The following maps can be found in the appendices of this document. Maps were either requested by Township staff or recommended by JC NERR staff during GTR meetings. As part of updates to the Getting to Resilience website, the site will host community profiles that include municipal mapping profile packets that are available for future download. These maps can be used to help write and update the Municipal Master Plan, All Hazards Mitigation Plan, Floodplain Management Plan, Evacuation Plan, Emergency Response Plan, Continuity of Operations Plan, Disaster Recovery Plan, Post Disaster Redevelopment Plan, Capital Improvements Plan, Economic Development Plan/Strategy, Coastal Plan, Shoreline Restoration Plan, Open Space Plan, Stormwater Management Plan, Historic Preservation Plan, Zoning Ordinance, Flood Damage Prevention Ordinance, and Building Code.

Sea Level Rise 1-3 feet with Critical Facilities

Over the past hundred years, sea level has risen slightly higher than one foot in New Jersey. Due to a variety of factors including melting land ice and thermal expansion, it is anticipated that the rate of sea level rise will increase substantially in the future. While sea level rise poses it's own threat to coastal communities, it also will increase the severity of storm surge and erosion. By examining sea level rise maps, the Township can better understand future flooding risk and plan accordingly. As a portion of the Township is near current sea level, including some municipal property, Sea Level Rise maps should be utilized heavily for municipal planning documents.

Storm Surge (SLOSH Category 1, SLOSH Category 2, & SLOSH Category 3)

SLOSH or Sea, Lake, and Overland Surge from Hurricanes is a computerized model from the National Hurricane Program. SLOSH takes into account various factors to compute surge inundation above ground level or simple inundation. These factors include storm size, storm pressure, storm speed, storm path, wind speed, bathymetry, and topography. With this set of factors, SLOSH determines the worst surge impacts that can be expected from hurricanes according to category. SLOSH maps are vital tools for Emergency Operations Center managers for making decisions about evacuation orders, timing of evacuation, and staging of emergency equipment prior to tropical weather systems.

Marsh Migration 1-3 feet

Marsh reaction to seal level rise has been mapped according to the Sea Level Affecting Marshes Model (SLAMM). Marshes provide various environmental and storm protection functions to communities and should be preserved. As sea level rises, many marshes will convert to open water or tidal mud flats. However, if suitable land is connected to current marshes, conversion of ecosystems may occur which could allow marshes to "migrate" further inland in balance with sea level. Upland areas that are deemed to be suitable marsh migration areas should be identified and preserved if possible and barriers to marsh migration should be eliminated. In doing so, the environmental and storm protection functions of marshes may persist despite sea level rise.

Preliminary Flood Insurance Rate Map

FEMA's Preliminary Flood Insurance Rate Map (PFIRM) represents the current best available data for Toms River concerning 1% and 0.2% flooding scenarios. Base Flood Elevations and wave modeling are established for the 1% flood. Flood Insurance Rate Maps should be used to assist in zoning and building code decisions. Additional mapping information about floodplain maps can be accessed off of FEMA's www.Region2Coastal.com.

Preliminary Flood Insurance Rate Map Table

FEMA's Preliminary Flood Insurance Rate Map (PFIRM) represents the current best available data for Toms River concerning 1% and 0.2% flooding scenarios. This table displays the coverage for the 0.2% zone, AE zone, and VE zone in terms of square miles (land and water) and percent coverage. This table can be used to better understand the Township's floodplain and be used as reference for various decisions concerning zoning, building, etc.

Sandy Surge Extent

FEMA has mapped the limits of the storm surge caused by Superstorm Sandy. This map can be used as a reference for this historical flooding event.

Other Suggested Maps

Toms River plans to undertake a Community Vulnerability Index (CVI) study. Many of the following suggested maps would be beneficial to include in addition to a CVI.

Repetitive Loss & Severe Repetitive Loss

Repetitive Loss and Substantial Damage maps can be used to identify "problem" areas. Depending on the location and size of these areas, the Township can make decisions about how to prevent repetitive loss from occurring. These options can range from utilizing Blue Acres funding and returning the properties to a natural state to creating protective infrastructure projects in order to help protect from risk.

Shoreline Change

Shorelines are constantly in a state of change, be it from tidal fluctuations or erosional and depositional forces. Shoreline change can create large scale shifts in risk. Erosion may move shoreline closer to buildings and infrastructure, reducing natural buffers and heightening impacts. Deposition that moves shorelines or near shore features such as sandbars may in turn reduce rates of flow of streams and stormwater management systems and cause greater risk of precipitation driven flooding. Deposition can also cause navigation hazards to waterways and navigation channels. Shoreline Change maps can identify trends and should be incorporated into appropriate municipal plans.

Overlays of Hazards and Populations, Infrastructure, and Building Footprints

Though it is the goal of this report to guide the Township of Toms River towards resiliency, risk will always exist. By overlaying hazards such as sea level rise and surge with population information, infrastructure, and building footprints, the Township will be able to identify areas of highest risk and plan accordingly.

Natural Resources, Historical Resources, Cultural Resources, & Economic Resources

Mapping of a community's resources is an extremely useful tool, not only for creating a catalogue of a community's strengths, but also for identifying areas that should be protected. Overlaying hazards such as sea level rise and surge may lead Toms River to make decisions on protecting certain resources through retrofitting historical buildings or protecting natural resources by allowing for natural floodplain functions.

Additional Mapping Resources

NJADAPT (www.NJAdapt.org) is a New Jersey-based website being built to host and apply climate science and impacts data. The objective of the NJADAPT platform is to provide communities with the ability to develop municipal profiles of various risks that may potentially impact their areas by making climate projection data for NJ more accessible. The initial development of the platform has been supported by the New Jersey Recovery Fund and NOAA.

The Flood Exposure Profiler is the first tool developed as part of the larger All Climate Hazards tools being developed through the NJADAPT initiative. The Profiler is broken into four major themes:

- Flooding (which shows the flooding hazards individually)
- Society (demographic data that shows information about populations, businesses, and employees)
- Infrastructure (provides information on facility and infrastructure locations that should be considered when planning for disaster events),
- Environment (data on coastal land use areas - marsh, open space, land use land cover).

Each of the profiles allow you to see the themed data and then overlay a hazard layer of your choice to see what the potential impacts may be. This tool allows you to create maps that you can then package and share links to or create pdfs from for further use.

Sea Level Rise and Surge Vulnerability

Toms River Township includes a wide variety of communities and landforms,many in close proximity to or boarded by water. Fluctuations in tidal levels through surge events and rising sea levels are significant even for areas bordering wetlands and creeks. Analysis of SLOSH maps show that as hurricane strength increases, potential surge impacts will increase in scope and severity. SLOSH models indicate flooding should be expected to be very near Sandy's flood levels for powerful Category 1 hurricanes. SLOSH models for Category 2 and 3 storms show increased vulnerability and intensity. Areas that have inundation depths of 0-3 feet during a Category 1 storm are capable of depths of 6-9 feet in a Category 2 storm. Flooding has the potential to impact almost all properties bordering wetlands, tidal creeks, the Toms River, and Barnegat Bay. The barrier island is completely impassable with the only non-submerged land being the dunal oceanfront of Dover Beaches North. All of Ortley Beach is submerged, including the dune system. This presents a very high risk for full breach of the barrier island and new inlet formation. On the mainlands, most areas east of County Road 571 and Coolidge Avenue are inundated. County Road 527 and East Water Street in the downtown area are flooded and the Garden State Parkway in the areas at and directly north of the Toms River are threatened with significant inundation. SLOSH maps for Category 3 show an extreme scenario. Areas that were flooded during Sandy and even some that did not see any flooding have the potential to be submerged with over 9 feet of floodwaters. The Parkway is impassable and Route 37 is flooded at Long Swamp Creek. Most areas east of Toms River High School East are flooded. The majority of the barrier island and all lagoonal communities are threatened by greater than 9 feet of flooding. The entire barrier island from Mantaloking to Island Seaside Park is

entirely under floodwaters with the exception of a few isolated dunes. This greatly increases the threat of infrastructure destruction from wave damage and inlet formation would appear likely.

It is important to note that in all SLOSH mapping for Category 1, 2, and 3, the critical evacuation route of Route 35 is threatened by surge. Other evacuation routes such as Route 37, County Round 527, County Road 571, Church Road, Hooper Avenue, and the Garden State Parkway are at varying risk of flooding in Category 2 and 3 storm surge modeling. As storm strength increases, the likelihood of safe use of these evacuation routes decreases. Other critical facilities at risk for flooding due to storm surge include Fire Station 26, Fire Station 28, Toms River Intermediate East, Hooper Avenue Elementary School, and all barrier island facilities. Although storms of this magnitude are very rare for our area, they remain a possibility that requires attention and planning.

Scientists anticipate the arrival of one foot of sea level rise before 2050. As sea level rise is expected to accelerate this century, three feet of sea level rise is very likely before 2100. In the table below, the "low", "high", and "best" estimates for sea level rise projections for New Jersey for the years 2050 and 2100 are displayed. "Best" refers to a 50% likelihood of that level of sea level rise occurring.

Total sea level rise projections for New Jersey.

	Total cm	Total inches	Total feet
2050 best	**40**	**16**	**1.3**
2050 low	23	9	0.7
2050 high	60	24	2.0
2100 best	**96**	**38**	**3.1**
2100 low	50	20	1.6
2100 high	147	58	4.8

All values with respect to a year 2000 baseline.

NJ sea level rise projection ranges and best estimates. Miller AK, Kopp RE, Horton BP, Browning JV and Kemp AC. 2013. A geological perspective on sea-level rise and its impacts along the U.S. mid-Atlantic coast. Earth's Future 1(1):3-18.

As a general rule of thumb for Toms River, areas bordering waterfront are the most likely to experience direct impacts from sea level rise. In other areas of Toms River, sea level rise impacts will be felt in the form of greater impact of storm events as surges will rise atop a higher sea level. Sea level rise maps for 1, 2, and 3 feet show that wetlands, creeks, and other low lying natural areas will see the greatest impacts. Modeling for 1 foot of sea level rise indicates many natural wetlands will experience regular inundation. Eastern areas of Silver Bay Tributary, much of Cattus Island Park, Goose Creek, the southern area of the Browns Mills property, the southern stretch of the Winding River, and many of the bay islands west of Dover Beaches North will be submerged on a nearly daily basis. Most of these areas are wetlands and are able to withstand such flooding. Models for 2 feet and 3 feet of sea level rise indicates that these sections of Toms River will experience greater areas of inundation as sea level rises. This includes the Toms River Country Club. Marsh migration modeling indicates that some of the lowest lying wetlands will eventually convert to mudflats or open water. This conversion results in loss of some of the services wetlands provide such as habitat, nutrient and pollution control, floodwater absorption,

and wave dampening. However, it should be noted that Toms River has a wealth of natural areas that are indicated as marsh retreat zones. These are uplands areas that can potentially convert to wetland areas over time. The Township would benefit greatly to attempt to prevent development in these areas to hopefully reduce the impacts of marsh loss in other areas.

In terms of developed areas, lagoonal communities and the barrier island communities are most at risk for sea level rise. At 1 foot of sea level rise, nearly every lagoonal community in Toms River, including the bayside of the barrier island, sees regular flooding of small sections of roadway or isolated property flooding. Dover Beaches North sees slightly greater impacts with flooding extending east away from the bay, potentially impacting southbound Route 35 in the Ocean Beach and Monterey Beach sections. It should be noted that Route 35 is not only the main connection north-south on the island but also is an evacuation route. At 2 feet of sea level rise. Waterfront and lagoonal communities will experience greater impacts. The lowest lying roads and properties will experience regular tidal flooding. The barrier island is of great concern. Most of the areas around or west of Route 35 will be undergo daily tidal inundation. Pelican Island also will begin to see flooding. Models for 3 feet of sea level rise indicates far reaching impacts. Many lagoonal communities and Pelican Island will experience regular tidal flooding in roughly 75% or more of their properties and roadways. On the barrier island, flooding is indicated further east, reaching the northbound portion of Route 35. Fire Station 26 is on the edge of a flooding area. Fire Station 28 is in a flooding area. This will impact the ability of these fire stations to respond and function in the future.

Toms River will also need to work to address sea level rise concerns with neighboring municipalities. Mantaloking, Brick Township, Lavallette, Seaside Heights, and South Toms River all will have evacuation route flooding at some point between 1 to 3 feet of sea level rise. Toms River residents will have to pass through these municipalities in the event of evacuation or just during day to day commuting. If Toms River addresses flooding but these municipalities do not, Toms River residents will still be at risk. Adaptation to sea level rise and the increase of other hazards such as surge should be taken into account when planning for the future.

CRS Sections That Likely Have Available Current Points

The following sections of the Community Rating System will likely contain credit points that are available for Toms River based off of the answers given in our Getting to Resilience questionnaire, discussions with JCNERR staff, and reviews of the Township Master Plan and other documents. These sections represent the current state of the Township but also include planned projects, uncompleted projects, and recommended actions deemed to be within the Toms River's reach. However, these projects may need to be complete in order to be granted credit. It is likely that the Outreach Projects in Section 330 will be highly achievable and less costly than other sections within the CRS. The following sections do not represent guaranteed points for the CRS but are likely achievable to a certain degree and should be investigated to determine the costs and benefits of the required actions when submitting to the CRS. When working with your CRS coordinator, we recommend inquiring about the following sections.

Section 310: Elevation Certificates: To maintain correct federal emergency management agency (FEMA) Elevation Certificates and other needed certifications for new and substantially improved buildings in the Special Flood Hazard Area (SFHA).

- **Maintaining Elevation Certificates (EC):** Up to 38 points for maintaining FEMA elevation certificates on all buildings built in the special SFHA after the date of application to the CRS. All communities applying to the CRS must apply for this element. (Could be done)
- **Maintaining Elevation Certificates for Post-FIRM Buildings (ECPO):** Up to 48 points for maintaining EC on buildings built before the date of application to the CRS but after the initial date of the FIRM. (Could be done)
- **Maintaining Elevation Certificates for Pre-FIRM Buildings (ECPR):** Up to 30 points for maintaining elevation certificates on buildings built before the initial date of the FIRM. (Could be done)

Section 320: Map Information Service: To provide inquirers with information about the local flood hazard and about flood-prone areas that need special protection because of their natural functions.

- **Basic Firm Information (MI1):** 30 points for providing basic information found on a FIRM that is needed to accurately rate a flood insurance policy. (GTR 1.7, 2.5)
- **Additional Firm Information (MI2):** 20 points for providing information that is shown on most FIRMS, such as protected coastal barriers, floodways, or lines demarcating wave action. (GTR 1.7, 2.5)
- **Problems Not Shown on the FIRM (MI3):** Up to 20 points for providing information about flood problems other than those shown on the FIRM. (GTR 1.7, 2.5)

Section 330: Outreach Projects: To provide the public with information needed to increase flood hazard awareness and to motivate actions to reduce flood damage, encourage flood insurance coverage, and protect the natural functions of floodplains. (GTR 4.4)

- **Outreach projects (OP):** Up to 200 points for designing and carrying out public outreach projects. Credits for individual projects may be increased if the community has a Program for Public Information (PPI). (GTR 2.5.1, 2.5.2, 2.7, 2.8, 2.14, 4.9)
- **Flood response preparations (FRP):** Up to 50 points for having a pre-flood plan for public information activities ready for the next flood. Credits for individual projects may be increased by the PPI multiplier. (GTR 2.7, 2.8, 4.9)
- **Program for Public Information (PPI):** Up to 50 points added to OP credits and up to 20 points added to FRP credits, for projects that are designed and implemented as part of an overall public information program. (GTR 2.7, 2.8)
- **Stakeholder delivery (STK):** Up to 80 points added to OP credits for having information disseminated by people or groups from outside the local government. (GTR 2.7, 2.8)

Section 340: Hazard Disclosure: To disclose a property's potential flood hazard to potential buyers before the lender notifies them of the need for flood insurance.

