



BOROUGH OF SEA BRIGHT STRATEGIC RECOVERY PLANNING REPORT



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STRATEGIC RECOVERY PLANNING REPORT
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The original of this document was signed and sealed in accordance with New Jersey Law.

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INTRODUCTION

This Strategic Recovery Planning Report (SRPR) serves as a blueprint to address conditions created or exacerbated by the storm, identify approaches to rebuilding that will be more resistant to damage from future storm events, and encourage sustainable economic growth. This SRPR will guide the recovery of the Borough of Sea Bright from the effects of Hurricane Sandy, to reduce vulnerabilities to future storms. Accordingly, the report:

1. Evaluates Hurricane Sandy's impacts on community features;
2. Addresses conditions that Hurricane Sandy created or exacerbated;
3. Describes the existing and potential vulnerabilities that the Borough faces from significant storm events, and sea-level rise; and,
4. Articulates planning goals, strategies, and actions to improve public safety, develop resistance to future storms, and stimulate economic recovery;
5. Describes each proposed project at a level of detail that:
 - Demonstrates how it relates to the storm's impacts;
 - Explains why it is important to the Borough's economic and environmental health;
 - Lists the major tasks with which it may be associated;
 - Includes an estimation of the cost of implementation;
 - Identifies potential or actual funding sources; and
 - Provides a timeline for implementation.

In the course of preparing this SRPR, the Borough participated in the Getting to Resilience (GTR) process, developed by the NJ Department of Environmental Protection and adapted and enhanced by the Jacques Cousteau National Estuarine Research Reserve (JCNERR). Through this process, the Borough was able to identify specific actions that will enhance long term resiliency in the town. These recommendations are integrated into this Report.

CHAPTER 1 BACKGROUND/EXISTING CONDITIONS ANALYSIS/CONTEXT

The Borough of Sea Bright is located on a barrier peninsula in the northeastern corner of Monmouth County. At approximately 1 square mile in area, it is one of New Jersey's smaller municipalities. It is bounded on the north by the Gateway National Park at Sandy Hook, on the east by the Atlantic Ocean, on the south by the Borough of Monmouth Beach, and to the west by the Shrewsbury and Navesink Rivers. The Borough is long and narrow, approximately 4.5 miles in length, with an average width of less than a ¼ mile. The municipality's year-round population, according to the 2010 Census, was 1,348¹, a 26% decrease as compared to the 2000 census count of 1,818. It is a community that is nearly completely developed, other than its beachfront, with only a very small percentage of its land area being vacant and developable. **Figure 1** shows the Borough and its regional position. NJ Route 36, also known as Ocean Avenue, is the primary road in and through the Borough.

Figure 1: Regional Location



¹ American Community Survey, 2008-2012, U.S. Census Bureau

DEMOGRAPHICS AND HOUSING

It is important to note that all the demographic and housing data presented herein is based on pre-Sandy counts. Current, reliable demographic and/or housing unit estimates have yet to be released.

The Borough's pre-Sandy year-round population was 1,348 persons (ACS, 2008-2012). Sea Bright had a somewhat older and less wealthy population than Monmouth County as a whole. The median age of the residents in the Borough was 46.6 years of age, more than 5 years older, on average, than the county's median age of 41.3 (2010 Census). The median household income in Sea Bright was \$74,236 (ACS 2007-2011), while it is \$83,842 (ACS 2007-2011) for the entire county. Over 94.4% of the Borough's population was reported as white and a Hispanic population of 14.5% (ACS 2008-2012). However, due to a relatively large margin of error for this Hispanic count, this figure should be used with caution.

The Borough has a total of 1,211 housing units, 901 of which were occupied year-round. Of these units, nearly 55% are owner occupied while more than 45% are renter occupied (Census 2010). Of all housing units (year round and seasonal) pre-Sandy, 26% were single family detached, 15% were single family attached, 10% were 2 unit, 16% were 3 to 9 units, and nearly 32% were 10 or more units. The median value of all owner occupied units was \$542,000 (ACS 2008-2012).

LAND USE AND ZONING

Prior to the storm, Sea Bright was nearly all built out. The Borough has three distinct geographic areas: South Beach; Downtown; and North Beach. Condominium developments with several marinas are found throughout South Beach. The Downtown contains the vast majority of commercial retail uses, older, single-family detached housing, and all municipal facilities. North Beach generally contains larger, newer single-family detached units. Sea Bright is unique among towns along the New Jersey shore in that seven beach clubs occupy considerable stretches of shore front properties, all privately owned and operated. These beach clubs – Driftwood, Edgewater, Surfriider, Chapel, Seabright, Ship Ahoy and the Sands, typically include cabanas, lockers for clothes, food service, beach access, and pools. Two of these beach clubs are located in the South Beach area, three are located in the Downtown area, and two are located in the North Beach area of town.

Nearly 67% of the Borough is located in flood hazard zone AE, according to the most recent FEMA Preliminary FIRMs, approximately 16.5% of the Borough is located in the VE zone, and 1.3% of the Borough lies within the AO flood hazard zone. Flood zones are examined in greater detail in **Chapter 3, Risk Assessment** of this Report.

Figure 2: Generalized Land Use



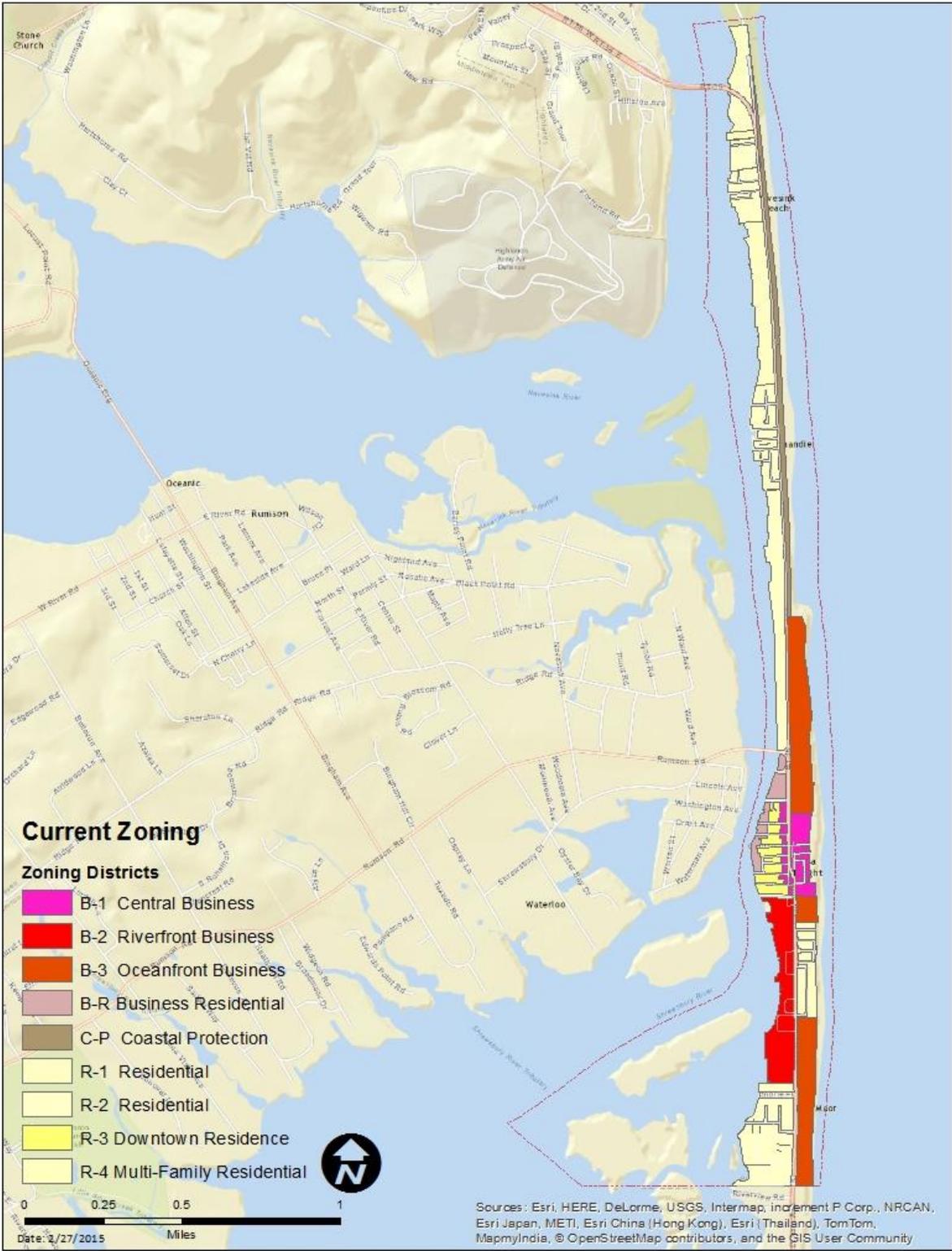
Table 1 reveals that Sea Bright has 9 zoning districts, 4 residential districts, 3 primarily business districts, a district primarily for the beach clubs, a mixed housing/commercial district, and a coastal protection area. According to 2010 Land Use Land Cover data obtained from the New Jersey Department of Environmental Protection² almost 27% of the upland area of the Borough is developed (216 acres), 3% (25 acres) is designated as barren. **The remaining 70% of the total area within the official Borough boundaries (549 acres) is designated as water and wetlands (see Figure 2 above and Table 1 below).** The Borough’s generalized zoning is illustrated in **Figure 3**.