- **Disclosure of the flood hazard (DFH):** Up to 25 points if real estate agents notify those interested in purchasing properties located in the Special Flood Hazard Area (SFHA) about the flood hazard and the flood insurance purchase requirement. An additional 10 points are provided if the disclosure program is part of a Program for Public Information credited under Activity 330 (Outreach Projects). (GTR 1.4, 2.5.2 (Could be instituted as a requirement))
- **Other disclosure requirements (ODR):** Up to 5 points for each other method of flood hazard disclosure required by law, up to a maximum of 25 points. (GTR 2.5.2)
- **Real estate agents' brochure (REB):** Up to 8 points if real estate agents are providing brochures or handouts that advise potential buyers to investigate the flood hazard for a property. An additional 4 points are provided if the disclosure program is part of a Program for Public Information credited in Activity 330 (Outreach Projects). (GTR 2.5.2 (Could be required))
- **Disclosure of other hazards (DOH):** Up to 8 points if the notification to prospective buyers includes disclosure of other flood-related hazards, such as erosion, subsidence, or wetlands. (GTR 2.5.2 (Could be instituted as a requirement))

Section 350: Flood Protection Information: To provide more detailed flood information than that provided by outreach products.

- **Flood protection library (LIB):** 10 points for having 10 Federal Emergency Management Agency publications on flood protection topics housed in the public library. (GTR 2.5.1, 2.5.2, 2.15)
- **Locally pertinent documents (LPD):** Up to 10 points for having additional references on the community's flood problem or local or state floodplain management programs housed in the public library. (GTR 2.5.1, 2.5.2)
- **Flood protection website (WEB):** Up to 76 points for providing flood protection information via the community's website. An additional 29 points are provided if the website is part of a Program for Public Information (credited under Activity 330 (Outreach Projects)). (GTR 2.5.1, 2.5.2, 2.7, 2.8, 4.7, 4.9)

Section 360: Flood Protection Assistance: To provide one-on-one help to people who are interested in protecting their property from flooding.

- **Property protection advice (PPA):** Up to 25 points for providing one-on-one advice about property protection (such as retrofitting techniques and drainage improvements). An additional 15 points are provided if the assistance program is part of a Program for Public Information (credited under Activity 330 (Outreach Projects)). (GTR 5.7)
- **Advisor training (TNG):** 10 points if the person providing the advice has graduated from the EMI courses on retrofitting or grants programs. (GTR 5.8 (could get training if not trained yet))

Section 410: Floodplain Mapping: To improve the quality of the mapping that is used to identify and regulate floodplain management.

- **New Study (NS):** Up to 290 points for new flood studies that produce base flood elevations or floodways. (GTR 1.1, 1.7 (Could be eligible if other elevation studies have been or are going to be done))
- **Higher Study Standards (HSS):** Up to 160 points if the new study was done to one or more standards higher than the FEMA mapping criteria. (GTR 1.4, 1.7)
- **Floodplain mapping of special flood-related hazards (MAPSH):** Up to 50 points if the community maps and regulates areas of special flood related hazards. (GTR 1.1, 1.3, 1.7, 2.5)

Section 420: Open Space Preservation: To prevent flood damage by keeping flood-prone lands free of development, and protect and enhance the natural functions of floodplains.

- **Open space preservation (OSP):** Up to 1,450 points for keeping land vacant through ownership or regulations. (GTR 3.3, 5.9, 5.12)

- **Natural shoreline preservation (NSP):** Up to 120 points for programs that protect natural channels and shorelines. (GTR 3.3, 5.9)
- **Deed restrictions (DR):** Up to 50 points extra credit for legal restrictions that ensure parcels credited for OPS will never be developed. (GTR 3.3, 5.9)
- **Natural functions open space (NFOS):** Up to 350 points extra credit for OPS-credited parcels that are preserved in or restored to their natural state. (GTR 3.3, 3.5, 5.9, 5.12)
- **Special flood-related hazards open space (SHOS):** Up to 50 points if the OSP credited parcels are subject to one of the special flood-related hazards or if areas of special flood related hazard are covered by low density zoning regulations. (GTR 1.3, 3.3, 5.9)
- **Open space incentives (OSI):** Up to 250 points for local requirements and incentives that keep flood-prone portions of new development open (GTR 3.3, 5.9)

Section 430- Higher Regulatory Standards: To credit regulations to protect existing and future development and natural floodplain functions that exceed the minimum criteria of the National Flood Insurance Program (NFIP).

- **Other higher standard (OHS):** Up to 100 points for other regulations. (GTR 4.9)
- **Special Flood-related Hazard Regulations (SHR):** Up to 370 points for higher regulatory standards in areas subject to coastal erosion. (GTR 1.3)
- **Emergency warning dissemination (EWD):** Up to 75 points for disseminating flood warnings to the public. (GTR discussions)
- **Flood response operations (FRO):** Up to 115 points with 10 points awarded for maintaining a database of people with special needs who require evacuation assistance when a flood warning is issued and for having a plan to provide transportation to secure locations. (GTR discussions)
- **Critical facilities planning (CFP):** Up to 75 points for coordinating flood warning and response activities with operators of critical facilities. (GTR discussions)
- **Protection of critical facilities (PCF):** Up to 80 points for protecting facilities that are critical to the community. (GTR 4.7)
- **Regulations administration (RA):** Up to 67 points for having trained staff and administrative procedures that meet specified standards. (GTR 3.4.5, 3.7.1, 5.6, 5.8)
- **Freeboard (FRB):** Up to 500 points for a freeboard requirement. (GTR 5.4)
- **Foundation Protection (FDN):** Up to 80 points for engineered foundations. (likely already done)

- **Coastal A Zone Requirements (CAZ):** Up to 500 points if if all new buildings in the coastal A Zone must meet the requirements for buildings in V Zones and for openings in A Zones (GTR [might be eligible for X zones on oceanfront])
- **State Mandated Standards (SMS):** Up to 20 points for a state-required measure that is implemented in both CRS and non-CRS communities in that state. (freeboard)

Section 440: Flood Data Maintenance: The community must maintain all copies of Flood Insurance Rate Maps issued for that community.

- **Additional Map Data (AMD):** Up to 160 points for implementing digital or paper systems that improve access, quality, and/or ease of updating flood data within the community. (GTR 1.7, 2.5)
- **FIRM Maintenance (FM):** Up to 15 points for maintaining copies of all FIRMs that have been issued for the community. (GTR 1.7, 2.5)
- **Erosion Data Maintenance (EDM):** up to 20 points for maintaining coastal erosion data. (GTR 1.3, 2.1 (Could easily be done by maintaining Stockton CRC data and USGS shoreline datasets))

Section 450: Stormwater Management: To prevent future development from increasing flood hazards to existing development and to maintain and improve water quality.

- **Watershed Master Plan (WMP):** Up to 315 points for regulating development according to a watershed management master plan (WMP). (GTR 1.13)

Section 510: Floodplain Management Planning: To credit the production of an overall strategy of programs, projects, and measures that will reduce the adverse impact of the hazard on the community and help meet other community needs.

- **Floodplain management planning (FMP):** 382 points for a community-wide floodplain management plan that follows a 10-step planning process. (GTR 3.3, 3.3.1, 3.3.2, 3.4, 3.4.1, 3.5, 3.7)
- **Repetitive Loss Area Analysis (RLAA):** Up to 140 points for a detailed mitigation plan for a repetitive loss area. (GTR 1.11, 1.12, 2.1)
- **Natural Floodplains Function Plan (NFP):** 100 points for adopting plans that protect one or more natural functions within the community's floodplain. (GTR 1.13)

Section 520: Acquisition & Relocation of buildings : To encourage communities to acquire, relocate, or otherwise clear existing buildings out of the flood hazard area. Up to 2,250 points based on the number of buildings that fit the criteria and have been acquired or relocated. (GTR 1.11, 1.12)

Section 530: Flood Protection: To protect buildings from flood damage by retrofitting the buildings so that they suffer no or minimal damage when flooded, and/or constructing small flood control projects that reduce the risk of flood waters reaching the buildings.

- **Flood protection project technique used (TU_):** Credit is provided for retrofitting techniques or flood control techniques. Retrofitting technique used: Points are provided for the use of elevation (TUE), dry floodproofing (TUD), wet floodproofing (TUW), protection from sewer backup (TUS), and barriers (TUB) Structural flood control technique used: Points are provided for the use of channel modifications (TUC), and storage facilities (TUF). (GTR 5.7)

Section 540: Drainage System Maintenance: To ensure that the community keeps its channels and storage basins clear of debris so that their flood carrying and storage capacity and maintained.

- **Capital improvement program (CIP):** up to 70 points for having a capital improvement program that corrects drainage problems. (GTR 3.7)
- **Coastal Erosion Protection Maintenance (EPM):** Up to 100 points for maintaining erosion protection programs in communities with coastal erosion prone areas. (GTR 1.3, 5.12)

Section 600: Warning and Response: The activities in this series focus on emergency warnings and response, because adequate notification combined with a plan for how to respond can save lives and prevent and/or minimize property damage. The activities emphasize coordinating emergency management functions with a community's other floodplain management efforts, such as providing public information and implementing a regulatory program. Separate, parallel activities are included for levees (Activity 620) and dams (Activity 630). Credit points are based on threat recognition, planning for a subsequent emergency response, and ongoing testing and maintenance. Up to 790 points. (GTR 4.2, 4.4)

Section 610: Flood Warning and Response: To encourage communities to ensure timely identification of impending flood threats, disseminate warnings to appropriate floodplain occupants, and coordinate flood response activities to reduce the threat to life and property. (GTR 4.5, 4.5.1, 4.5.2, 4.5.3, 4.5.4)

- **Flood response operations (FRO):** Up to 115 points with 10 points awarded for maintaining a data base of people with special needs who require evacuation assistance when a flood warning is issued and for having a plan to provide transportation to secure locations. (GTR 4.8, 4.9, 4.9.6)
- **Flood threat recognition system (FTR):** Up to 75 points for a system that predicts flood elevations and arrival times at specific locations within the community (GTR 1.7 (could be done))

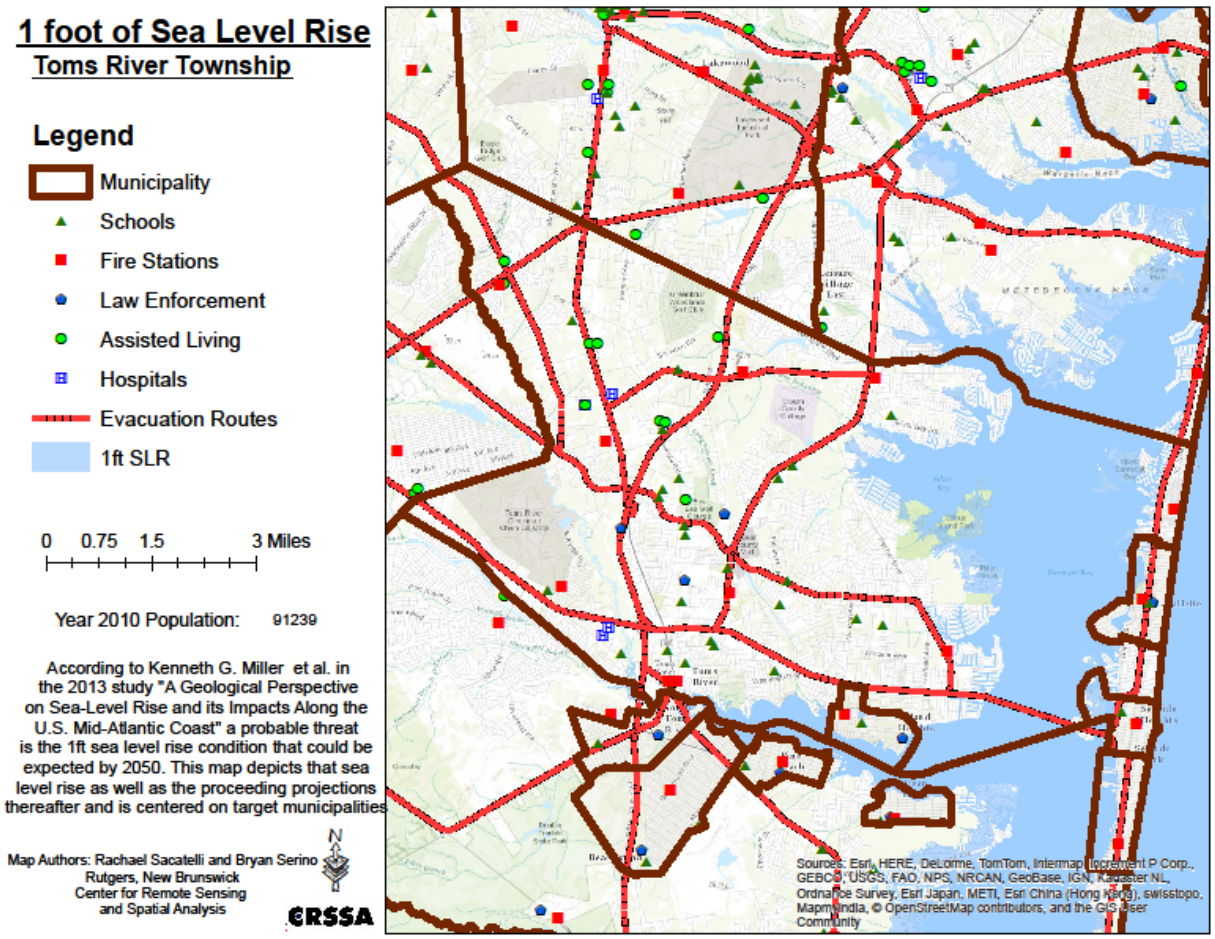
· **Emergency warning dissemination (EWD):** Up to 75 points for disseminating flood warnings to the public. (GTR 4.7, 4.9)

· **EWD9 :** 10 points, if all schools, hospitals, nursing homes, prisons, and similar facilities that need flood warning have NOAA weather radio receivers and at least one automated backup system for receiving flood warnings. (GTR 4.11)

· **Critical facilities planning (CFP):** Up to 75 points for coordinating flood warning and response activities with operators of critical facilities. (GTR 4.7, 4.9)

· **StormReady community (SRC):** 25 points for designation by the National Weather Service as a StormReady community (GTR 4.6 (Could become designated))

Appendix


1 foot of Sea Level Rise
Toms River Township
Legend
Municipality
Schools
Fire Stations
Law Enforcement
Assisted Living
Hospitals
Evacuation Routes
1ft SLR
0 0.75 1.5 3 Miles
Year 2010 Population: 91239
According to Kenneth G. Miller et al. in the 2013 study "A Geological Perspective on Sea-Level Rise and its Impacts Along the U.S. Mid-Atlantic Coast" a probable threat is the 1ft sea level rise condition that could be expected by 2050. This map depicts that sea level rise as well as the proceeding projections thereafter and is centered on target municipalities
Map Authors: Rachael Sacatelli and Bryan Serino
Rutgers, New Brunswick
Center for Remote Sensing
and Spatial Analysis
N
CRSSA
Sources: Esri, HERE, DeLorme, TomTom, Intermap, Increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

2 feet of Sea Level Rise
Toms River Township

Legend

- Municipality
- Schools
- Fire Stations
- Law Enforcement
- Assisted Living
- Hospitals
- Evacuation Routes
- 2ft SLR