Table 1: Zoning Districts, Land Use/Land Cover

Zoning District	Description	Total Acres	Barren	Developed	Water	Wetlands
B-1	Central Business	29	3	15	7	4
B-2	Riverfront Business	115		27	67	20
B-3	Oceanfront Business	94	19	34	30	12
BR	Business Residential	17		9	9	
C-P	Coastal Protection	107	0	1	53	53
MF	Multifamily Residential	0			0	
POS	Public Facilities & Open Space	0			0	
R-1	Residence	119	2	39	70	8
R-1.01	Single Family Residential	0			0	
R-1.03	Single Family Residential	0			0	
R-1A	Single Family Residential	0			0	
R-2	Residence	285	1	78	152	53
R-220	Rural Estate Residence	9			9	
R-2A	Single Family Residential	0			0	
R-3	Downtown Residence	14		12	2	
R-4	Multifamily Housing	3		1	1	0
R-5	Single Family Residential	0			0	
WC-1	Waterfront Commercial	0			0	
WT-C	Waterfront Transitional Commercial	0			0	
Total		791	25	216	400	149

² NJDEP 2007 Land Use/Land Cover Update (7/19/10) <http://www.nj.gov/dep/gis/lulc07cshp.html>

Figure 3: Current Zoning (Generalized)



INFRASTRUCTURE AND CRITICAL FACILITIES

Storm sewers and pump stations serve Sea Bright, and the entire municipality has a central sewer service system, which is connected to the Two Rivers Water Reclamation Authority. Jersey Central Power and Light distributes electricity. Natural gas service is provided by New Jersey Natural Gas Company.

Prior to Hurricane Sandy, the Borough had a municipal building/community center, library, beach pavilion, fire station, police station, EMS station, a public works building and a post office. There are no hospitals, nursing homes, schools, or prisons in Sea Bright. Sandy significantly damaged the library, fire station and post office. The library was demolished, the fire station is uninhabitable and the post office closed. More details on municipal facilities can be found in **Chapter 2, Impacts of Sandy**, and **Chapter 3, Risk Assessment**.

Sea Bright does have a sea wall that runs nearly the entire 4.5-mile length of the Borough. However, it is not continuous, with a gap of approximately 1,700 linear feet adjacent to the downtown. Bulkheads run nearly continuously along the Shrewsbury River, from the Monmouth Beach border, to Sandy Hook Gateway National Recreation Area, however they are not uniform in height.

Transit service is limited in Sea Bright. There are three bus lines that traverse the Borough, running along State Route 36/Ocean Ave. One bus line, Route 835, is operated by New Jersey Transit and travels between Sea Bright and Red Bank, through Rumson. This bus line terminates in downtown Sea Bright and does not serve North Beach or South Beach. Two bus lines in Sea Bright are operated by Academy Bus Lines running from Route 36 to the Port Authority of New York and New Jersey and Route 36 to Wall Street. Route 36 to the Port Authority runs from Long Branch to the Port Authority in Manhattan via NJ Route 36. It generally runs hourly during AM peak hours and every 2 hours off-peak on weekdays. It runs every 2 hours on weekends. The Route 36 to Wall Street line has very limited service from Sea Bright, with 2 buses in the morning and 6 buses in the evening. There is no direct rail service to Sea Bright, the closest station located in Red Bank, approximately 6 miles away.

According to the Monmouth County Sheriff's office, there are three evacuation routes leading out of Sea Bright. One heads northbound on Route 36, over the Captain Joseph Azzolina Memorial Bridge to Highlands. A second route heads southbound on Route 36, through Monmouth Beach. And a third route extends from the Downtown area over the Rumson Bridge (County Route 520) towards Rumson and Little Silver. However, the <http://www.ready.nj.gov/> website does not show the Rumson Bridge route as an evacuation route.

CHAPTER 2 ASSESSMENT OF SANDY IMPACTS

Immediately following Hurricane Sandy's landfall in Sea Bright, the Borough faced the following devastating impacts that had to be addressed without delay:

- Four to six feet of sand covered the Borough from the seawall to the river;
- Sand was laden with asphalt, debris, boats, cabanas, and cars that had to be sifted and separated; and
- The Borough was inaccessible by vehicle. It was therefore necessary to clear the roads and open up a travel corridor from the Rumson Bridge to the Emergency Service headquarters servicing the EMS, Fire, and Police.

As the Borough addressed the initial impacts from the storm, additional extensive damage to utility services, public buildings and public facilities were identified including; beaches, roads, bridges, bulkheads, seawall, boardwalk, and parks. Overall, it is estimated that the Borough lost \$60 million in tax ratable property due to Hurricane Sandy. According to building permit data maintained by the Borough, Sea Bright sustained over \$18 million in property damages as a result of Sandy. The Borough has filed for over \$6 million in FEMA Public Assistance (PA) claims. The impacts from the storm and the existing condition of affected buildings, facilities and infrastructure are outlined below.

1. IMPACTS ON UTILITY SERVICES

All of Sea Bright's utility services were affected by Hurricane Sandy, and the Borough struggled in the days and weeks after the storm to restore essential services and communications.

Electricity: The high-velocity, sustained winds and floods from Hurricane Sandy resulted in the downing of utility poles and power lines throughout Sea Bright, and much of the town's electrical infrastructure was subsequently buried in sand and mixed with debris and vehicles throughout the Borough. The electrical substation located on River Street sustained substantial damage despite the pre-emptive shut down of electric service to the Borough. And it was not possible to bring this station back online until a damaged substation located in Rumson Borough was repaired.

Natural Gas: The Borough's natural gas infrastructure sustained considerable damage, causing significant disruptions in recovery efforts immediately after the storm. Shortly after the storm passed through the area, a break in a natural gas line at an undetermined location was detected. All of the gas meters in the Borough, which were submerged by the floodwaters and therefore inoperable, had to be cut and capped in an effort to isolate the break. The break was isolated approximately three (3) days after the storm, but not before natural gas service was shut off to approximately three quarters of the Borough.

The shutdown of natural gas service through the majority of the area of the town rendered inoperable natural gas backup generators serving the Borough's sanitary sewer pump stations, Verizon's communication substation, the municipal offices, and the firehouse. New Jersey Natural Gas (NJNG) was required to cap the Borough's gas main to repair the break. As a result, all police, fire and emergency personnel communications, Verizon's communication substation, and all Borough facilities and pump stations were offline. NJNG was able to cap the main to the north of the natural gas lateral serving Borough offices, which allowed Borough offices to continue to operate. The Borough then worked with NJNG to run temporary laterals to the Fire Department, Police, and EMS backup generators and to the Verizon substation. The backup generator at the Verizon communication substation subsequently shorted and failed, requiring the Borough and NJNG to abandon the temporary lateral.

Fuel: All refineries in the Port of Newark and Elizabeth areas were shut down and fuel was limited throughout the State. Once fuel was located, essential machinery was placed on 8-hour fueling cycles to keep them in operation. The Borough also purchased and commandeered gas cans to fuel ATVs and smaller power equipment.

Telephone Service: Because natural gas was shut down within the Borough in order to isolate and repair a break in the Borough's natural gas main, leaking pipes, the natural gas generators in the Verizon substation were inoperable. This resulted in the disruption of land-line phone service within the Borough. All phones, including those at the police headquarters, were not operable and continuing lines of communication for essential emergency services was a struggle. Police and Fire services ran off of radio and cell phones. In addition, cell phone service was disrupted in the Borough until Verizon was able to install a temporary cell tower, known as a "cell on wheels", behind the police station.

Water: There were multiple water service breaks where homes and businesses sustained severe damage. Hydrants were also buried among sand and debris. Once roads were cleared of sand and debris, water service breaks were evident where ponding occurred in the streets and where water could be seen bubbling through the sand.

Sanitary Sewer Pump Stations: The wet and dry wells of the Borough's sanitary sewer pump stations were full, and 20 feet of water had to be pumped from the dry wells. In addition, the Borough's portable backup generators were flooded and destroyed. This would not have affected the Borough's pump stations, which are equipped with natural gas back-up generators. However, because natural gas was shut down within a substantial portion of the Borough, and the distance between operable natural gas lines and these pump stations was too far to run temporary lines, it was necessary to obtain three-phase 120 volt portable generators in order to continue operating sanitary sewer pump stations.

Storm Sewer: The entire storm sewer system became choked by sand infiltration and every inlet and pipe had to be jet vacuumed to restore the storm sewer system's function. There was threat of corrugated metal pipes collapsing under the weight of the sand-filled roads after being cleaned. However, every pipe was checked before cleaning, and no corrugated metal was found.

The Borough has two large stormwater pump stations located at Beach Street and Center Street. The electrical panels at both pump stations were submerged during the storm and were damaged beyond repair. All of the pumps (two in each station) shorted out and restoring them took several weeks to complete. Both of these pump stations have since been repaired, and the control panels were reinstalled above flood elevation.

2. DAMAGES TO MUNICIPAL BUILDINGS

Several structures within the Borough sustained significant damage during the storm, but were not fully destroyed. These structures, which included the beach pavilion, kiosks, and cabanas that were moved to Rooney Park by the storm surge and floodwaters, created a public safety hazard and had to be demolished.

Borough Hall: Floodwaters rushed under the Borough's municipal building washing out under several of the piers. A number of the building's concrete columns did not fully bear on the foundation, and foundation block walls cracked. The building also sustained roof damage. Moisture within the building led to the growth of mold after the storm. This building, in addition to the Borough post office, was rendered uninhabitable due to sustained damages.

Police Station: The Borough's police station sustained only moderate damage, experiencing numerous cracks to the exterior (totaling approximately 35 linear feet), bulging, and irregularities to the brick face on the front of the building, as well as destruction of the building's generator. The police station shares a common wall with the first aid station.