0 0.75 1.5 3 Miles

Year 2010 Population: 91239

According to Kenneth G. Miller et al. in the 2013 study "A Geological Perspective on Sea-Level Rise and its Impacts Along the U.S. Mid-Atlantic Coast" a probable threat is the 1ft sea level rise condition that could be expected by 2050. This map depicts that sea level rise as well as the proceeding projections thereafter and is centered on target municipalities

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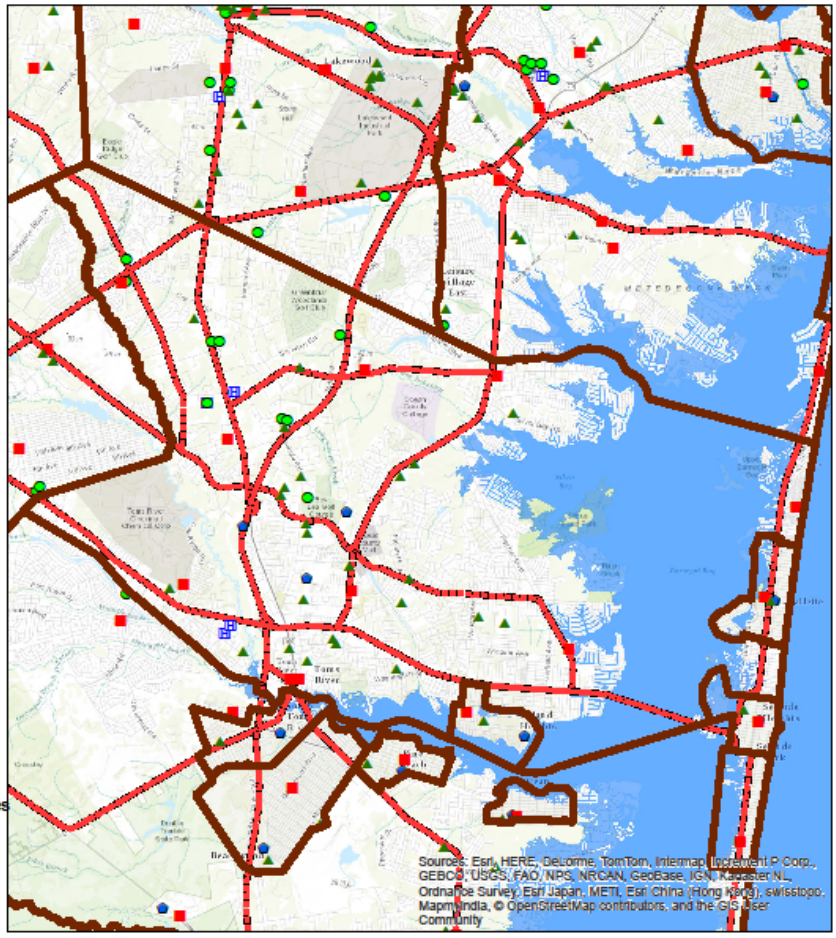

3 feet of Sea Level Rise
Toms River Township

Legend

- Municipality
- Schools
- Fire Stations
- Law Enforcement
- Assisted Living
- Hospitals
- Evacuation Routes
- 3ft SLR

0 0.75 1.5 3 Miles

Year 2010 Population: 91239

According to Kenneth G. Miller et al. in the 2013 study "A Geological Perspective on Sea-Level Rise and its Impacts Along the U.S. Mid-Atlantic Coast" a probable threat is the 1ft sea level rise condition that could be expected by 2050. This map depicts that sea level rise as well as the proceeding projections thereafter and is centered on target municipalities

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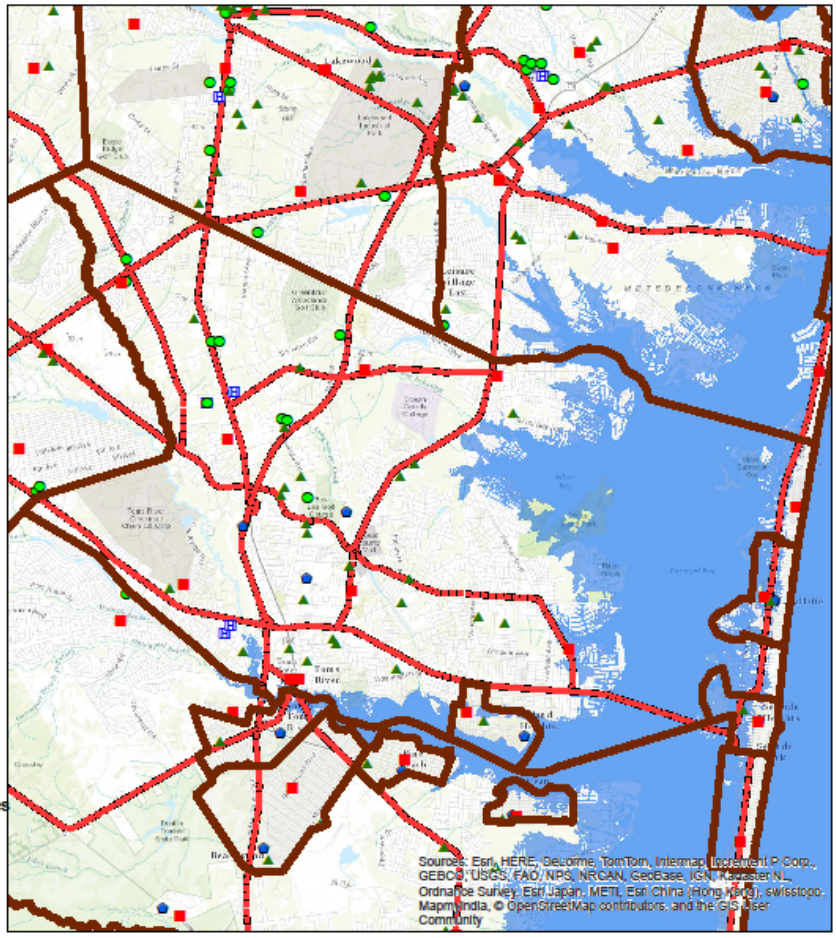
CRSSA



Category 1 SLOSH Model
Toms River Township

Legend

- Municipality
- Schools
- Assisted Living
- Law Enforcement
- Hospitals
- Fire Stations
- Evacuation Routes

Category 1 SLOSH

- 0 - 3 Feet Above Ground Level
- 3 - 6
- 6 - 9
- > 9

0 2 4 Miles

Year 2010 Population: 91239

This map depicts the SLOSH model extents provided by NOAA. The depths are ranged from 0-9 or greater feet of inundation above ground level and are categorized in the legend above.

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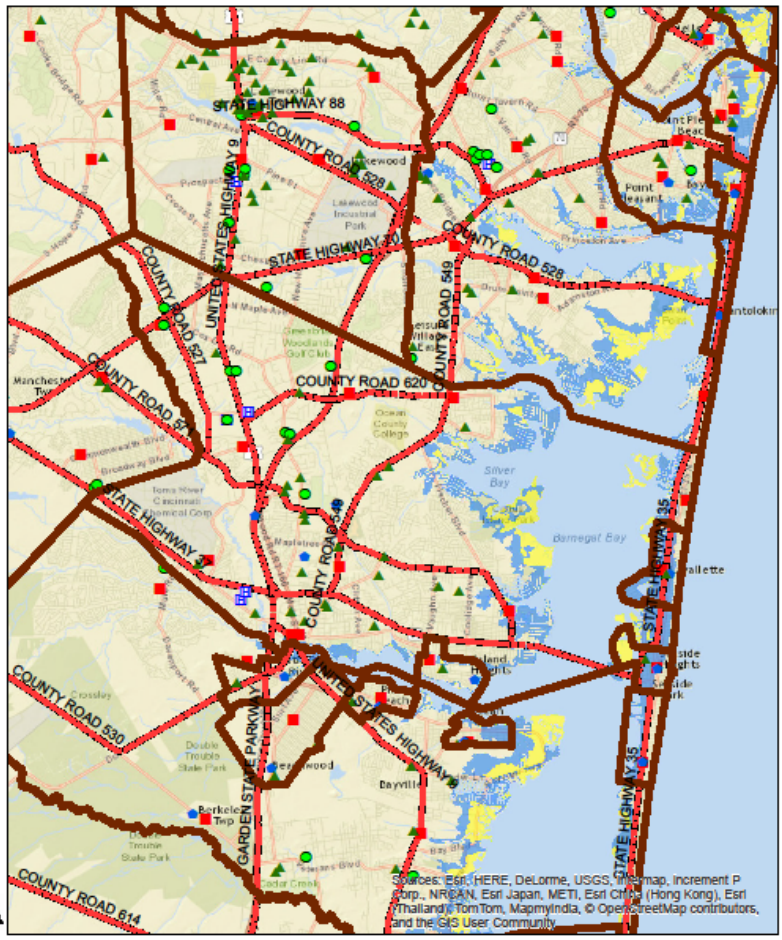
Rutgers, New Brunswick
Center for Remote Sensing
and Spatial Analysis

CRSSA



Category 2 SLOSH Model
Toms River Township

Legend

- Municipality
- Schools
- Assisted Living
- Law Enforcement
- Hospitals
- Fire Stations
- Evacuation Routes

Category 2 SLOSH

- 0 - 3 Feet Above Ground Level
- 3 - 6
- 6 - 9
- > 9

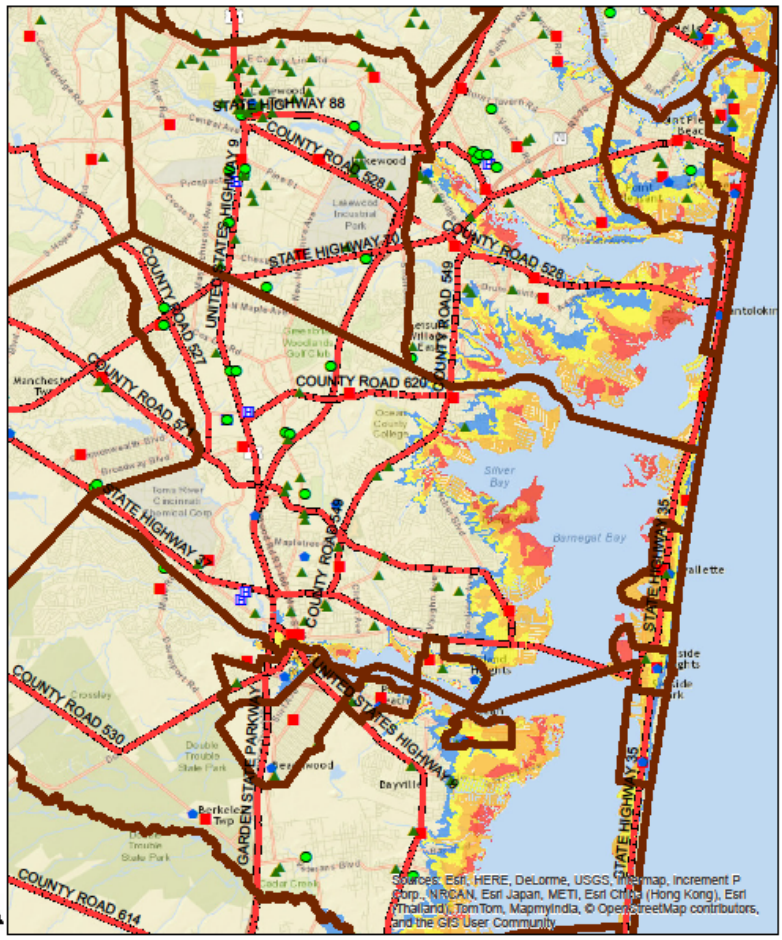
0 2 4 Miles

Year 2010 Population: 91239

This map depicts the SLOSH model extents provided by NOAA. The depths are ranged from 0-9 or greater feet of inundation above ground level and are categorized in the legend above.

Map Authors: Rachael Sacatelli and Bryan Serino
Rutgers, New Brunswick
Center for Remote Sensing
and Spatial Analysis

CRSSA



Category 3 SLOSH Model
Toms River Township

Legend

- Municipality
- Schools
- Assisted Living
- Law Enforcement
- Hospitals
- Fire Stations
- Evacuation Routes

Category 3 SLOSH

- 0 - 3 Feet Above Ground Level
- 3 - 6
- 6 - 9
- > 9

0 2 4 Miles

Year 2010 Population: 91239

This map depicts the SLOSH model extents provided by NOAA. The depths are ranged from 0-9 or greater feet of inundation above ground level and are categorized in the legend above.

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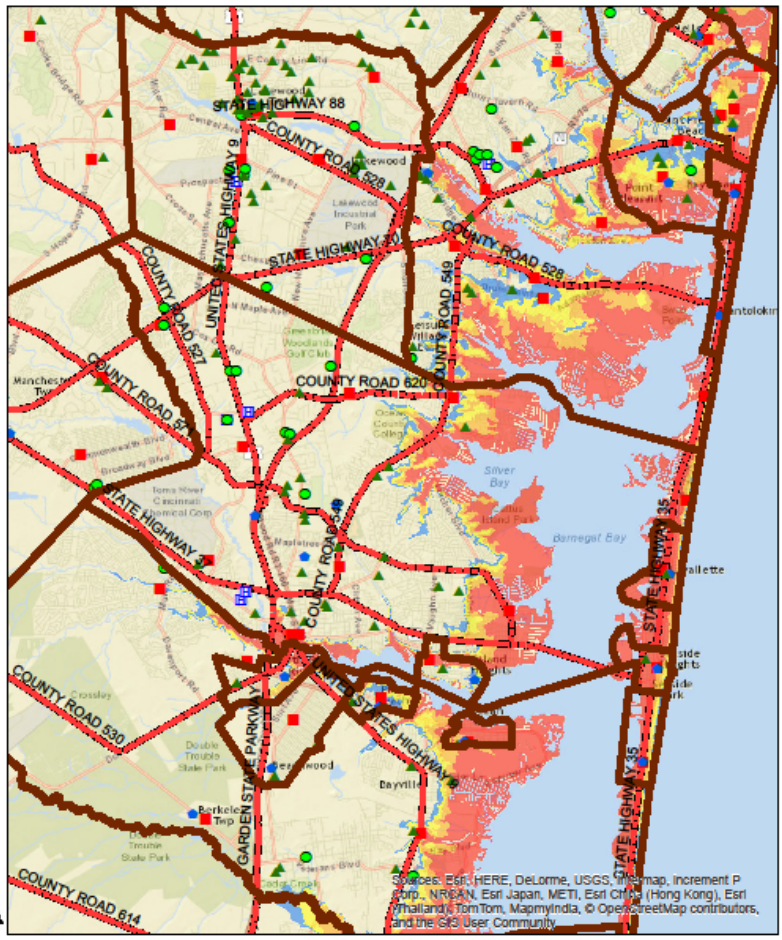

Marsh Retreat at 1 feet of Sea Level Rise Toms River Township

Legend

- Municipality
- Schools
- Fire Stations
- Law Enforcement
- Assisted Living
- Hospitals
- Evacuation Routes

Marsh Retreat at 1ft SLR

- Unimpeaded Marsh Retreat Zone
- Impeded Marsh Retreat Zone
- Marsh Conversion: Unconsolidated Shore
- Marsh Conversion: Open Water
- Unchanged Tidal Marsh

0 0.75 1.5 3 Miles

Year 2010 Population: 91239

According to Kenneth G. Miller et al. in the 2013 study "A Geological Perspective on Sea-Level Rise and its Impacts Along the U.S. Mid-Atlantic Coast" a probable threat is the 1ft sea level rise condition that could be expected by 2050. This map depicts the marsh retreat caused by sea level rise centered on target municipalities.