Fire Station and First Aid Building: The fire station and first aid building was hit by a 30-foot wave that caused numerous cracks in the exterior totaling approximately 50 linear feet. Like the police station building, this building exhibited bulging to the brick front face. Approximately 75% of the building's concrete floor was heaved and uneven after the storm. The fire station sustained numerous cracks in the exterior and interior of the building. The main crack (totaling about 220 linear feet) extended through one pilaster near the northwest corner of the building. The remaining pilasters on the north wall were not visible at the elevation of the horizontal crack. FEMA (through the Army Corps of Engineers) determined that the building was more than 50% damaged ("substantially damaged").

Department of Public Works: The DPW building was moderately damaged, and all equipment and tools were flooded. All three sanitary pump station buildings were inspected and found to be structurally acceptable.

Municipal Library: During the storm, a 20-foot portion of the library's eastern wall was lost. The building sustained significant non-structural damage including damage to the building's electrical and mechanical systems, carpeting, books, book shelves, siding, windows, gutters, interior drywall, furniture and drop ceiling. The presence of mold and accumulation of debris was also noted. The library was demolished at the end of 2013 and there are plans to relocate the new library to the new beach pavilion building.

3. DAMAGE TO PUBLIC FACILITIES

Hurricane Sandy caused widespread damage to Sea Bright's public facilities ranging in intensity depending on the area of the Borough. In general, the Borough sustained damage to roads, curbs, sidewalks, bulkheads, the boardwalk and public access points, beaches and beach buildings, and parks. The Borough also sustained minor damage to its bridges and seawall. These damages are described below.

Roads, Curbs and Sidewalks: Damage occurred to pavement, curbs, and sidewalk in areas where the seawall was not present or bulkheads blew out. Additionally, scouring and road wash outs up to 10-12 feet in depth occurred where there was no splash pad behind the seawall. These areas had to be immediately re-packed with fill and stone to avoid significant public safety hazards.

Approximately 53,000 cubic yards of sand was collected from streets and properties throughout the Borough after the storm. Other damages to the Borough's roads included destruction of portions of roads, destroyed or damaged sidewalks destroyed or damaged signage, cracks, potholes and destroyed inlets. These details are all outlined below in **Table 2**.

Table 2: Road, Curb, and Sidewalk Damage

	Portion of Road Destroyed	Destroyed Sidewalks	Damaged Sidewalks	Destroyed/Missing	Damaged Signage	Cracks	Potholes	Destroyed Inlet	Other	Comments
Mountain View Way					x					Cracking throughout
Water View Way			x		x					
South Way				x						
Atlantic Way					x					
Willow Way					x					
Bellevue Place					x					
Shrewsbury Way				x						
Peninsula Avenue		x				x				Repairs were made as part of the 2013 road program
River Street		x				x	x			Pothole at intersection with Poppinger Place Repairs were made as part of the 2013 road program
Poppinger Place						x				Pothole at Intersection with River Street
East New Street		x								
East Ocean Avenue								x		Curbing and landscaping at parking islands were destroyed
Wayne Street						x				Repairs were made as part of the 2013 road program
Church Street	x		x					x		Concrete barrier along edge of bulkhead was damaged
New Street										
Front Street				x						
Osborne Place		x						x		
Village Road	x	x		x	x					Damage occurred on eastern portion of road Currently under construction to replace curb, pavement, and sidewalks
Sand Piper Lane	x									Entrance to road was destroyed Currently under construction to replace curb, pavement, and sidewalks
Marius Lane	x	x				x				Approximately 60 feet of road was destroyed
Tradewinds Way								x		Faced heavy sand cover
Imbrie Place								x		Center island has scour and landscaping was destroyed
Island View Way				x						

Municipal Lots: The municipal parking lot was severely damaged. It was left with cracking, uneven pavement, and low spots in multiple areas. Large portions of asphalt were completely missing along the bulkhead and in the areas closest to the beach. The gravel area of the parking lot was also completely disrupted and filled with debris. The lot is currently being completely reconstructed and curbed.

Bridges: The Rumson Bridge exhibited scour and issues with its bearings. The Highlands Bridge, which connects Sea Bright to Highlands Borough to the northwest, owned by NJDOT, was undamaged.

Seawall: Sea Bright’s seawall does not run the entire length of the Borough, there are gaps in it. Recently, a section of seawall that was constructed at some point in the early 20th century that had been “submerged” by sand was discovered, it is not visible and does not provide any significant protection from storm surges.

The NJ Department of Environmental Protection rebuilt a large portion of the visible seawall in the early 1990s, and this wall stands 15-18’ above existing grades.

Areas of town protected by this rebuilt seawall incurred significantly less damage than areas without protection. The majority of the extent of the seawall was unharmed in the storm. A “splash pad” consisting of an 8-inch thick reinforced concrete slab is located behind much of the seawall. However, areas of the seawall without splash pad experienced extreme scour up to 10-12 feet deep. In addition, along some areas of the seawall, boulders were displaced into the side streets and needed to be replaced to ensure structural integrity.

Bulkheads: Several bulkheads along the ocean blew out entirely and the homes behind them were washed out. Most of the bulkheads along the river, including the bulkheads at Island View Way, Imbrie Place, Peninsula Avenue, Swing Bridge Park, Shrewsbury Way, Willow Way, Atlantic Way, Jenkinson Street, Waterview Way, Mountainview Way, and River Street survived and sustained damage that was generally limited to scouring. **Table 3** outlines further damage to the more heavily impacted bulkheads in Sea Bright. Most of these bulkheads sustained deterioration and are in various stages of design to be replaced and raised, thereby helping ensure a degree of resiliency in the event of future storms.

Table 3: Bulkhead Damage

	Scour	Deterioration	Missing Timber Cap	Missing Tideflex Valve	Failed	Comments
Osborne Place	x		x			Currently in design stages to replace and raise existing bulkhead
Center Street	x	x		x		Currently in design stages to replace and raise existing bulkhead
Beach Street	x	x		x		Currently in design stages to replace and raise existing bulkhead
Church Street	x	x				
South Street	x	x				Currently in design stages to replace and raise existing bulkhead
River Street	x	x				Currently in design stages to replace and raise existing bulkhead
Municipal Parking Lot					x	75% damage; Parking lot has been redesigned and bid for construction; Estimated completion in Spring 2014

Boardwalk and Public Access Points: The boardwalk and its superstructure elements, with the exception of its piers, were destroyed by Sandy’s storm surge. Seven of the boardwalk’s public access points, including ramps and staircases, were completely destroyed. The boardwalk’s restroom was also completely destroyed. The boardwalk has since been reconstructed, the work was completed prior to summer 2013. **Table 4** outlines other damages to the Borough’s public access points. In addition, railings were damaged or destroyed, pavement around staircase footings was missing or damaged, fencing, parts of the sea wall and bulkheads were damaged, scouring occurred, storm boards were missing.

Table 4: Other Damage

	Missing Staircase	Damage to Staircase	Missing Footings	Missing Railings	Damage to Railings	Missing Pavement	Damage to Pavement	Damage to Fencing	Damage to Sea Wall	Scour	Missing Storm Boards	Bulkhead Blown Out	Comments
Sunrise		x		x		x							Public access has since been replaced
Tradewinds (South)	x	x		x		x	x						Public access has since been replaced
Tradewinds (North)		x	x					x	x	x			Public access has since been replaced
Wayne Avenue		x	x		x	x			x				
Anchorage	x		x		x					x	x		Bulkhead has since been reconstructed in early fall 2013; Plans to bid and construct restroom facility and beach access
Middle		x	x		x								Public access has since been replaced
Fairbanks		x	x		x								Public access has since been replaced
Via Ripa	x	x											Staircase sustained 100% damage and was missing; Public access has since been replaced

Beaches and Beach Buildings: The Borough’s beaches sustained substantial damage during the storm. All dunes were destroyed by the storm and beach profiles were severely eroded. The beaches were also covered in debris. The beach pavilion (consisting of lifeguard and ticket kiosk buildings and the public restroom) adjacent to the boardwalk were completely destroyed.

Parks: All structures in Rooney Park were completely destroyed. The boardwalk along the Shrewsbury River was destroyed. The statue located on site was missing and could not be located. Curbing around the parking area was destroyed and pieces were missing and crumbling. The playground and showers near the municipal lot were also destroyed, swept away by the storm surge and unable to be located. The playground on the municipal lot sustained significant damage, and the remaining bent and broken structures remaining after the storm were deemed unsafe for use. The playground was replaced prior to the 2013 summer beach season.

4. POST-STORM GOVERNMENT OPERATIONS

In the immediate wake of Sandy, the Borough faced a long road to recovery and rebuilding, and these efforts were hampered not only by the amount of devastation wrought by the storm, but also by the interruption of the Borough’s government operations due to damaged and destroyed facilities and understaffing. Furthermore, in the weeks and months after the storm, the Borough identified a significant need for additional staff to coordinate recovery efforts, prepare FEMA reimbursement documents, and process demolition and building permits.

5. LONG-TERM RECOVERY EFFORTS

In the wake of the storm, the Borough recognized the importance of engaging residents, business owners, and other stakeholders in long-term planning efforts aimed at creating a more resilient and sustainable Sea Bright. The Borough formed the Sea Bright 2020 Steering Committee to facilitate the public involvement process shortly after the storm. After its formation, the Sea Bright 2020 Steering Committee undertook a community driven process that identified key projects and strategies intended to revitalize the Borough with a focus on sustainability and resilience. After holding a series of public workshops and presenting projects identified through the process to the public, the Sea Bright 2020 Steering Committee presented the Sea Bright 2020 Community Recovery Plan to the Mayor and Council on November 18, 2013. The Committee’s Plan was accepted and the Borough is now exploring the feasibility of implementing several of the Plan’s identified projects. This SRPR includes recommendations from Sea Bright 2020, as well as other planning documents, as described in **Chapter 4 Planning Assessment**.