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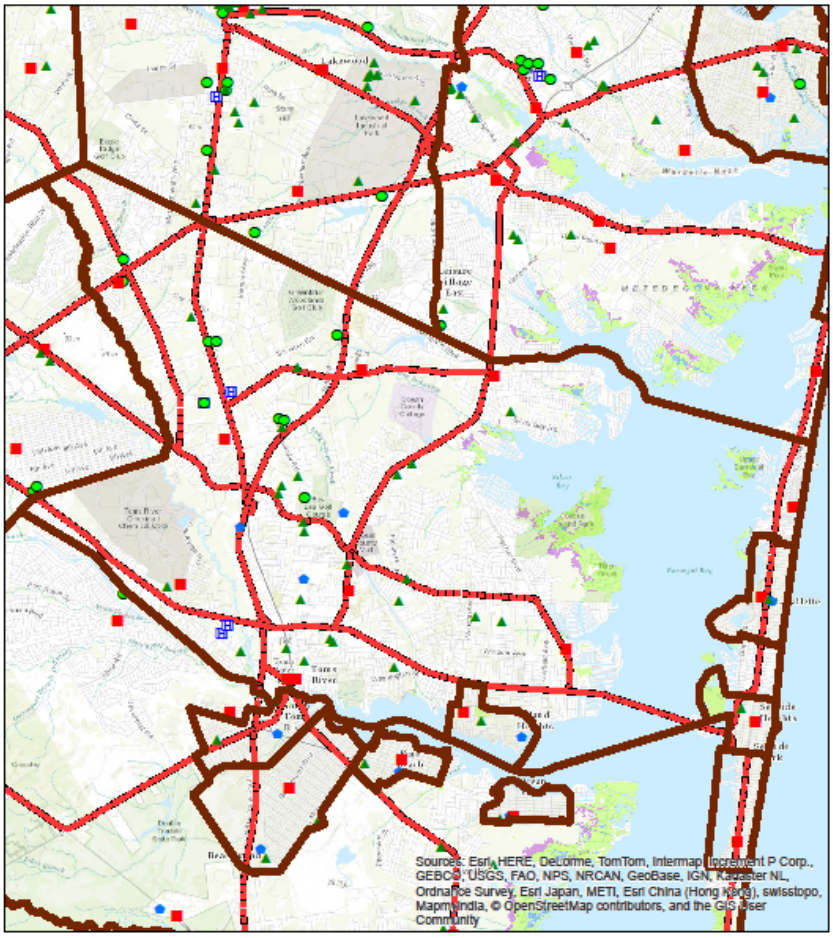

Marsh Retreat at 2 feet of Sea Level Rise Toms River Township

Legend

- Municipality
- Schools
- Fire Stations
- Law Enforcement
- Assisted Living
- Hospitals
- Evacuation Routes

Marsh Retreat at 2ft SLR

- Unimpeaded Marsh Retreat Zone
- Impeded Marsh Retreat Zone
- Marsh Conversion: Unconsolidated Shore
- Marsh Conversion: Open Water
- Unchanged Tidal Marsh

0 0.75 1.5 3 Miles

Year 2010 Population: 91239

According to Kenneth G. Miller et al. in the 2013 study "A Geological Perspective on Sea-Level Rise and its Impacts Along the U.S. Mid-Atlantic Coast" a probable threat is the 1ft sea level rise condition that could be expected by 2050. This map depicts the marsh retreat caused by sea level rise centered on target municipalities.

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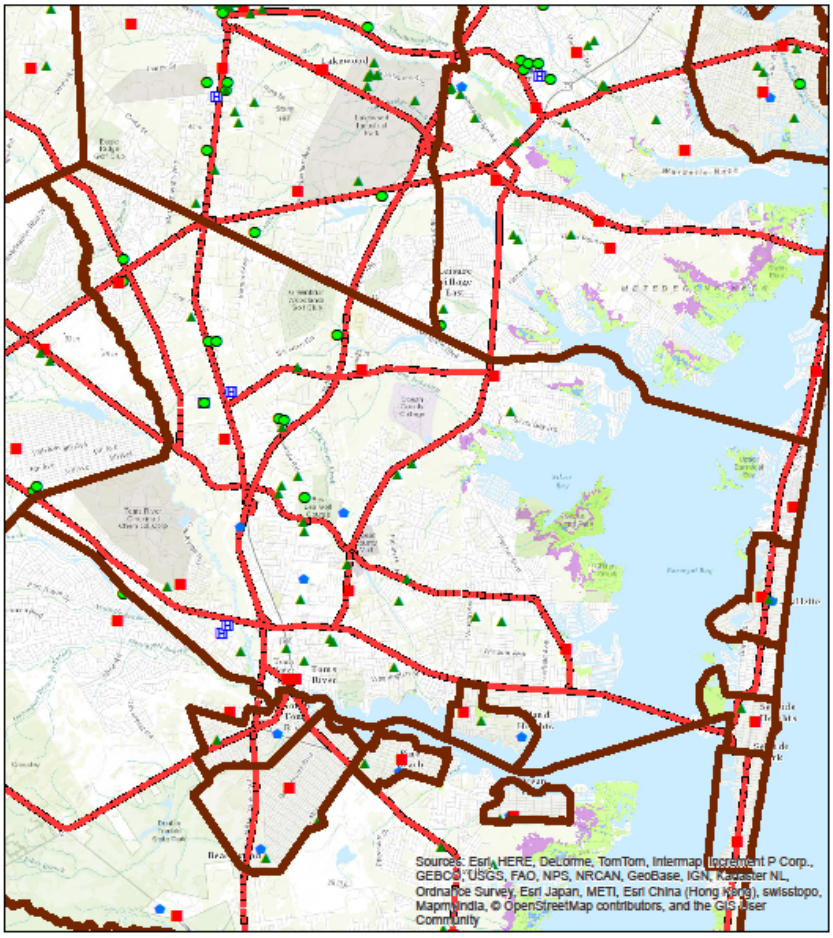

Marsh Retreat at 3 feet of Sea Level Rise Toms River Township

Legend

- Municipality
- Schools
- Fire Stations
- Law Enforcement
- Assisted Living
- Hospitals
- Evacuation Routes

Marsh Retreat at 3ft SLR

- Unimpeded Marsh Retreat Zone
- Impeded Marsh Retreat Zone
- Marsh Conversion: Unconsolidated Shore
- Marsh Conversion: Open Water
- Unchanged Tidal Marsh

0 0.75 1.5 3 Miles

Year 2010 Population: 91239

According to Kenneth G. Miller et al. in the 2013 study "A Geological Perspective on Sea-Level Rise and its Impacts Along the U.S. Mid-Atlantic Coast" a probable threat is the 1ft sea level rise condition that could be expected by 2050. This map depicts the marsh retreat caused by sea level rise centered on target municipalities.

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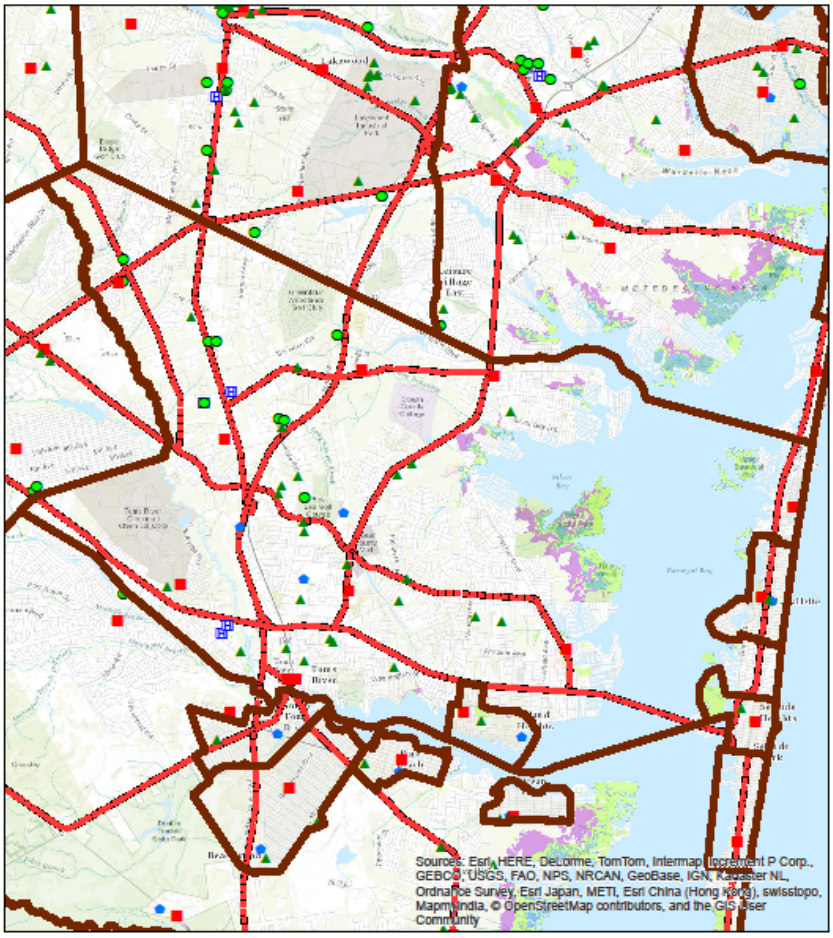

FEMA's PFIRM Flood Zones for New Jersey
Toms River Township

Legend

- Municipality
- Schools
- Assisted Living
- Law Enforcement
- Hospitals
- Fire Stations
- Evacuation Routes

PFIRM

- Zone X - 0.2% Annual Chance
- A
- AE
- AO
- D
- VE

0 2 4 Miles

Year 2010 Population: 91239

This map shows the extents of FEMA's latest flood insureance rate maps for the state of New Jersey. The numerical label in the zones portrays the static ABFE zone. Please refer to the index for more information.

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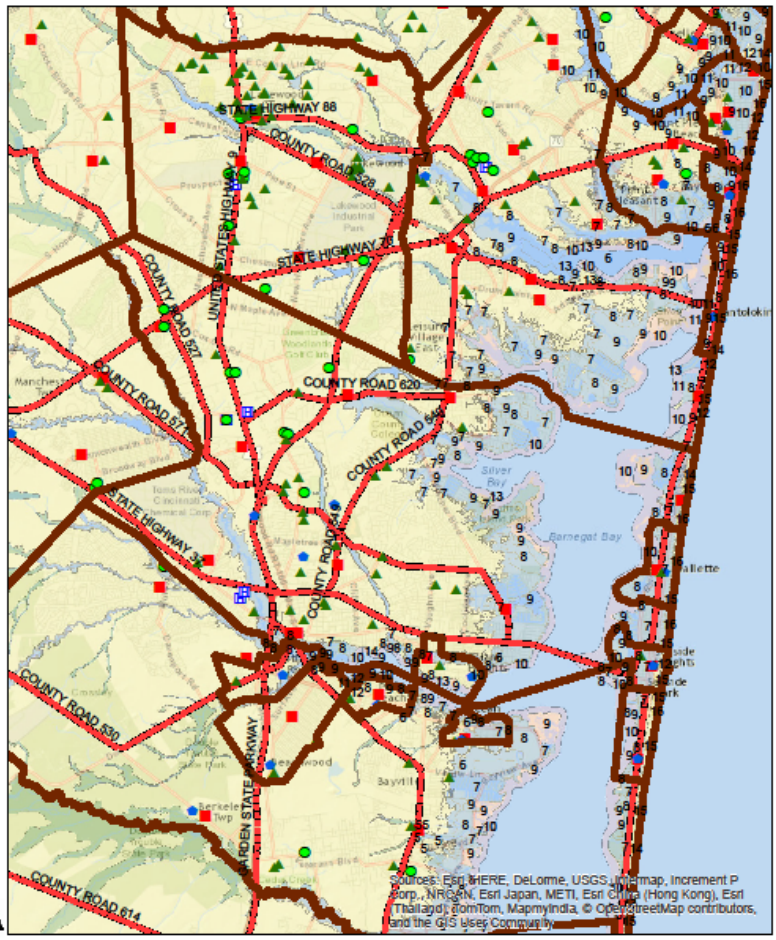
and Spatial Analysis

CRSSA



Note: Coverage, Percent Coverage, and Municipality Size include land and water area

PFIRM Zones				
Municipality	Flood Zone	Coverage (Sq. Mi.)	Percent Coverage	Municipality Size (Sq. Mi)
Toms River Township	0.2 PCT ANNUAL CHANCE FLOOD HAZARD	1.51	2.87	52.68
Toms River Township	A	0.01	0.01	52.68
Toms River Township	AE	8.51	16.16	52.68
Toms River Township	AO	0.02	0.04	52.68
Toms River Township	VE	3.65	6.93	52.68

Sandy Storm Surge
Toms River Township

Legend

- Municipality
- Schools
- Fire Stations
- Law Enforcement
- Assisted Living
- Hospitals
- Evacuation Routes

Sandy Storm Surge

High: More Water

Low: Less Water

0 1 2 4 Miles

Year 2010 Population: 91239

This map depicts the Sandy Storm Surge extents provided by FEMA. The depths are ranged in meters of inundation above ground level and are categorized in the legend above.

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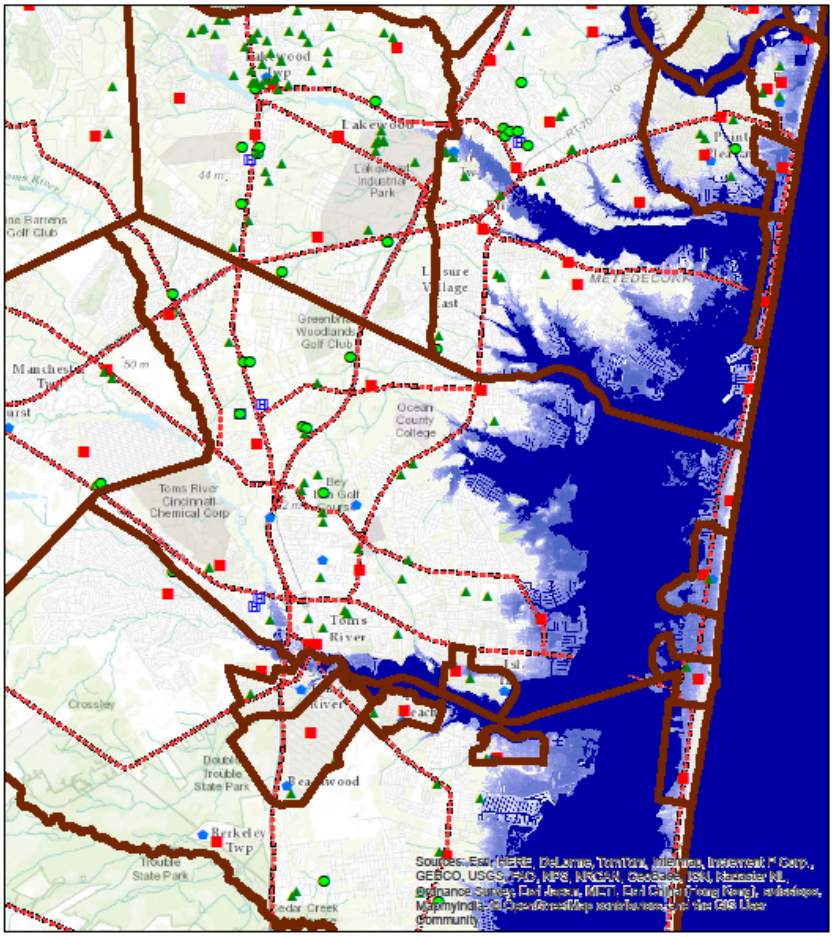


Toms River Historical Erosion Data

Beach-Dune Performance Assessment of New Jersey Beach Profile Network (NJBPN) Sites at Northern Ocean County, New Jersey After Hurricane Sandy Related to FEMA Disaster DR-NJ 4086

November 28, 2012

Introduction;

The Richard Stockton College of NJ Coastal Research Center (CRC) has initiated a post-storm survey and assessment of the New Jersey shoreline in response to severe beach erosion resulting from the impact and landfall of Hurricane Sandy. As a result of the Presidential Disaster Declaration, the Federal Emergency Management Agency (FEMA) has termed the event DR-NJ-4086 for reporting/assistance purposes. The analysis for the developed portion of the northern Ocean County barrier-spit compares data collected during fall 2012 (mid-September) to data surveyed poststorm on November 8th, 12th, and 19th 2012. This initial report is focused on the impact to northern Ocean County's dunes and beaches from Hurricane Sandy. The damage details have been organized specific to each municipal segment of the barrier-spit starting in the north at Point Pleasant Beach and ending in the south at Seaside Park.

Hurricane Sandy's Impact on the Northern Ocean County Shoreline;

In general terms, the all forms of damage to beaches, dunes and public or private property was significantly worse on the north side of the storm's zone of coastal landfall in Atlantic County. Southern Cape May County fared best with limited overwash, dune scarping and loss of beach elevation. Many Cape May coastal communities were beneficiaries of either USACE or NJ State co-sponsored Shore Protection Projects that yielded wider beaches and dunes designed with specific storm resistance in terms of elevation and width. Damages increased towards the region of landfall with moderate dune breaches, especially in southern Ocean City area, and damages to southern Absecon Island's oceanfront properties. Dune breaches, loss and scarping of dunes, beach width and elevation continued north into Brigantine. From the natural area of Holgate on Long Beach Island, north along the remainder of the Jersey coast the intensity dramatically increased for dune breaching and overwash and/or complete erosion of the dunes, drastic lowering of the elevation on beaches with substantial sand transport onto and across Long Beach Island or Northern Ocean County's spit. Damage to oceanfront property (public and private) increased dramatically.

In addition to comparing pre- and post-storm profile data, the CRC has added results from the state-wide, beach-dune susceptibility assessment for the 100-year storm event (or 1% base flood event as classified by FEMA) for a preliminary validation of the model (for the time being, only visual observation – more testing is needed on the results). The beach-dune assessment started in 2006 and is funded through the NOAA Coastal Services Center. The beach-dune assessment is based on year-2000

LiDAR elevation data and evaluates the storm protection performance potential of the oceanfront beach-dune system. The assessment was carried out by segmenting the beach-dune system, parallel to the shoreline from Manasquan Inlet to Barnegat Inlet (~23 miles), into 490 uniform zonal analysis areas, called "bins", that are 250-foot-wide. For each bin, several variables relating to dune width, height, seaward slope, beach elevation and width, and nearshore geomorphology. The presence of vegetation and structures (such as groins), were collected, compiled, and evaluated in order to determine the susceptibility of the dune system to potential damage from storm activity. These susceptibility variables were quantified and, using expert knowledge, assigned a "weight of influence" with respect to their individual abilities to withstand or counteract the effects of storm-induced erosion. LiDAR elevation and profile survey bathymetry data were used as data input to a wave run-up erosion simulation (USACE's SBEACH) to determine the failure point of the dune system for each bin (the point of failure is defined as the point when the dune crest is breached in response to landward recession of the foredune toe). The output of the erosion simulations were used to control how the susceptibility variables were integrated, and to classify the resulting susceptibility values into statistical intervals. The results for the 100-year storm are conveyed on a map as multicolored polygons that delineate the foredune prior to the storm simulation.

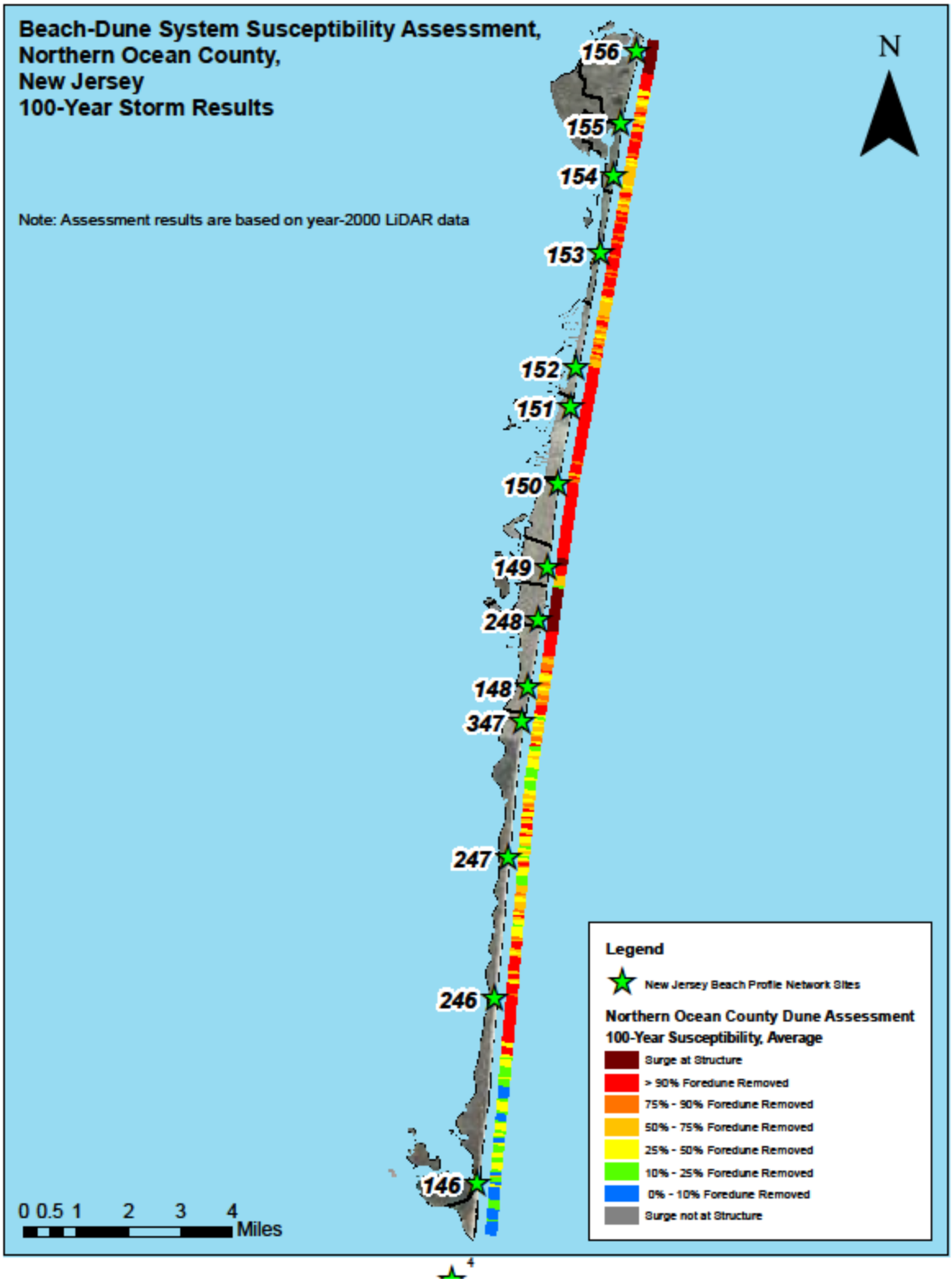
Beach/Dune Damage Assessment by Municipal Island Segment:

To measure the erosion, 11 of 14 pre-existing New Jersey Beach Profile Network (NJBPN) monitoring sites were used to provide an accurate comparison and assessment of storm related shoreline and beach volume changes. The data from the fall 2012 NJBPN survey, completed along the developed portion of northern Ocean County's shoreline by September 21st, provides an excellent indication of beach and dune conditions against which to show damages that occurred during the hurricane. Data collected at the 11 oceanfront beach profile locations cover the municipal beaches from Point Pleasant Beach to Midway Beach (Seaside Park). Island Beach State Park (IBSP) is a natural area and has not yet been surveyed for this initial report. It should be noted that no areas along the northern Ocean County barrier-spit shoreline have seen the USACE design plan for regional shore protection move to construction. There have not been any NJ State, County or local beach replenishment projects completed prior to Hurricane Sandy. Previous storm damage has been addressed by importing mainland quarry sand in piecemeal repairs to minor breaches or beach elevation loss on a local basis. The vast majority of the quarry sand has been delivered to Long Beach Island over the years. The Borough of Mantoloking obtained permits to place sand mined from the Ambrose Channel leading into New York Harbor in the 1990's, but that project failed to materialize.

Profile Locations:

The following sites on the developed portion of the barrier-spit of northern Ocean County were surveyed during September 2012 and post-Sandy on November 8th, 12th, and 19th (Figure 1). Post-storm surveys were not completed for the three locations within Island Beach State Park. Information regarding shoreline and volume changes for those sites will be included in the annual 2012 report. *Below is a map showing the location of each profile.
NJBPN 156 Water St. Point Pleasant NJBPN 149 8th Ave. Ortley Beach

NJBPN 155 Maryland Ave. Point Pleasant NJBPN 248 Franklin Ave. Seaside Heights
NJBPN 154 Johnson Ave. Bay Head NJBPN 148 4th Ave. Seaside Park
NJBPN 153 1117 Ocean Ave. Mantoloking NJBPN 147 6th Lane Midway Beach
NJBPN 152 Public Beach #3 Brick Township NJBPN 247 North End Island Beach SP
NJBPN 151 1st Ave. Normandy Beach NJBPN 246 Parking Lot A7 Island Beach SP
NJBPN 150 White Ave. Lavallette NJBPN 146 South End Island Beach SP

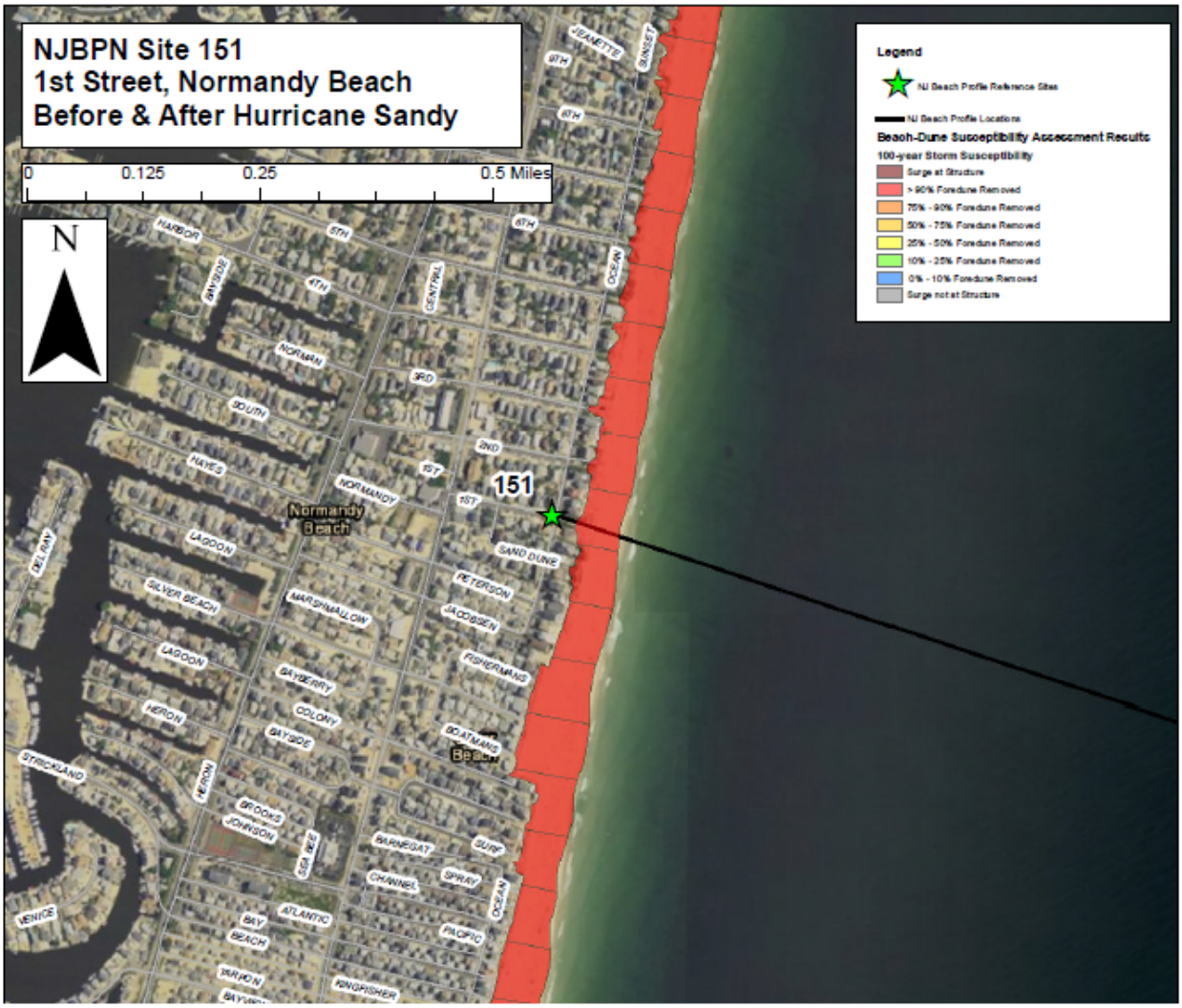

Beach-Dune System Susceptibility Assessment,
Northern Ocean County,
New Jersey
100-Year Storm Results
Note: Assessment results are based on year-2000 LiDAR data
N
156
155
154
153
152
151
150
149
248
148
347
247
246
146
0 0.5 1 2 3 4
Miles
Legend
New Jersey Beach Profile Network Sites
Northern Ocean County Dune Assessment
100-Year Susceptibility, Average
Surge at Structure
> 90% Foredune Removed
75% - 90% Foredune Removed
50% - 75% Foredune Removed
25% - 50% Foredune Removed
10% - 25% Foredune Removed
0% - 10% Foredune Removed
Surge not at Structure

Toms River Township (Normandy Beach);
The northern Township shoreline fared better than did the Ortley Beach section to the south, but significant overwash occurred in this section and many oceanfront and landward homes were damaged. This was due to beachdune widths and elevations not adequate to withstand the tidal surge and wave action produced by Hurricane Sandy. Site #151 had losses of the dune and berm where 46.1 yds3/ft. of sand were removed during the storm.

Toms River Township (Ortley Beach);
Ortley Beach had a 25-year history of shoreline retreat and sand volume loss as determined by the Coastal Center's 8th Avenue survey site. Ocean Avenue, the boardwalk and many homes were completely destroyed in this segment. Site #149 located at 8th Avenue showed a sand volume loss of 68.7 yds3/ft. with over 10 feet of dune removed and pushed landward in overwash deposits. Everything was stripped away leaving a flat, featureless beach sloping into
the sea. This was the site of the worst and most widespread structural damage in Northern Ocean County.