6. NEW JERSEY FUTURE LOCAL RECOVERY MANAGER PROGRAM

A New Jersey Future Local Recovery Planning Manager is currently working with the Borough of Sea Bright to assist in its long-term recovery initiatives .New Jersey received funding through the Merck Foundation and the New Jersey Recovery Fund to create a Local Recovery Planning Manager Program. This program provides assistance to municipalities that were severely damaged by Hurricane Sandy, embedding Local Recovery Planning Managers (LRPMs) to work with a community for a minimum of 18 months. The LRPMs act as adjunct staff, working directly with the municipal staff to provide additional capacity to plan, manage and implement plans and projects to address immediate and long-range recovery and rebuilding needs.

CHAPTER 3 RISK ASSESSMENT

1. INTRODUCTION

Over the past nine years New Jersey has experienced eleven flood-related events that were declared Federal Disasters by the President of the United States. Currently there is consensus among numerous scientifically based studies that the state can expect to experience an increasing rate and intensity of storms in the foreseeable future³. Given New Jersey's settlement patterns, with extremely high-density residential and commercial development along its coastal fringe, and in light of the economic return the state depends upon from tourism at the shore – approximately \$35.9 billion of state GDP in 2013, or 6.9% of the state's economy⁴ - it's particularly important to evaluate the **potential** risk and vulnerabilities inherent in exposure to such storms. The extent of vulnerability has considerable consequences for the health of the state's residents, ecosystems, natural and built environments, and understanding risk is particularly important in guiding rebuilding and recovery strategies and financial investment.

The purpose of a risk assessment is to evaluate vulnerability to hazards a community is likely experience. The vulnerability assessment can then serve as a framework for identifying and prioritizing those actions that most effectively reduce or avoid future losses. The technical definition of the term "**risk**" is expected future losses; **vulnerability** is the tendency of something to be damaged when exposed to a hazard and **exposure** is the value of structures and number of people exposed to hazards. This assessment is intended to provide a basis for Sea Bright Borough's recovery and mitigation strategies by evaluating vulnerability and quantifying exposure.

The purpose of a risk assessment is to evaluate vulnerability to likely hazards and to identify and prioritize those actions that most effectively reduce or avoid future losses. The most significant hazard faced by Sea Bright is flooding, which is caused by extreme rainfall events, storm surge, or both. This section of the SRPR is divided into Vulnerability Assessment and Estimation Exposure. This subsection evaluates the types and numbers of structures and people that are exposed to hazard of flood and storm surge risks.

2. VULNERABILITY

In this section, various factors of vulnerability with respect to flooding from future storm events are examined, including:

- The extent of the Borough's flood zones;
- Plans and infrastructure the Borough currently has in place to manage storm and flood events;
- The amount of Federal disaster recovery assistance that has been made available to the municipality and individual property owners to address damage from prior storm events the Borough has experienced;
- The relationship of the location of community facilities and infrastructure to flood zones; and
- The relationship of the Borough's zoning districts to its flood zones.

³ See "What We Know, The Realities, Risks And Response To Climate Change", American Association for the Advancement of Science, 2014. "Climate Change 2013, The Physical Science Basis" Intergovernmental Panel on Climate Change. Climate Change 2014, Impacts, Adaptation and Vulnerabilities", Intergovernmental Panel on Climate Change. "State of the Climate, New Jersey", 2013, Rutgers Climate Institute.

⁴ The figure represents direct, indirect and induced impacts. Source: "The Economic Impact of Tourism in New Jersey, Tourism Satellite Account, Calendar Year 2013", Tourism Economics

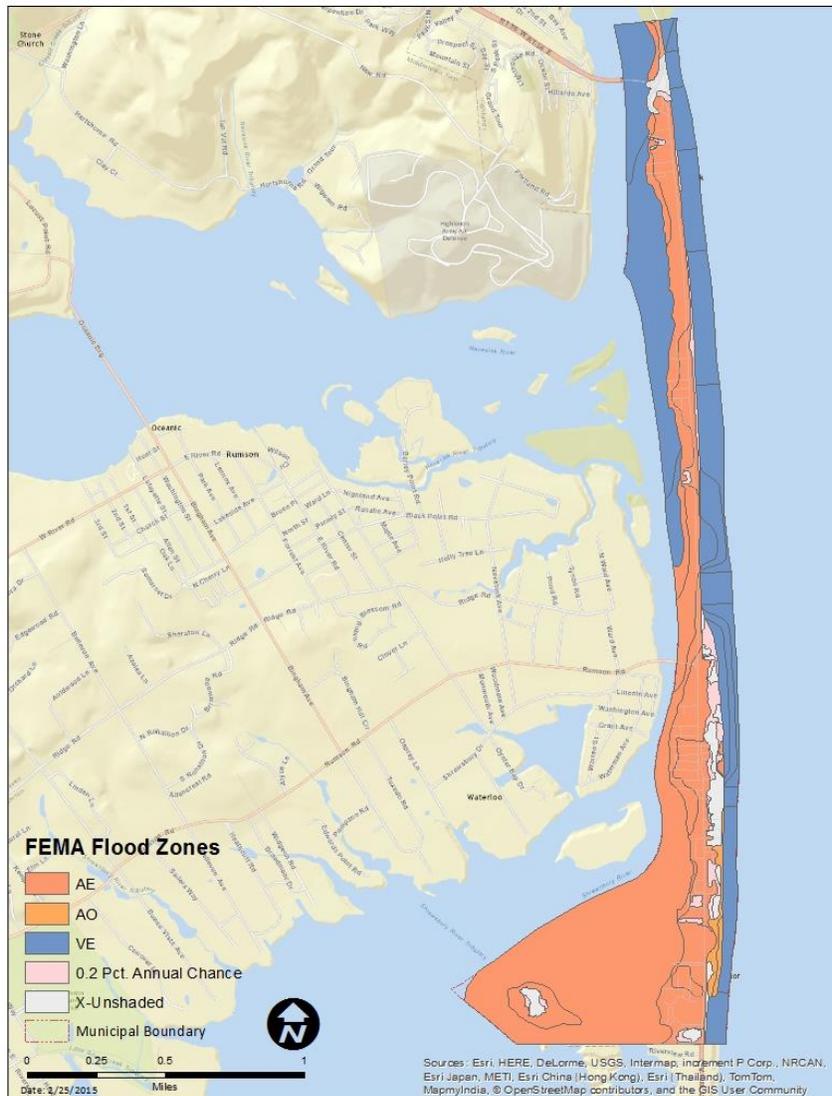
A. Flood Zones

The Federal Emergency Management Agency (FEMA) defines flood zones as geographic areas subject to varying levels of flood risk and types of flooding. These zones are delineated on Flood Insurance Rate Maps (FIRMs) and Flood Hazard Boundary Maps (FHBMs). FEMA delineates four different flood hazard areas:

- Special Flood Hazard Areas – High Risk;
- Coastal High Hazard Areas – High Risk;
- Moderate and Minimal Risk Areas; and
- Undetermined Risk Areas.

Each of these areas has an associated series of flood zones defined by FEMA and included in the **Flood Zones Table** provided in **Appendix 2** of this report. January 2015 Preliminary Flood Plain maps currently available for Sea Bright⁵ show that the entire area of the Borough is encompassed with one of five FEMA flood zones.

Figure 4: Flood Zones



⁵ <https://hazards.fema.gov/femaportal/prelimdownload/searchResult.action>

AE Zone

Special Flood Hazard Areas (SFHA) have a 1% annual probability of being inundated by flooding and structures located in these zones have a 26% chance of flooding within the life of a standard 30-year mortgage. These are areas of highest vulnerability to flooding inundation. The AE zone, one of two SFHA zones within the Borough, encompasses 67% (436 acres) of the total area of the municipality and 78% of the Borough’s developed area. The boundaries of this zone run along the entire extent of the Borough west of Route 36, where the majority of residential and commercial land uses are located.

AO Zone

A second SFHA area, the AO Zone, is a relatively small area in the southern portion of the Borough east of State Route 36, comprising 9 acres. This Zone partially encompasses a 20-unit residential development on Tradewinds Lane and the Driftwood and Edgewater Beach Clubs. Properties within AO Zones are typically affected by relatively shallow flooding.

VE Zone

The VE Flood Zone extends along the entire length of Borough’s Atlantic shoreline and encompasses 17% (107 acres) of the area of the community. The VE Zone is a Coastal High Hazard Area, which has a 1% annual probability of being inundated by flooding and is subject to high velocity wave action. As with properties within the SFHA, structures within Coastal High Hazard Area zones have a 26% chance of flooding within the life of a standard 30-year mortgage.

X (shaded) and X (Unshaded) Zones

The .2% Annual Chance Zone, also referred to as the 500-year flood plain and X-Shaded zone, encompasses 19 acres of the area of the Borough. The Minimal Risk, X-Unshaded Zone, overlays 28 acres of the area of the municipality. Portions of these zone areas are found in several locations east of Ocean Avenue. According to FEMA, buildings in Moderate and Minimal Risk zones can be flooded by severe, concentrated rainfall coupled with inadequate local drainage systems.

Table 5: Land Use Type by Flood Zone

Land Use Type	Area (acres)	AE Zone	AO Zone	VE Zone	.2 Pct. Annual Chance	X-Unshaded
Agriculture	0	0	0	0	0	0
Barren	25	2	2	19	1	1
Forest	0	0	0	0	0	0
Developed	216	169	6	6	14	20
Water	391	185	0	205	0	0
Wetlands	149	84	1	48	9	7
Total	780	440	9	279	24	28

Table 5 shows that 84% of the Developed Area of Sea Bright (181 acres) is located in the AE, AO, or VE FEMA flood zones. As noted above, these zones have the highest vulnerability to regular flooding inundation. A total of 135 acres of the 216 acres of Developed Area of Sea Bright is occupied by residential land uses. **Figure 5** illustrates that the majority of this residential area is located west of Ocean Avenue, almost all of which is located within the AE Flood Zone with some small pockets of areas in the VE Zone. The residential area to the east of Ocean Avenue, generally between 1187 Ocean Avenue and the Edgewater Beach Club, is interlaced by AE, AO and X Flood Zones.