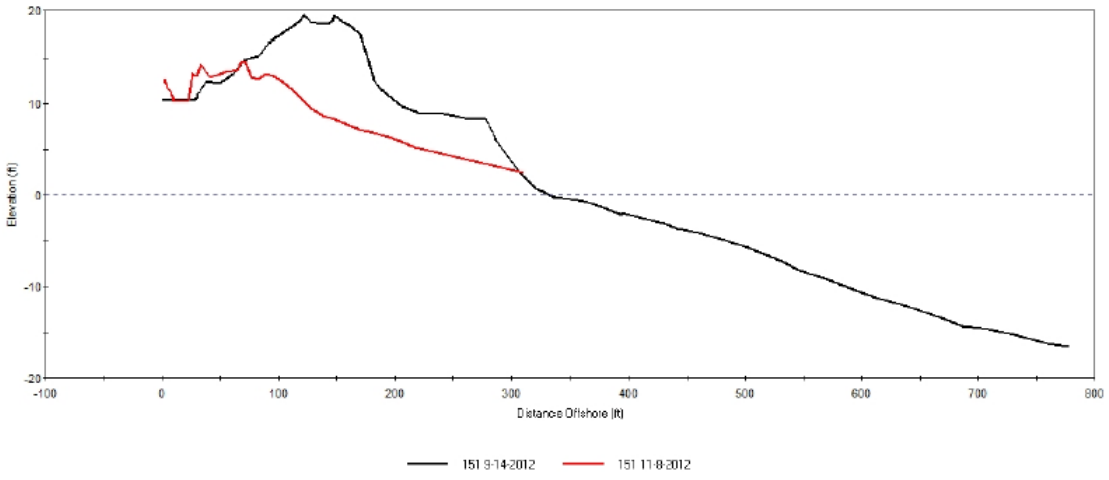
The photographs above were taken on September 14, 2012 (left) and November 8, 2012 (right).

Figure 7. The following figure shows the predicted impacts from a 100-year storm surge at Normandy Beach. The predicted susceptibility was based upon the lack of an established dune system and minimal berm. Also shown is the comparison plot between the pre- and post-storm surveys. The plot depicts the changes caused by the storm and the losses of the berm where 46.1 yds^3/ft. of sand were removed during the storm. Significant overwash occurred at this site and many oceanfront and landward homes were damaged.



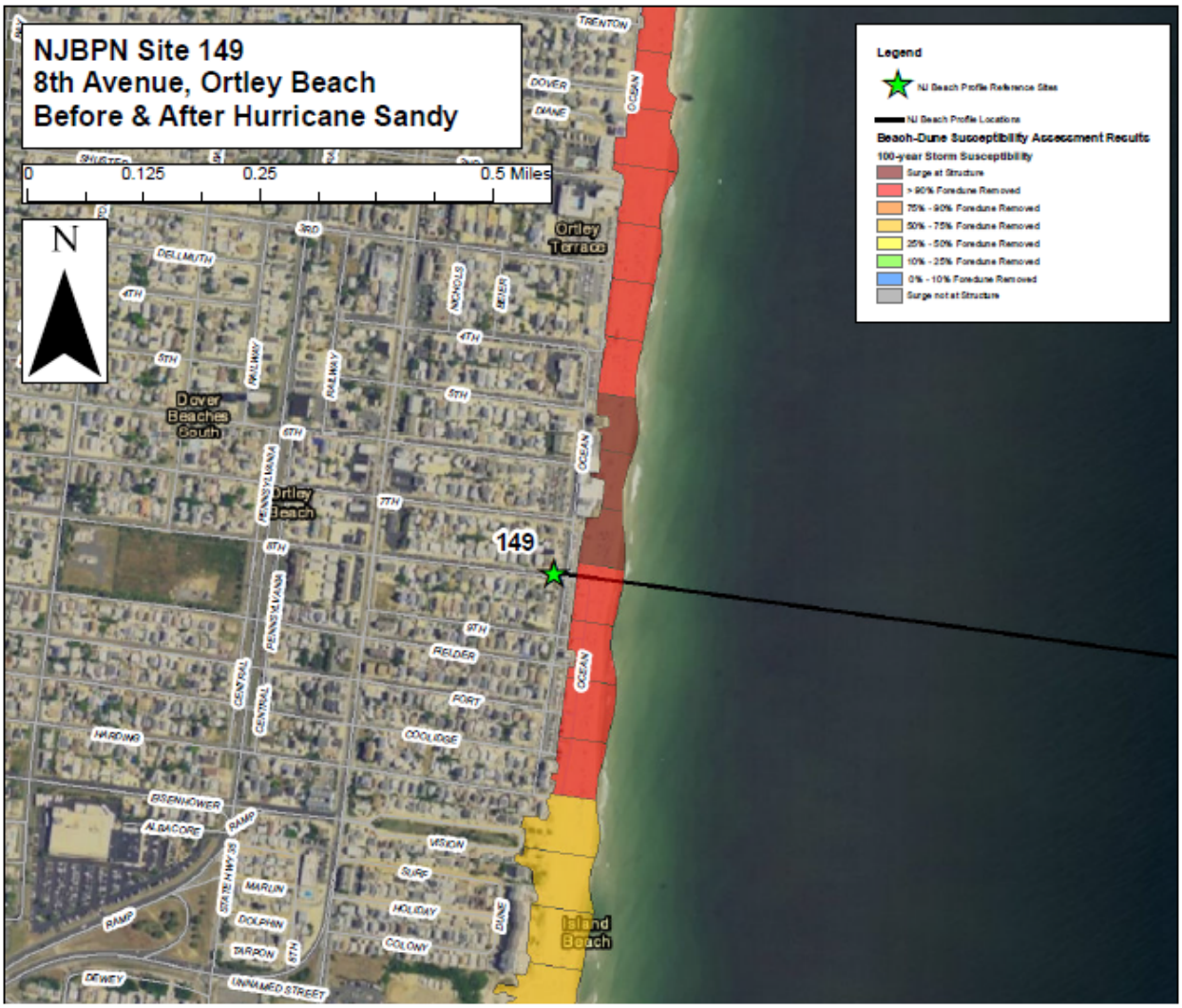
Pre vs. Post Sandy
Site 151
1st Ave., Normandy Beach

Volume Change = -46.139 cu. yd/ft



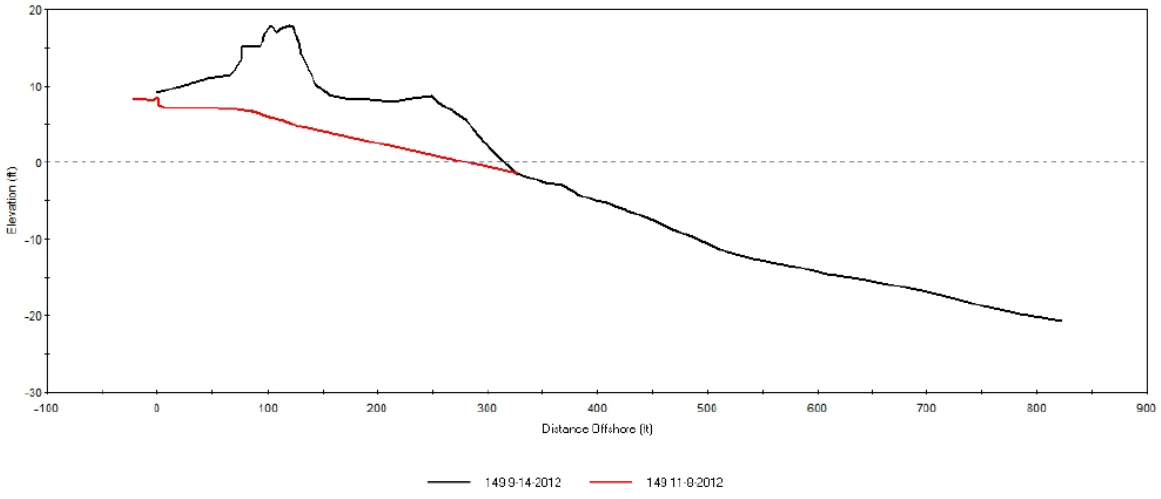
The photographs above were taken on September 14, 2012 (left) and November 8, 2012 (right).

Figure 9. The following figure shows the predicted impacts from a 100-year storm surge at Ortley Beach. The predicted susceptibility was based upon the lack of an established dune system and minimal berm width. Also shown is the comparison plot between the pre- and post-storm surveys. The plot depicts the changes caused by the storm and the losses of the berm and dune where 68.7 yds^3/ft. of sand were removed during the storm. Over 10 feet of dune was removed and pushed landward in overwash deposits. Ocean Avenue was completely destroyed as well as several homes. The photo on the right shows a classic planed beach caused by the large waves. Follow-up surveys will determine whether some of the sand moved seaward into nearshore bars.



Pre vs. Post Sandy
Site 149
8th Ave., Ortley Beach

Volume Change = -68.744 cu. yd/ft



Northern Ocean County Post Sandy Volume Changes			
Site	**Vol Change cu yds per ft**	**Dune Failure**	**Recent Beach Fill**
347	-48.673	N	N
148	-43.722	N	N
248	-39.327	Y	N
149	-68.744	Y	N
150	-51.687	Y	N
151	-46.139	Y	N
152	-42.014	Y	N
153	-109.595	Y	N
154	-19.576	Y	N
155	-45.752	Y	N
156	-62.677	Y	N

Figure 13 shows a table of values for the 11 developed shoreline profile site locations in northern Ocean County. The sand volume lost per foot of shoreline represents loss from the dune and the beach and does not include changes in the offshore region. These surveys were completed as rapidly as possible so no swimmers were brought to these sites. The swimming portion of the survey takes 75% of the time at each site and the crew was trying to cover as many sites as possible each day following Sandy. There are 105 sites to cover statewide.

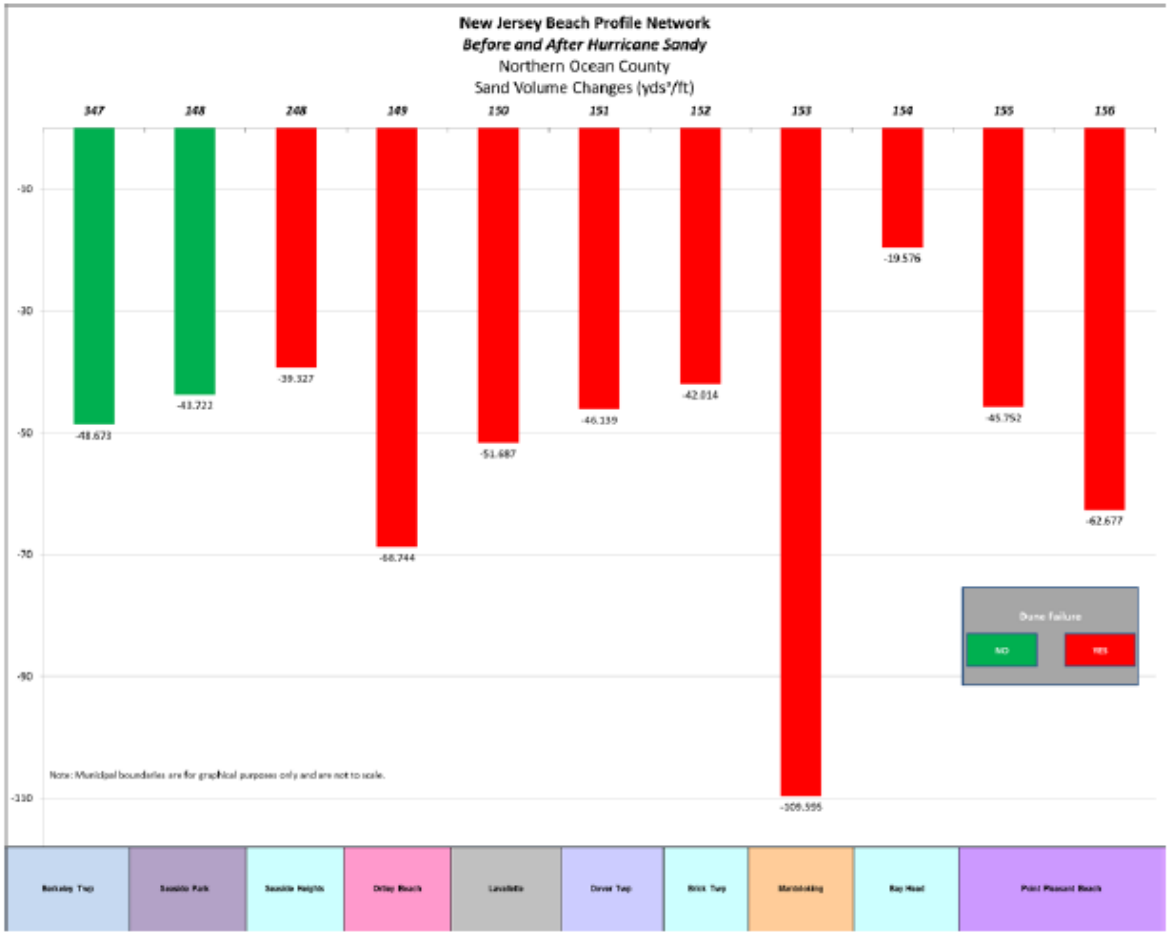


Figure 14. This graphic shows the sand volume loss figures for each of the communities within the developed sections of the northern Ocean County Atlantic shoreline. No Federal shore protection projects have occurred along this portion of the New Jersey shoreline. All sites experienced berm erosion and dune losses. Sites 347 and 148 contained a greater dune volume prior to the storm and though dune losses were recorded, there was no dune failure. The losses measured at Site 153 were enhanced due to the presence of a newly-opened inlet (with depths measured at approximately 18 feet). The dune at Site 154 contained a rock/timber core that was included in the pre-storm dune volume calculation.

Northern Ocean County Post Sandy Volume Changes

MUNICIPALITY	Site	Vol Change cu yds per ft	Average Volume Between Sites	Dune Failure	Recent Beach Fill	REF POINT Distance (FEET)	Vol Change - Cubic Yards Between Profiles (South to North)	Cumulative Volume Change - Cubic Yards (South to North)
Berkely Township	347	-48.673		N	N	0.00	0.00	0
Seaside Park	148	-43.722	-46.20	N	N	4,607.59	-212,859.05	-212,859.05
Seaside Heights	248	-39.327	-41.52	Y	N	9,074.11	-376,798.01	-589,657.06
Ortley Beach	149	-68.744	-54.04	Y	N	7,154.30	-386,586.18	-976,243.25
Lavallette	150	-51.687	-60.22	Y	N	11,087.76	-667,654.81	-1,643,898.06
Dover Twp	151	-46.139	-48.91	Y	N	10,393.85	-508,394.46	-2,152,292.51
Brick Twp	152	-42.014	-44.08	Y	N	5,184.78	-228,527.02	-2,380,819.53
Mantoloking	153	-109.595	-75.80	Y	N	15,628.24	-1,184,691.26	-3,565,510.79
Bay Head	154	-19.576	-64.59	Y	N	10,487.40	-677,333.97	-4,242,844.76
Point Pleasant Beach	155	-45.752	-32.66	Y	N	6,800.90	-222,144.64	-4,464,989.40
Point Pleasant Beach	156	-62.677	-54.21	Y	N	9,971.70	-540,610.46	-5,005,599.86
					Total Volume Loss for Northern Ocean County =		-5,005,599.86	

Figure 15. This table provides a summary of all the individual site sand volume losses from the dune and beach to the limit of the post-Sandy survey. The total is derived by adding two adjacent site losses and dividing by two, then multiplying by the distance in feet between the two sites. This is known in the dredging industry as "closed-end averaging" to obtain dredged volume along a channel. It is acknowledged that sand resources reside seaward of the short post-storm surveys, but the need for speed dictated that taking additional time to survey to 15-16 feet of water offshore would not add significantly to the losses seen within the beach/dune system. These longer surveys will be completed in due course however. No estimate was made for the sand loss values south of the Berkeley Township site (347) in the natural areas of Island Beach State Park. A percentage of the sand carried offshore by Sandy will move back toward the beach over time in the absence of future storms. All sand lost from the dunes will require human intervention to replace, groom and re-vegetate in order to have the protection in place quickly. A natural dune system developing from scratch would require 15 to 20 years to re-establish close to what was lost.