Figure 5: Residential Areas/FEMA Flood Zones



B. Federal Recovery Assistance

There are three principal sources of Federal assistance available to municipalities and individual property owners for disaster recovery: National Flood Insurance Program (NFIP), Public Assistance (PA), and Individual Assistance (IA). It's important to note that all payout figures quoted below are provided at the census block group or tract level to ensure data anonymity.

1. National Flood Insurance Program (NFIP)

The NFIP offers flood insurance to homeowners, renters, and business owners if their community participates in the program. Participating communities agree to adopt and enforce ordinances that meet or exceed FEMA requirements to reduce the risk of flooding. FEMA defines a Repetitive Loss (RL) property as "any insurable building for which two or more claims of more than \$1,000 were paid through the NFIP within any rolling ten-year period, since 1978." A Severe Repetitive Loss (SRL) is defined as "a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which four or more separate claim payments have been paid under flood insurance coverage, with the amount of each claim payment

exceeding \$5,000 and with cumulative amount of such claims payments exceeding \$20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property. The two claims must have occurred within any 10-year period and must be greater than 10 days apart.

According to the information on NFIP payouts in the Repetitive Loss database held by the New Jersey Department of Environmental Protection for Hurricane Sandy, there were a total of 69 claims payments in Sea Bright for a total of \$12,209,829.58 made to properties located with 16 of the Borough's census block groups. Average payouts ranged from \$10,770 to \$592,624 per census block group. An examination of the payout data maps reveals that several of the census block group areas where payouts were made in the Borough following Sandy were the same areas where payouts were made following Hurricane Irene and unnamed Storm Event # 1897.⁶ Overall, since the NFIP program was created, there are 191 Repetitive Loss properties, with insurance claims totaling over \$33 million dollars.⁷

2. Public Assistance (PA)

FEMA's Public Assistance (PA) Grant Program is to provide assistance to State, Tribal and local governments, and certain types of Private Nonprofit organizations so that communities can quickly respond to and recover from major disasters or emergencies declared by the President. This program provides supplemental Federal disaster grant assistance for debris removal, emergency protective measures, and the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain Private Non-Profit (PNP) organizations. The PA Program also encourages protection of these damaged facilities from future events by providing assistance for hazard mitigation measures during the recovery process. Following Hurricane Sandy, there were a total of 20 public assistance grants within the Borough for a total amount of \$7,480,561.

3. Individual Assistance (IA)

FEMA Individual Assistance (IA) program provides financial or direct assistance to individuals and families whose property has been damaged or destroyed as a result of a federally-declared disaster, and whose losses are not covered by insurance. It is meant to help meet critical expenses that cannot be covered in other ways. This assistance provides for temporary housing, repair or replacement of a primary residence that is not covered by insurance. Following Sandy, a total of 1,430 individual assistance payouts were made to qualifying individual and families living in Sea Bright, for a total payout of \$4,737,136.27. Payment amounts ranged from \$2,256.07 to 4,741.32 per census block group.

C. Current Storm Water Plans

According to Sea Bright's 2007 Storm Water Management Plan⁸, flooding from the Shrewsbury River occurs daily during new and full moons as well as during storm events, discharging pollutants to the Shrewsbury River. The Sea Bright seawall, which runs parallel to Ocean Avenue extending roughly along the entire length of the municipality, is an important defense against ocean storms, second only in importance to the community's ocean-side beach and dune system. This barrier was breached in three

⁶ Storm Event # 1897 refers to the incident period of March 12, 2010 to April 15, 2010, a Nor'easter for which Governor Christie requested a declaration of Public Assistance for 12 counties on March 26, 2010 and for which President Obama declared a major disaster on April 2, 2010.

⁷ "Multi-Jurisdictional Natural Hazard Mitigation Plan, Monmouth County NJ", prepared for Monmouth County Office of Emergency Management, URS, 2014

⁸ "Stormwater Management Plan For Borough of Sea Bright, Monmouth County, New Jersey", Maser Consulting, P.A., February, 2005

locations during Sandy; all three areas have been rebuilt since the storm. A bulkhead is in place along the Borough's river-side coast but, as suggested in a draft study issued in April, 2013⁹, it is no longer of sufficient height to provide adequate protection during full and new moon tide cycles, due to rising river levels.

D. Critical Services and Infrastructure

Sea Bright Borough's capacity to respond to severe storms and flooding events is, to a large extent, predicated on the extent to which these events are likely to impact critical infrastructure - such as evacuation routes – and emergency services – such as police and fire services. **Figure 6** illustrates the location of critical facilities throughout Sea Bright and their proximity to areas of probable future inundation.

Figure 6 shows that the AE Zone extends inland covering almost the entire western side of the Borough, west of Route 36 (Ocean Avenue) – the Borough's primary evacuation route. Several of the Borough's key facilities are located within the VE Zone including: four bus stops (Rt. 36 at Church Street, Ocean Avenue at Church Street (2 stops), Rt. 36 at Rumson Road); the Borough Hall (1167 Ocean Avenue) one half mile of bus route; 3.5 miles of Ocean Avenue. The VE Zone encompasses the eastern side of the Borough, east of Route 36, and covers an additional .8 miles of Ocean Avenue.

The existing sea wall that runs parallel to and along virtually the entire length of the east side of Ocean Avenue through Sea Bright provides considerable protection against rising sea levels from the Borough's Atlantic coast. However, as noted previously, the bulkhead along the Borough's riverside coast is no longer of sufficient height to provide adequate protection against rising water levels under current conditions, let alone the predicted sea-level rise in 2050. Consequently, as Figure 4 illustrates, most of the impacts from the 2050 sea level elevations will be experienced on the west side of the Borough. These parcels primarily front on the following streets located in the south westerly area of the Borough, where inundation will extend from Sea Bright's river border toward, and in some cases, up to Ocean Avenue.

- Peninsula Avenue
- River Street
- Poppi Place
- South Street
- Church Street
- New Street
- Front Street
- Surf Street
- Beach Street
- Ocean Avenue (branch)
- Center Street
- Osborne Place

⁹ "Hurricane Sandy Recovery and Management Strategy – Borough of Sea Bright" (Working Draft, Version 1, April 15, 2013

Figure 6: Infrastructure Exposure



E. Zoning and Land Use

A municipality's zoning regulations determine where certain land uses will occur, and how buildings will be configured on lots within a range of use zones. For generations New Jersey's coastal communities have permitted relatively dense residential and commercial development patterns within close proximity to coastlines to take advantage of the attractive and unparalleled natural resource of the state's shore areas. This development has largely occurred without regard to exposure to storms and flooding. However, as sea levels rise and the probability of more intense and frequent storm events increases, it is necessary to evaluate the extent to which these historic development patterns put people and property in increasing jeopardy and consider alternatives to minimize or avoid such risk.

Figure 7 and **Table 6** reveal that 57% of zoned areas in Sea Bright Borough are designated for some form of residential use. Over 90% (117 acres) of areas zoned for residential uses (130 acres) are located within the A, AO (1% annual flood risk) or the VE zone (subject to storm-induced velocity wave action) in the Borough and therefore are at considerable risk. 73% (61 acres) of the Borough's Business districts is located within these high-risk zones.