Toms River 25 Year Review
Introduction:

OCEAN COUNTY SUMMARY

Northern Ocean County has been studied by the US Army Corps of Engineers (ACOE) under the Water Resources Development Act of 2007 leading to the need for a Limited Reevaluation Report and the execution of the Project Partnership Agreement with the State of New Jersey and all impacted municipal entities. Currently set at a cost of $78,000,000 for both Federal and non-Federal shares, the project calls for the construction of a berm and dune requiring 10 million cubic yards of material derived from offshore borrow sites. The Congressional authorization of the funds, the need for many real estate easements along the oceanfront, and finalized construction plans remain substantial obstacles blocking the start of construction.

Ocean County has the longest oceanfront shoreline of the four coastal counties (45.2 miles) where the northern section comprises 23.6 and Long Beach Island makes up 21.6 miles. There are a total of 13.4 miles of undeveloped shoreline in two large parcels (Island Beach State Park – 10.0 mi. and Holgate – 3.4 miles). There is just one inlet in Ocean County (Barnegat Inlet dividing the northern section from Long Beach Island) between Manasquan Inlet to the north and Little Egg Inlet on the south. The northern section is unique along the NJ coastline in that it lies within a zone where sand transport parallel to the shoreline is essentially zero over long periods of time. Monmouth County's beaches have a limited distance over water for northeast storm winds (fetch) to generate big waves, so sand moves dominantly north (creating Sandy Hook National Seashore over time), while the much greater distance for wave generation between Long Island, NY and Long Beach Island, Atlantic and Cape May Counties gives rise to dominant sand transport to the south. The absence of inlets along a 23.6-mile segment of shoreline also means fewer zones where tidal currents interact with the wave sets to alter the orientation and stability of the barrier islands as in Cape/Atlantic Counties. Northeast storms do move sand south along the Northern Ocean County shoreline, but these impacts are nearly balanced by southeast wave sets acting to move the sand back to the north in near equal quantities. Therefore, over long periods of time the net transport in either direction is zero. Detailed observations do show that sand transport at Manasquan Inlet favors a northern direction, evidenced by a far larger beach width present (without beach nourishment) in Point Pleasant Beach than in the Borough of Manasquan (with a major NY District beach project in 2000). The reverse pattern is evident at Barnegat Inlet where sand preferentially accumulates at the north side of the north jetty in Island Beach State Park.

There has been no Federal, State or locally funded beach nourishment project in northern Ocean County in the past 25 years. Sand was pumped onto the county shoreline following the March 1962 northeast storm derived from dredging deep borrow zones within Barnegat Bay. These 30-foot deep areas are still present and represent biological dead zones due to the absence of oxygen in the deep water column because of the lack of circulation in them. Dunes were built and the shoreline slowly recovered. In 1992, storm damage revealed the presence of vintage cars used to block wave action until the dune was re-built. The Borough of Mantoloking recovered vehicles and discovered they had significant value to those interested in the parts for restorations.

The dramatic influence of inlets on sand distribution has been well documented, as observed in the effect on the adjacent beaches from changing the orientation and location of the south jetty at Barnegat Inlet. In 1988 the Philadelphia District Corps of Engineers undertook the re-alignment of the south jetty from the 1932 "arrow-head design" to starting the south jetty at the lighthouse tower and continuing parallel to the north jetty to the same end point. The land base of the old south jetty came ashore near 9th Street in Barnegat Light Borough about a quarter-mile south of the present land point for the new jetty. Before the new jetty was half complete, sand was back-filling the open water area between the old and new jetties. The cover of this report shows this contrast between the aerial photographs. The "shoreline" at the base of the new jetty extended seaward along the south side of the new structure for about 2,400 feet, making this by far the most accretional beach in New Jersey over the past 25 years. The total area, once water and now vegetated or dry sand, is hundreds of acres. A maritime forest will eventually occupy this zone if left natural by succeeding generations of developers, making the trek to the high tide line one of arduous effort if one is trying go bathing with children, their "supplies" and the umbrella etc. The high tide line for the CRC profile site at 10th Street lies 1,400 feet from the street end. In fact, a fishing vessel that sank offshore in the 1980's with its mast showing above the water, now rests well landward of the crest of the primary dune near this cross section.

Long Beach Island shore protection was authorized under the Water Resources Development Act of 2000 and went to construction in Sept. 2006 in Surf City. The US Army Corps of Engineers (ACOE) returned to Ocean County in 2010 following the 2007 Surf City work to place beach nourishment sand in Harvey Cedars. The addition of catch baskets to both the dredge and discharge pipeline have prevented the recurrence of the $15.7 million expense to search the new deposit for military hardware disposed at sea in the past. Work commenced in Spring 2010 at Harvey Cedars and moved north from the point where the 2007 project ended. This work completed another section of the Long Beach Island project.

Following the Federal disaster declarations in 2009 and 2010, Federal Control and Coastal Emergency funds were used to evaluate the beach damage, and as a result of the study, the FCCE authorized spending $6,048,000 to restore the federal project area eligible. Between March and June 2011 sand was pumped on the beach at Surf City between 11th and 24th Streets, not Harvey Cedars because it was not complete in November 2009. The Corps is ready to commence construction of the Brant Beach segment in 2012 with FY12 funds.

Real estate issues still plague more rapid progress elsewhere on Long Beach Island. Easement issues where individual private owners hold title to the mean high water line have resisted signing off to allow the projects to proceed across their holdings. Many issues have been raised at countless meetings and in spite of assurances that there will be no permanent "taking" of rights or ownership, some owners have no intention of allowing this work to proceed. Claims of loss of view, which reduces the property's value, increased public use of "their" beach, a perpetuity clause in the easement documents to cover future maintenance, and no serious financial inducement to sign the easement has kept some on the sidelines while a few militantly refuse any type of cooperation. One does wonder that should a massive storm wreck these properties in the absence of this project, will it be the duty of the US taxpayer to fund the restoration of the supporting infrastructure that makes oceanfront living possible?

Below are links to the US Army Corps of Engineers Philadelphia website for the direct information on Ocean County.

http://www.nap.usace.army.mil/cenap-dp/projects/factsheets/NJ/4CG_NJShoreProtection_ManasquantoBarnegat.pdf

http://www.nap.usace.army.mil/cenap-dp/projects/factsheets/NJ/Barnegat%20Inlet%20to%20LittleEgg%20(Long%20Beach%20Island).pdf

Link to full report:

http://intraweb.stockton.edu/eyos/coastal/content/docs/2011_NJBPN_report/oceancounty2011.pdf

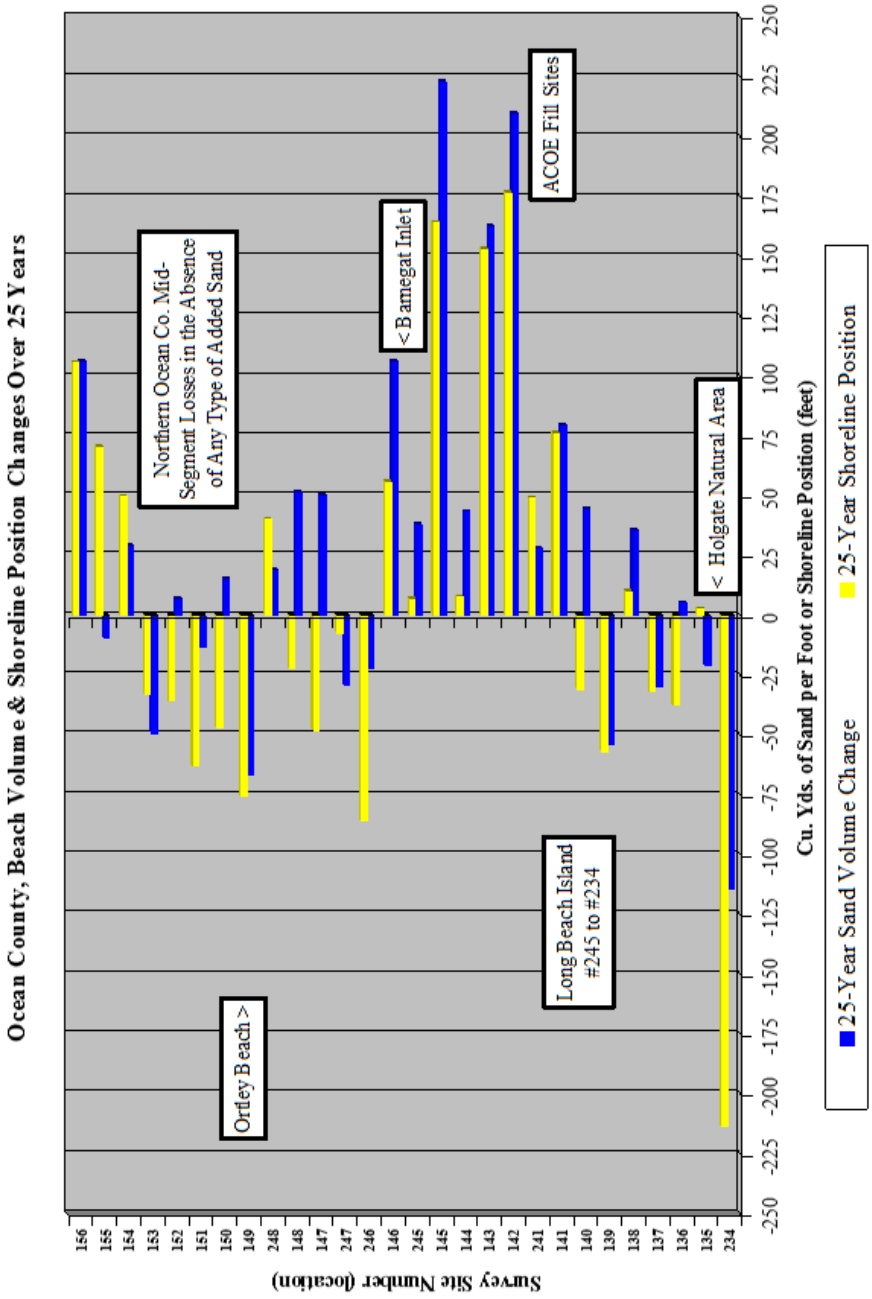


Figure 150. A summary graph showing the 25-year computations of the amount of sand added or lost (blue) and the change in shoreline position (yellow) landward or seaward in 25 years. No beach nourishment activity of any type took place in Northern Ocean County and the middle sites (Surf City, Harvey Cedars & Ship Bottom) were recipients of ACOE projects since 2006. The huge loss in the Holgate Natural area is due to a lack of sand by-passing the terminal rock groin in Beach Haven

Figure 179. Shown above is the view looking north from the seaward crest at 8th Avenue in Ortley Beach, NJ.

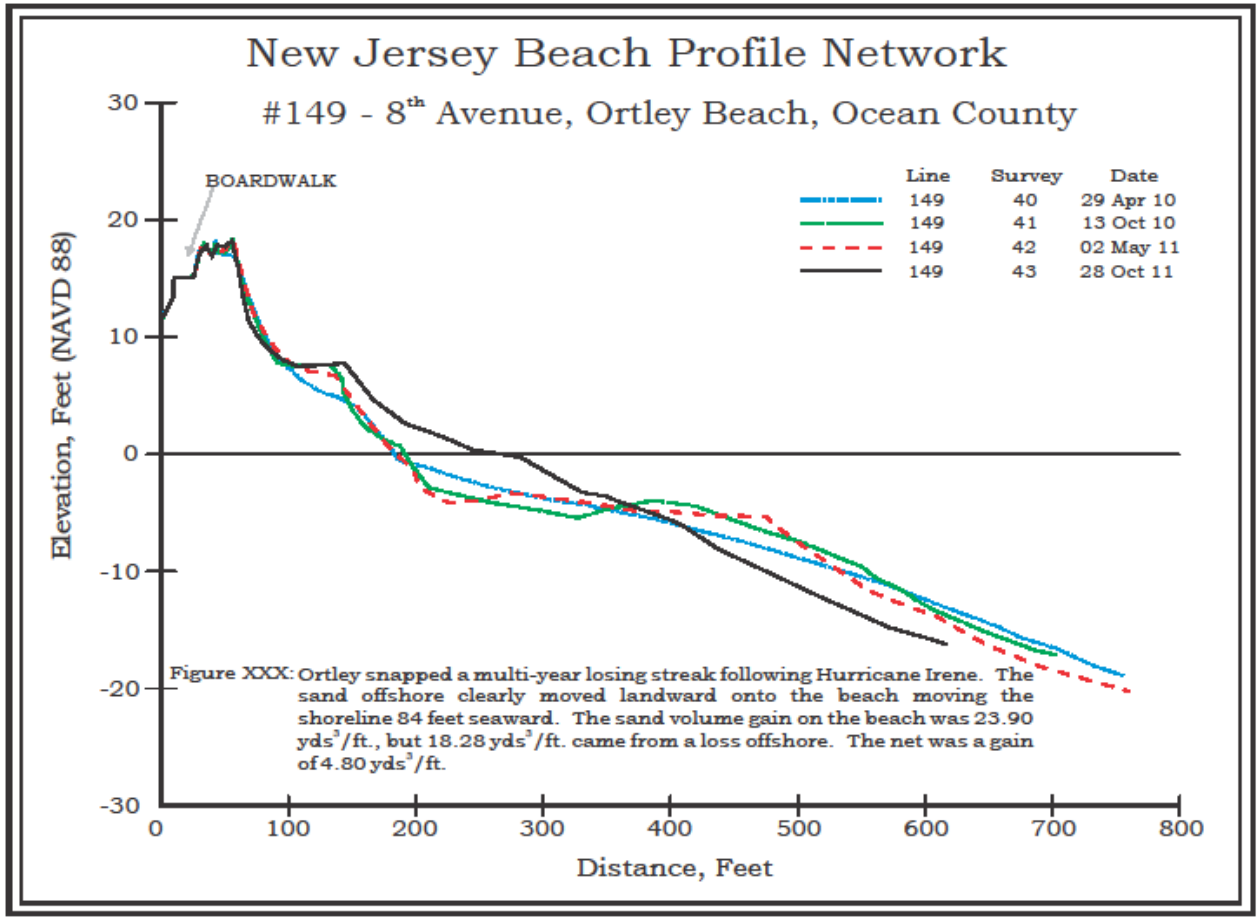


Figure XXX: Ortley snapped a multi-year losing streak following Hurricane Irene. The sand offshore clearly moved landward onto the beach moving the shoreline 84 feet seaward. The sand volume gain on the beach was 23.90 $yds^3/ft.$, but 18.28 $yds^3/ft.$ came from a loss offshore. The net was a gain of 4.80 $yds^3/ft.$

8th AVENUE, ORTLEY BEACH – SITE 149

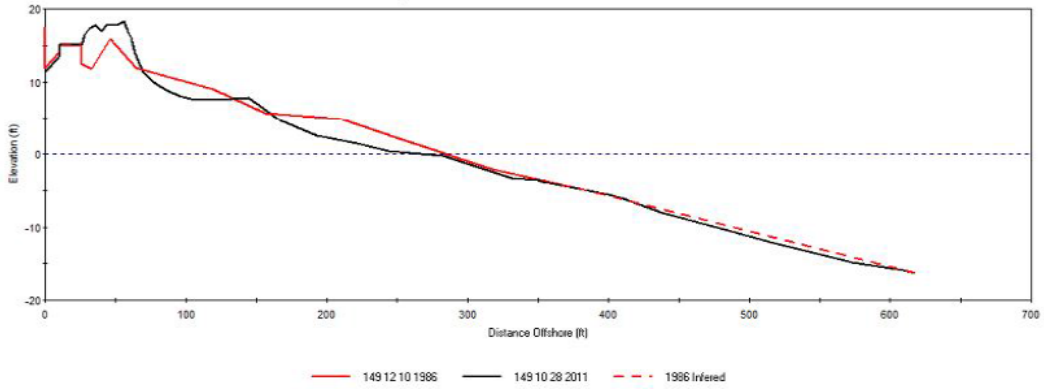


Figure 181 above shows the changes to the beach at 8th Street in Ortley Beach since its initial survey in 1986. The dune has grown vertically, however losses to the dune toe and beach face resulted in a shoreline retreat of 16 feet and a net loss of 7.402 cu.yd/ft. of sand.
Photo on the left was taken in February of 1989 and shows the view looking northeast from the boardwalk.
Photo on the right was taken in October of 2011 and shows the view north from the crest of the dune.