Figure 7: FEMA Flood Zones/Zoning

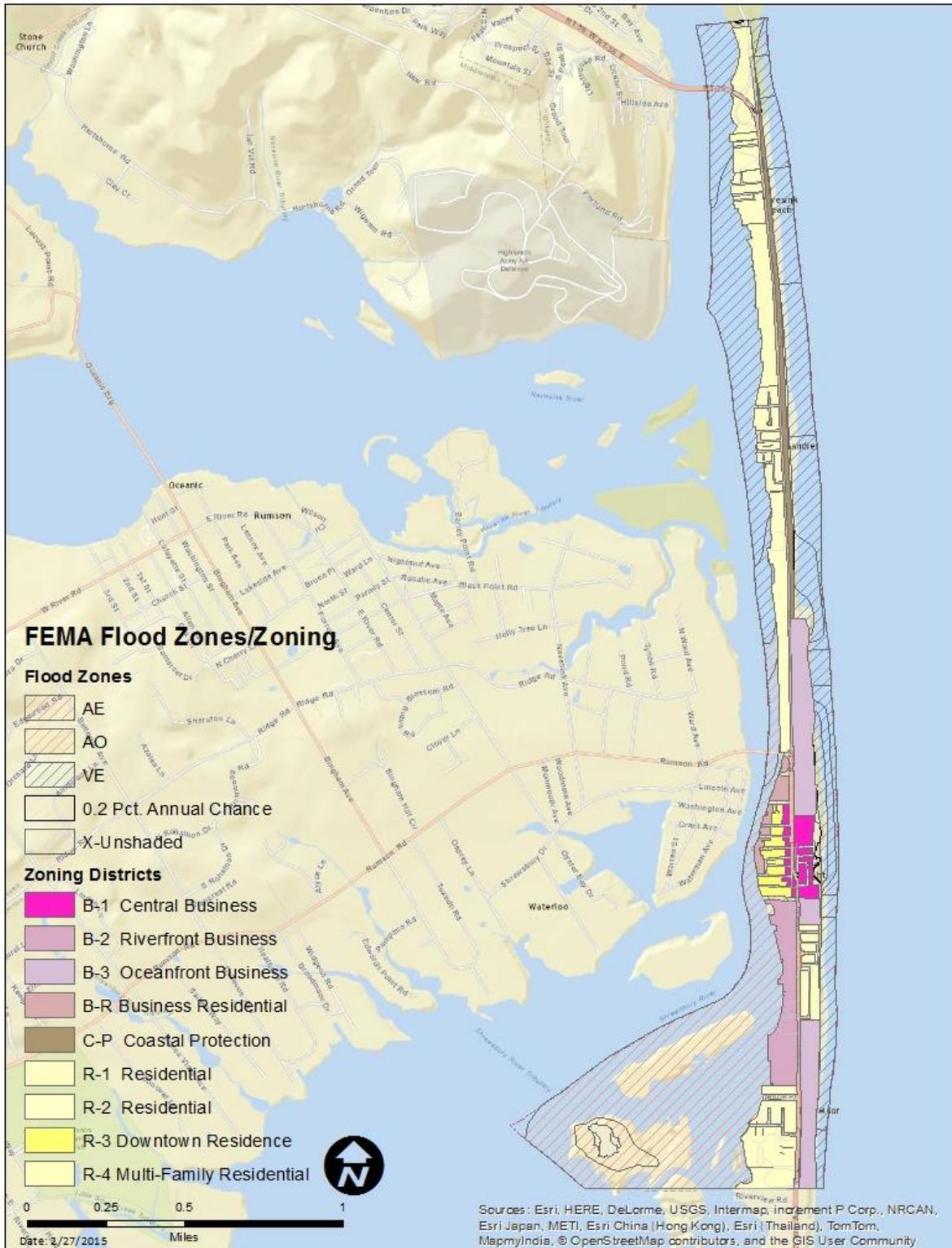


Table 6: Generalized Zoning/FEMA Flood Zones

Description	Total Acres	AE	AO	VE	.2 Pct. chance	X Unshaded
B-1 Central Business	11	6			1	4
B-2 Riverfront Business	25	23			2	
B-3 Oceanfront Business	47	10	7	15	7	8
B-R Business Residential	7	7				
C-P Coastal Protection	15	11		1	2	0
R-1 Residential	38	24	2	4	2	7
R-2 Residential	74	68		3	2	1
R-3 Downtown Residence	9	9				
R-4 Multi-Family Residential	1	1		0		
Total	228	159	9	22	17	21

F. Socially Vulnerable Population

The preceding analysis describes the vulnerability of the built environment in Sea Bright, however, the vulnerability of the residents and their social environment must also be considered. Social vulnerability can be defined as: *“the susceptibility of social groups to potential losses from hazard events”*. Research has shown that certain social, demographic, economic, and housing characteristics influence a community’s ability to respond to, cope with, recover from and adapt to natural hazards. This may be due to relative wealth and access to resources, insurance, family care responsibilities, ability to move out of harm’s way, and/or lack of information. Research focused on social vulnerability in New Jersey has identified the most significant characteristics as: low socioeconomic status, race and ethnicity, linguistic isolation, low educational attainment, gender (female), age (the very young and very old), compromised health and cognitive constraints, family structure (single parents and/or high number of dependents), housing tenure (renters) and occupation (service sector).

A review of census data for Sea Bright reveals that there are sizable numbers of these more vulnerable groups in the Borough, with approximately 168 persons over the age of 65, 78 persons earning below the poverty level, 93 single parent families and approximately 39% of housing units occupied by renters¹⁰.

Recent research focusing on Sandy impacts found that, due to insufficient insurance coverage and lack of personal financial assets, middle income homeowners are another socially vulnerable group.

3. INUNDATION IMPACTS

A report published by Kenneth Miller and Robert Kopp, of Rutgers University indicates that over the past century sea levels along the New Jersey coast have risen at a rate of approximately 3.8 mm (.15 inches)/year, roughly half of which is attributable to coastal subsidence. This rate has gradually accelerated into the current century.¹¹ According to Kopp, 70,000 more people were affected by Hurricane Sandy in the NY/NJ area due to sea level rise (SLR) than would have been the case had there been no such increase¹². Rising sea levels will likely result in permanent inundations of areas that currently are frequently flooded and frequent inundation of areas that only episodically flood currently.

Permanent inundation from sea level rise is only one of the hazards that climate change presents to New Jersey’s coastal property and infrastructure. Higher average sea levels lead to higher storm surges

¹⁰ American Community Survey, 2009-2013, US Census Bureau

¹¹ *“A Geological Perspective On Sea-Level Rise and Its Impacts Along the U.S. Mid-Atlantic Coast”*, K. G. Miller, R.E. Kopp, B.P. Horton, J.V. Browning, A. C. Kemp, AGU Publications, Department of Earth and Planetary Sciences, Rutgers University, 5 Dec. 2013

¹² Robert Kopp interview, WHYY “Radio Times” interview, July 1, 2014

and increased flooding risks¹³, even if the intensity or frequency of storms remains unchanged¹⁴. Kemp and Horton (2013) found that, while the record 13.9-foot storm tide in New York Harbor during Hurricane Sandy was primarily due to the coincidence of the strongest winds with high tide, SLR driven by historical climate change added more than one foot to that 13.9 foot total¹⁵. The impact of climate change on flooding during coastal storms is greater and more immediate than the impacts of inundation from gradually rising sea levels¹⁶. Potential damage of flooding from hurricanes and Nor'easters is projected to increase by 14%-36% in New Jersey by 2030, due to sea level rise.

Changing climate conditions are also predicted to drive increasing storm intensity. Recent research indicates that New Jersey is receiving more of its annual precipitation from intense storms than it has in the past¹⁷. This increases the risk of flash floods, urban flooding, and coastal flooding, which are all closely tied to heavy precipitation events¹⁸.

Primary Impacts

The immediate effect of sea level rise, higher storm surges and more intense storms may include:

- loss of land and wetlands from inundation
- loss of buildings and infrastructure from inundation
- loss of power/power interruptions from storms
- decreased usability of structures due to flooded access roads and supporting infrastructure
- increased structural damage from repetitive storm damages

Secondary Impacts

Although termed “secondary impacts”, the impacts discussed below can have significant and long lasting effects on a community, as Sea Bright has seen with the aftermath of Hurricane Sandy. These secondary impacts may include economic, health, community cohesion and governmental service effects.

a. Economic Impacts -Tourism, Ocean Avenue businesses and water dependent businesses

In general, coastal areas are important to the local economy because they tend to contain numerous natural and man-made resources. However, recent reports on climate change caution that: “*Tourism, aquaculture, fisheries, ... recreation, and infrastructure will all be strongly affected by the effects of rising sea levels*” Sea Bright is no exception, its economy is highly dependent upon the water and its beaches, whether it is retail services catering to visitors, marinas, or fishing.

Most Borough employers are very small firms. Typically, small businesses have fewer resources than larger companies and are thus are likely to be more vulnerable to disruptive impacts of SLR and extreme weather events. In addition to typical issues associated with loss of property and contents, severe storms are likely to cause prolonged business interruption and disrupt supply chains linked to the affected businesses. Power outages from extreme events not only directly affect business operations, but also cause a drop in demand as customers are also without power and thus unlikely to shop. Sea Bright’s recent experience with Hurricane Sandy demonstrated the effects of extreme weather events. There was extensive storm damage to Ocean Avenue, Sea Bright’s main business district. The adverse effect of SLR and extreme weather events on regional tourism are likely to have negative impacts on Sea Bright’s economy, in part due to its proximity to the National Gateway Recreation Area –

¹³ Frumhoff et al. 2007

¹⁴ Frazier et al. 2010

¹⁵ American Climate Prospectus, Economic Risks in the US, 2014

¹⁶ Ibid

¹⁷ “State of the Climate: New Jersey, 2013”; Broccoli, Kaplan, Loikith, Robinson; Rutgers Climate Institute

¹⁸ American Climate Prospectus, Economic Risks in the US, 2014

Sandy Hook Unit and the millions of visitors that travel there annually. In Monmouth County, tourism spending in 2013 amounted to over \$2.2 billion, with \$433 million spent on lodging, \$573 million on food and beverages, \$417 million on retail goods, and \$489 million on recreation. In addition, tourism employed 21,000 people in Monmouth County in 2013. But rising sea levels, more intense storms and subsequent flooding are likely to discourage visitors who might otherwise travel to the bay and ocean and frequent the Borough's restaurants. Recent research in nearby Ocean County confirms that tourism activities are highly vulnerable to extreme weather events.

b. Public Health impacts

Storm surges and other flooding events can cause injury and death and have significant public health impacts. They can also generate a host of more persistent environmental health hazards, including bacterial, fungal and chemical contamination of drinking water sources, sewage and solid waste system disruption, hazardous materials releases, and increased or displaced populations of insects, rodents and other disease vectors. During and after floods, the imperative to restore impacted areas as quickly as possible can interfere with efforts to identify and address less obvious problems, such as newly contaminated soil or housing. Recovery can be further hampered by gaps in understanding risk factors and treatments for post-flood disease outbreaks.

Mental health impacts from a catastrophic flood event are also a significant risk. Extreme weather events act as repetitive stressors and more frequent storms and floods are likely to lead to increased incidence of mental health disorders - particularly anxiety, depression, and post-traumatic stress - which communities are often unprepared to address. The Monmouth County Long Term Recovery Group, which has been established to provide direct counseling and social services for victims of Hurricane Sandy, is an acknowledgement of the potential for these outcomes.

c. Community cohesion

Flood and storm damage can lead to temporary or permanent loss of services and amenities - hospitals; clinics; community, senior and day care centers; schools; and recreational open space. Sea Bright experienced just this type of impact from Sandy when the library was damaged and rendered uninhabitable. In many cases, communities have invested considerable time and energy to secure these amenities, and their full value may not be reflected in typical vulnerability assessments. Such losses degrade the quality of life for shoreline communities.

Other, more subtle losses that affect a community's ability to recover from flooding may have pronounced long-term consequences. Community cohesion and identity are important indicators of overall community resilience. Communities that have overlapping social networks, organizations that work together, and community members who are involved in decision-making, have greater ability to plan for and cope with natural or human-made disasters. The sense of community cohesion and identity can be seriously undermined when treasured commercial streets, landmarks, historic sites, heirlooms, tourist attractions or traditions are lost or altered. Losses of this kind cannot be gauged by simple monetary replacement costs.

d. Impact on government services

A less-studied impact of extreme weather events relates to the subsequent demand for local government services. Many municipal governments, including Sea Bright, are stressed by tax-base losses, damage to public facilities and increased demand for services. Hurricane Sandy's created immense demand for emergency services and public safety. And the Borough also faced considerable organizational challenges as government officials were overwhelmed by a surging demand for building permits, expedited planning and zoning board decisions, and other construction-related permitting.

Increased coordination with federal and state government agencies was also required, as improvements to Borough infrastructure and buildings were undertaken using federal funds requiring Borough staff to negotiate entirely unfamiliar federal rules and procedures.

A less-obvious impact on government services relates to the day-to-day interactions between residents, businesses and the municipal staff. As recovery commenced people and businesses seeking resources and/or resolution to the myriad issues they faced continually called for answer from municipal offices, despite the fact that the municipality often did not possess the requested resource or resolutions. These demands consumed substantial amounts of staff time, and considerably increased stress as administrators attended to day-to-day work tasks, while attempting to address residents' and businesses' frustrations with levels of governmental entities entirely outside their control.

Exposure Analysis Procedure

This section of the analysis estimates the value of properties potentially exposed to flooding and sea level rise for 2050 sea-level rise projections. It's important to stress that the **data presented herein are intended for planning purposes only**. In estimating the extent of the Borough's future exposure as a result of flood inundation it was necessary to perform a detailed geographic analysis of the community. This analysis began with a determination of the current mean higher high water (MHHW) tide levels at the Borough's coast. MHHW is a measure of the higher of the two high tides that occur each day, averaged over a 19-year period.¹⁹ Once the MHHW was established, it was necessary to determine the extent to which areas within the Borough would be subject to flooding under various future scenarios – for the purpose of this assessment, predicted sea-level rise for the periods 2030, 2050 and 2100 were considered, consistent with the Miller et al. report.²⁰ However, as noted above, **this analysis focused on projections to 2050**.

The next step of the risk assessment was to evaluate specifically which parcels within the Borough were likely to be affected under the two scenarios: Mean Higher High Water Level and FEMA 1% Storm given an increase in sea-level rise for 2050 as projected by Miller et al. This was accomplished by analyzing and mapping the predicted inundation extent for each scenario. The predicted extent was then overlaid with the 2012 MOD-IV data set assembled and maintained by the New Jersey Division of Taxation and posted on the New Jersey Geographic Information Network web site²¹. Parcels with 10% or more inundation were included in this parcel-level calculation, under the assumption that if a parcel was less than 10% inundated it is not likely to experience significant structural damage. Parcels were also eliminated from the calculation if the structure did not overlap with the inundation extent. In addition, all parcels with units that have been elevated since Hurricane Sandy were identified, mapped and excluded from the calculation. According to data provided by Borough officials, as of April 2015, 71 dwellings have been elevated above the Base Flood Elevation in accordance with zoning regulations put into effect in Sea Bright Borough following the Hurricane. However, although units may be elevated above flood stage, at-grade streets and infrastructure will continue to be exposed to inundation, which is likely to adversely affect property value over time.

¹⁹ The MHHW is the average of all high water heights observed over the National Tidal Datum Epoch - the specific 19-year period adopted by the National Ocean Service as the official time segment over which tide observations are taken and reduced to obtain mean values (e.g., mean lower low water, etc.) for tidal datum.

²⁰ See Footnote 6

²¹ https://njgin.state.nj.us/NJ_NJGINExplorer/DataDownloads.jsp

Evaluating property tax information and the inundated parcels in tandem enabled an assessment of probable damage at the parcel level under the 2050 sea-level rise scenario²² by comparing the predicted depths of inundation throughout the Borough. The scenarios were modeled using 1-meter Digital Elevation data derived from LiDAR (Light Detection and Ranging - remote sensing technology) collected in 2006. The output from this comparison was further refined through the application of depth damage curves, which are used to estimate the percentage of structural damage based on relative flood depths.²³

4. ESTIMATION OF EXPOSURE

In order to assess the extent to which the Borough of Sea Bright is exposed to flood inundation and storm surge it's necessary to evaluate the probable impacts of near-term sea-level rise for the community. It is important, however, to note that the Borough experiences nuisance flooding today. Such flooding commonly occurs four times a month, at the highest tides (i.e. full moons and new moons) and at both high tides. Nuisance flooding also occurs during periods of heavy rainfall or sustained winds over 30 miles per hour and winds out of the northwest.

Typically, the side streets in downtown Sea Bright that lie along the Shrewsbury River are the ones that are affected by nuisance flooding. This includes: Island View Way, Darden Way, Longview Way, near Imbrie Place (at Navesink marina), Osborne, Beach, Centre, West Front, Surf, New, Church, South, River and Peninsula Streets and the 900, 600 (near the municipal pump station) and 200 blocks of Ocean Avenue.

Residents are alerted to the flooding via the Nixle alert system²⁴, and in downtown an audible flood siren is activated and periodically police officers will conduct door to door visits. Residents tend to respond to nuisance flooding by relocating their cars to higher ground (typically parking lots that lie on the east side of Ocean Ave.), although these areas are only a few feet higher in elevation than adjacent areas.



A. Exposure Analysis: 2050 Sea Level Rise

Nuisance flooding that is tolerated in the Borough today is likely to have far more damaging effects in the future principally due to rising sea levels. **Figure 8** illustrates that impacts of sea-level rise by 2050

²² The 2050 scenario was determined to be a reasonable planning horizon for the purpose of the detailed assessment of exposure value. The Miller et. al. report projects low, central and high sea level rise values for 2030, 2050 and 2100. For 2050, the values range from a low of 1.08' to a high of 1.94'. **For the purpose of this analysis the central value, 1.48', was added to the current day MHHW.**

²³ Developed by the U.S Army Corps of Engineers, <http://planning.usace.army.mil/toolbox/library/EGMs/egm04-01.pdf>

²⁴ Nixel is an open communication forum that connects public safety, municipalities, schools, and businesses and residents. The system is used to provide warnings about severe weather events, evacuations, safety hazards, security threats, facilities problems, employee notifications, and IT/Telecom disruptions

will occur in what is presently the most densely populated portions of Sea Bright and the area where the municipality's downtown commercial activity currently occurs.

Figure 8: 2050 Sea-Level Rise



Tables 7 and 8, developed in accordance with the Exposure Analysis Procedure outlined above, provide a breakdown of value of inundated parcels – “**exposure value**” - under the 2050 sea-level rise scenario.²⁵ The number of potentially vulnerable parcels, their improvement values (value of structures) and land values are presented in the following tables.

**Table 7: Vulnerable Parcels
2050 Sea-Level Rise Scenario**

Property Class (Class Code)	Total Borough Lots	Vulnerable Lots	% Vulnerable Lots	Total Borough Acres	Vulnerable Acres	% Vulnerable Acres
Vacant (1)	260	38	15%	71	20	28%
Residential (2)	1,016	176	17%	94	25	27%
Commercial (4A)	63	21	33%	67	29	43%
Apartment (4C)	4	1	25%	2	1	48%
Public Property (15C)	14	3	21%	14	1	4%
Church/Charitable (15D)	3		0%	1		0%
Other Exempt (15F)	2	1	50%	1	0	50%
Total	1,362	240	18%	250	76	30%

As **Table 7** reveals, under the 2050 sea-level rise scenario, 240 of the Borough’s 1,362 parcels (18%) and slightly over 30% (76 acres) of the total area of the community will be inundated.²⁶ **Table 8** indicates that the value of the affected properties represents slightly more than \$49.3 million or 11% of the total assessed value of the approximately of the Borough. Although only a relatively small portion of the community’s assessed value will be affected, it is important to note that over 43% of the commercial areas of the community will be inundated representing 36% of the commercial area assessed value.

**Table 8: Exposure Value - Vulnerable Parcels
2050 Sea-Level Rise**

Property Class (Class Code)	Total Borough Value	Vulnerable Land Value	Vulnerable Improvement Value	Vulnerable Parcels Value	% of Total Value
Vacant (1)	\$14,871,180	\$1,007,400	\$4,873	\$1,012,273	7%
Residential (2)	\$366,723,900	\$26,096,500	\$2,627,606	\$28,724,106	8%
Commercial (4A)	\$51,674,800	\$17,618,200	\$1,077,896	\$18,696,096	36%
Apartment (4C)	\$3,228,500	\$712,700	\$208,402	\$921,102	29%
Public Property (15C)	\$13,494,200	\$378,400	\$11,225	\$389,625	3%
Church/Charitable (15D)	\$2,758,600	\$0	\$0	\$0	0%
Other Exempt (15F)	\$1,476,500	\$395,300	\$205,953	\$601,253	41%
Total	\$454,227,680	\$46,208,500	\$4,135,955	\$50,344,455	11%
Net Taxable Value	\$436,498,380	\$45,434,800	\$3,918,777	\$49,353,577	11%