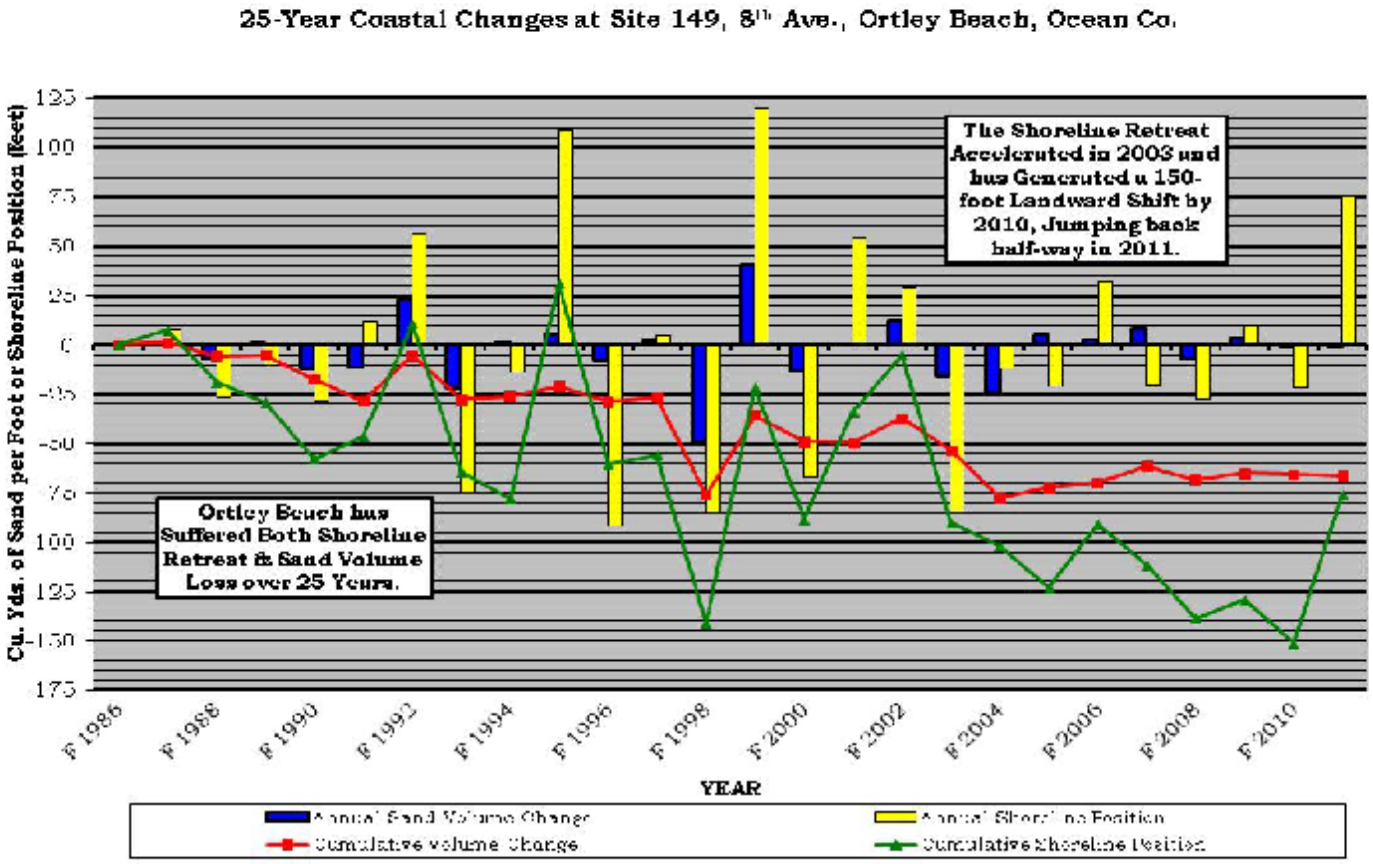


Figure 182. Profile 149 at Ortley Beach endured extensive oscillations in its shoreline position, particularly between 1992 and 2003; while the overall trend in sand volume has been that of a slow decline. The shoreline retreat accelerated in 2003 with the low point in 25 year history occurring in 2010, while some recovery occurred in 2011 the overall shoreline trend was that of retreat. From 2003 through 2011 the sand volume stabilized despite the shoreline retreat, and began a slight upward trend.

Figure 171. Shown above is the view looking southeast from the dune at 1st Street in Normandy Beach, NJ.

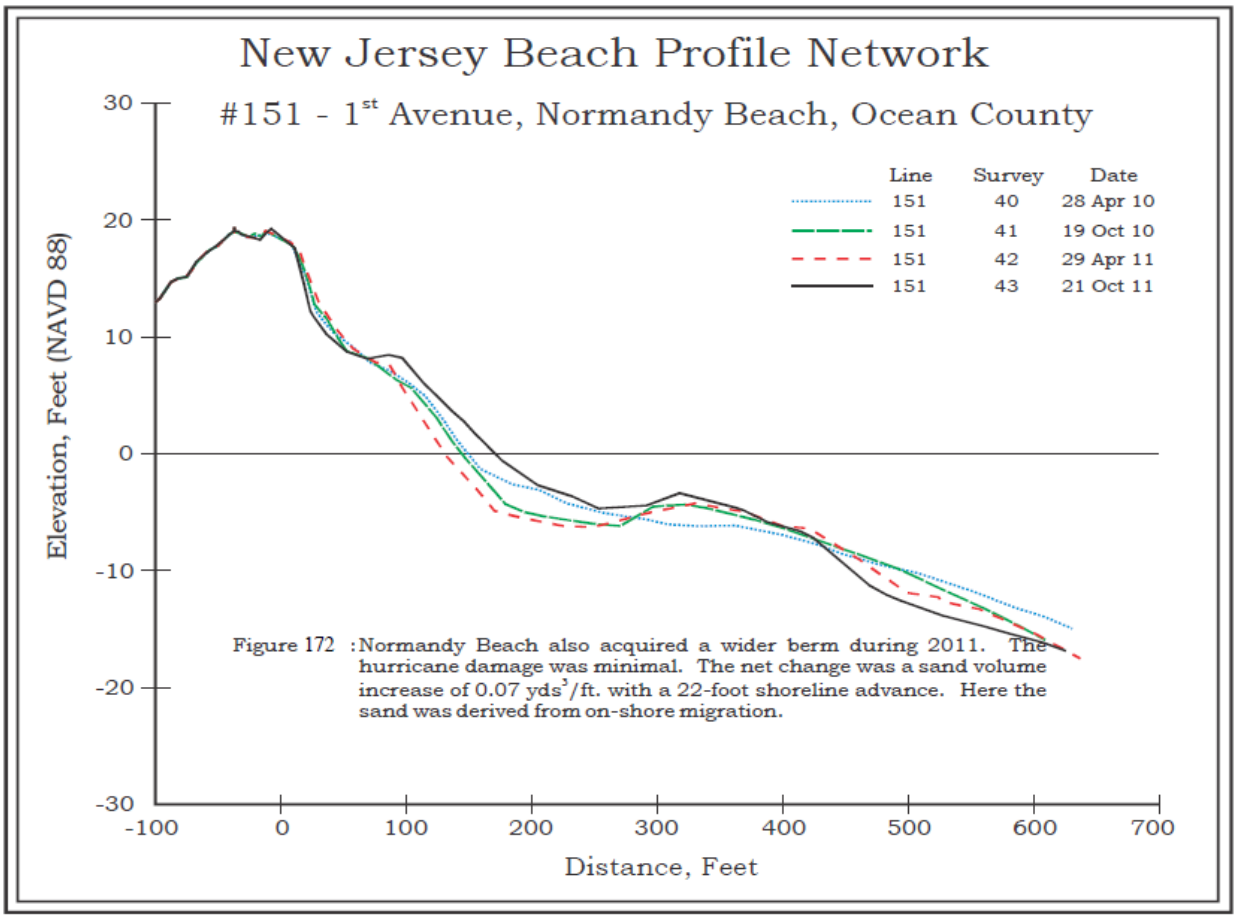


Figure 172 : Normandy Beach also acquired a wider berm during 2011. The hurricane damage was minimal. The net change was a sand volume increase of 0.07 $yds^3/ft.$ with a 22-foot shoreline advance. Here the sand was derived from on-shore migration.

1st AVENUE, NORMANDY BEACH – SITE 151

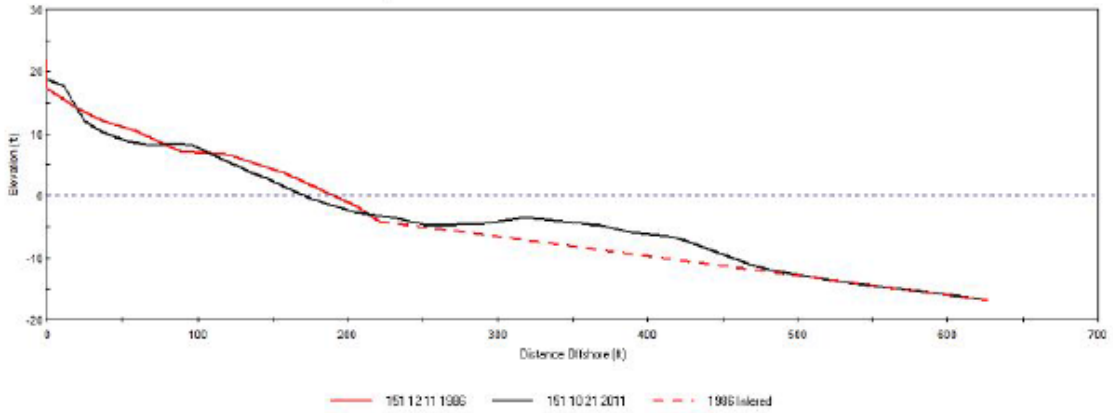


Figure 173 above shows that since the initial survey in 1986 there has been relatively little change. This is apparent in both the shoreline and volume changes, as the shoreline retreated 19 feet and the net loss in volume was a negligible 2.286 cu.yd/ft..
Photo on the left was taken in November of 1991and shows the view to the north from the dune.
Photo on the right was taken in October of 2011and shows the view to the north from the dune toe.

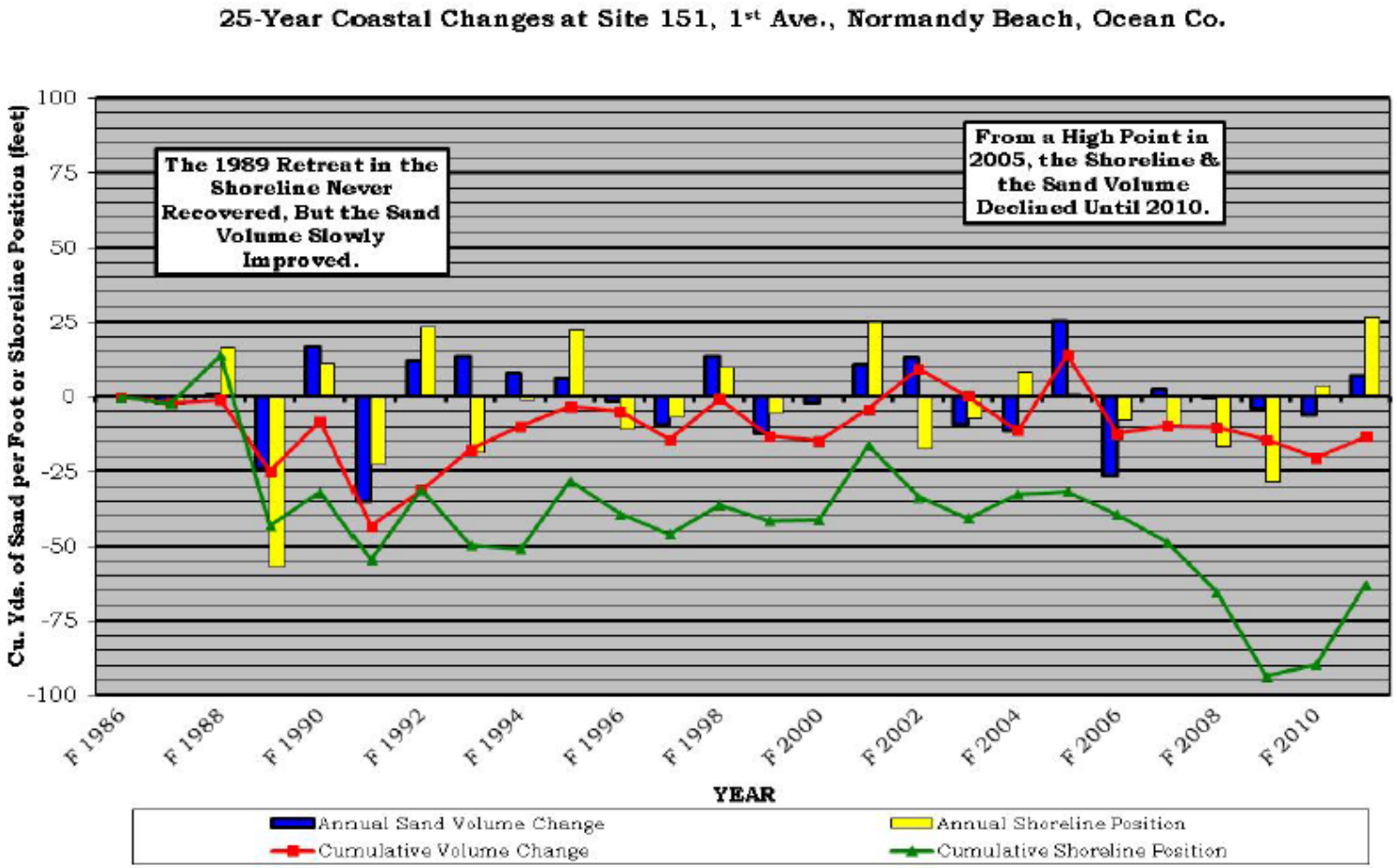


Figure 174. Profile 151 in Normandy Beach there were significant losses to the shoreline position and sand volume in 1989 and 1991. While the sand volume slowly recovered the shoreline did not. Starting in 2005 there was downward trend in shoreline and sand volume until 2010. The low point in the shoreline position occurred in 2009, despite the sand volume only losing moderate amounts of sand. Some recovery occurred in 2011, however, not nearly enough to offset the significant losses in the years prior.

USGS Historical Shoreline Data

For a longer look back at shoreline data for Toms River's oceanfront communities, the USGS has compiled a listing of the shoreline data for our area. You can access these different surveys at http://marine.usgs.gov/dsasweb/#

Zoom in on Toms River and analyze the different shorelines. You can click on each for information about when that shoreline position was sampled. The earliest data appears to be for 1839. As you will see, the shoreline position has not moved dramatically over time, appearing to be most stable near the current shoreline position. However, there have been shoreline positions that sit at or near the first row of oceanfront development, showing that fluctuations in shoreline position have occurred in the past. Though not shown in this dataset, some historical maps show that there was once an inlet at the northern portion of Barnegat Bay sometimes referred to as Olde Inlet. Cranberry Inlet also existed further south of the area near the mouth of the Toms River from 1758 to 1812 and was fully navigable. These historical inlets and the recent Sandy breech in Mantaloking underscore the dynamic nature of the barrier spit and the threat for new inlet creation.