B. Exposure Analysis: 2050 Sea Level Rise with 1% Annual Flood

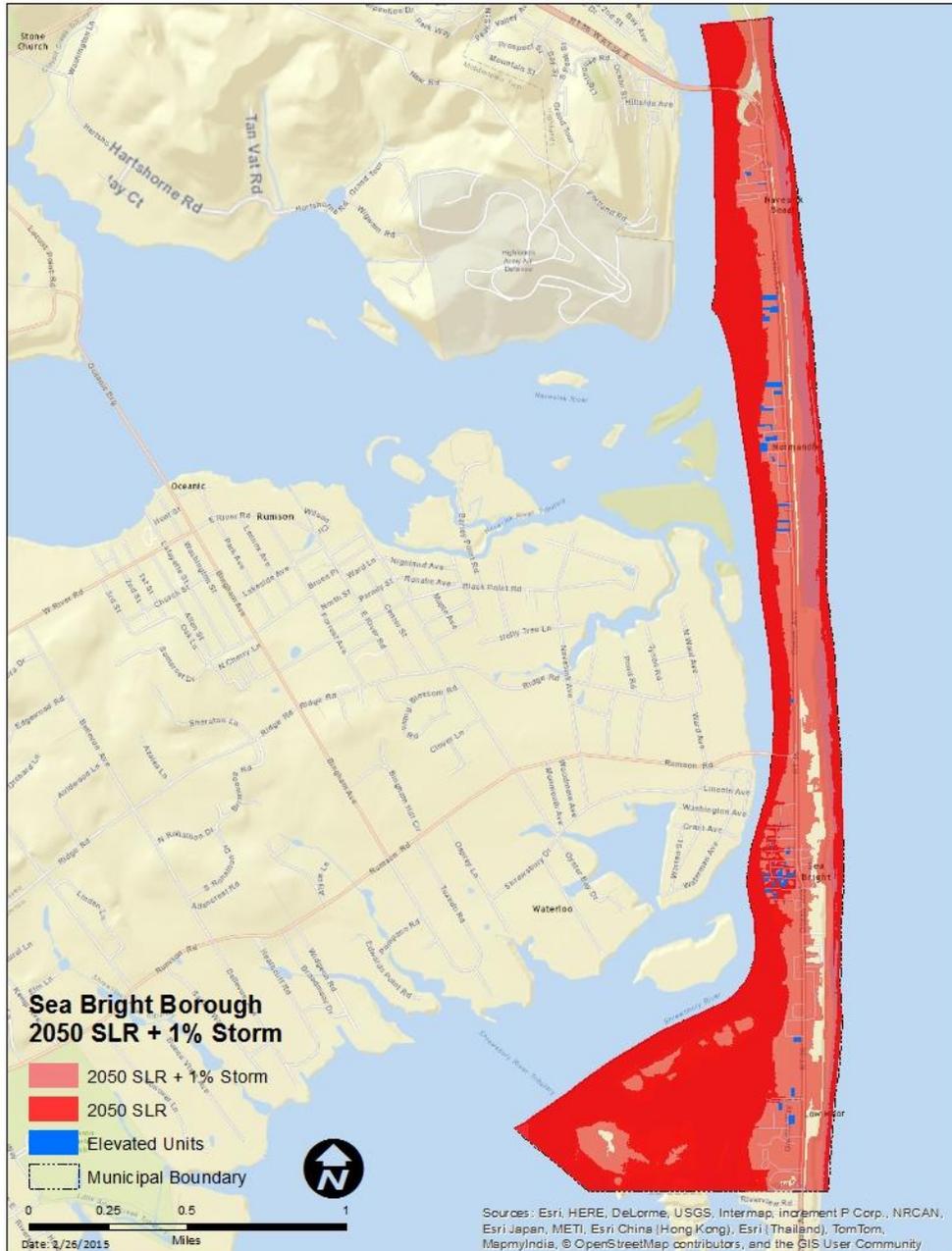
The foregoing 2050 Sea Level Rise scenario assumes that areas of the municipality will be regularly inundated and, therefore, exposure values included total land and structural values for all parcels that are projected to be more than 10% inundated. However, for those additional parcels impacted under the 2050 Sea Level Rise plus 1% Storm scenario, land value may or may not be affected. Structures on properties that may be inundated by episodic flooding (e.g., a 1% storm) can and often are rebuilt. Since it’s not possible to predict which parcels may or may not be suitable for redevelopment under this future scenario, three alternative exposure values have been calculated assuming: **1)** 100% of the land value is permanently extinguished; **2)** 50% of exposed land value is permanently lost, and **3)** no land value is permanently lost.

²⁵ For the purpose of the analysis the depth damage function for residential, 2-story structures, with at-grade elevations was applied.

²⁶ All parcels less than 10% flooded were not considered inundated and not included in the exposure value

Figure 9: 2050 Sea-level Rise Scenario under a 1% Storm Event, identifies areas that will be affected in locations throughout the Borough under this future scenario, differentiating between the inundated areas under the 2050 sea level rise scenario and those additional areas that would be affected by the 1% storm event.

Figure 9: 2050 Sea-Level Rise Scenario - 1% Storm Event



**Table 9: Exposure Value - Inundated Parcels
2050 Sea-Level Rise with 1% Annual Flood**

Property Class (Class Code)	Total Borough Lots	Vulnerable Lots	% Vulnerable Lots	Total Borough Acres	Vulnerable Acres	% Vulnerable Acres
Vacant (1)	260	215	83%	71	61	86%
Residential (2)	1,016	885	87%	94	86	92%
Commercial (4A)	63	61	97%	67	58	86%
Apartment (4C)	4	4	100%	2	2	100%
Public Property (15C)	14	13	93%	14	10	69%
Church/Charitable (15D)	3	3	100%	1	1	100%
Other Exempt (15F)	2	2	100%	1	1	70%
Total	1,362	1,183	87%	250	218	87%

Table 9 indicates that under the 2050 sea-level rise with a 1% annual flood, 1,183 of the Borough's 1,362 parcels (87%) would be inundated, 87% of the community's total 250 acres. **Table 10** reveals that these parcels represent approximately 53% of the total assessed value of the Borough, over 48% of the commercial market value and slightly more than 53% of the total residential value of the community (residential plus apartment).

**Table 10: Exposure Value - Inundated Parcels
2050 Sea-Level Rise with 1% Annual Flood (100% Extinguished Land Value)**

Property Class (Class Code)	Total Borough Value	Exposed Land Value	Exposed Improvement Value	Exposed Value	% of Total Net Value
Vacant (1)	\$14,871,180	\$9,951,300	\$742,456	\$10,693,756	72%
Residential (2)	\$366,723,900	\$163,612,800	\$32,265,441	\$195,878,241	53%
Commercial (4A)	\$51,674,800	\$22,583,500	\$2,080,741	\$24,664,241	48%
Apartment (4C)	\$3,228,500	\$1,153,000	\$195,649	\$1,348,649	42%
Public Property (15C)	\$13,494,200	\$11,866,400	\$228,357	\$12,094,757	90%
Church/Charitable (15D)	\$2,758,600	\$978,800	\$558,857	\$1,537,657	56%
Other Exempt (15F)	\$1,476,500	\$425,300	\$0	\$425,300	29%
Total	\$454,227,680	\$210,571,100	\$36,071,501	\$246,642,601	54%
Net Taxable Value	\$436,498,380	\$197,300,600	\$35,284,287	\$232,584,887	53%

Table 11 assumes a 50% loss in land value for parcels inundated in the event of a 1% flood, in addition to the parcels subject to 2050 Sea Level Rise inundation. This alternative assumes that the decline in land value would apply to all inundated parcels, including those with elevated structures (1,241 parcels, 225 acres). Under this alternative, the total loss (value of exposed land and structures) would amount to \$182.4 million or approximately 42% of the Borough's net taxable value.

**Table 11: Exposure Value - Vulnerable Parcels
2050 Sea-Level Rise with 1% Annual Flood (50% Extinguished Land Value)**

Property Class (Class Code)	Total Borough Value	Exposed Land Value	Exposed Improvement Value	Exposed Value	% of Total Net Value
Vacant (1)	\$14,871,180	\$5,983,050	\$747,329	\$6,730,379	45%
Residential (2)	\$366,723,900	\$113,795,550	\$28,071,347	\$141,866,897	39%
Commercial (4A)	\$51,674,800	\$29,074,650	\$3,072,837	\$32,147,487	62%
Apartment (4C)	\$3,228,500	\$1,289,200	\$404,051	\$1,693,251	52%
Public Property (15C)	\$13,494,200	\$6,311,600	\$239,582	\$6,551,182	49%
Church/Charitable (15D)	\$2,758,600	\$489,400	\$558,857	\$1,048,257	38%
Other Exempt (15F)	\$1,476,500	\$607,950	\$205,953	\$813,903	55%
Total	\$454,227,680	\$157,551,400	\$33,299,956	\$190,851,356	42%
Net Taxable Value	\$436,498,380	\$150,142,450	\$32,295,564	\$182,438,014	42%

Table 12 assumes **no loss in land value** for parcels inundated in the event of a 1% flood, in addition to the parcels subject to 2050 Sea Level Rise inundation. This alternative assumes that the impacts of inundation would be applicable to all parcels within the inundation extent, including those with elevated structures. Under this alternative, the total loss (value of exposed land and structures) would amount to \$77.7 million or approximately 18% of the Borough’s total assessed value.

**Table 12: Exposure Value - Vulnerable Parcels
2050 Sea-Level Rise with 1% Annual Flood (0% Extinguished Land Value)**

Property Class (Class Code)	Total Borough Value	Exposed Land Value	Exposed Improvement Value	Exposed Value	% of Total Net Value
Vacant (1)	\$14,871,180	\$1,007,400	\$747,329	\$1,754,729	12%
Residential (2)	\$366,723,900	\$26,096,500	\$28,071,347	\$54,167,847	15%
Commercial (4A)	\$51,674,800	\$17,618,200	\$3,072,837	\$20,691,037	40%
Apartment (4C)	\$3,228,500	\$712,700	\$404,051	\$1,116,751	35%
Public Property (15C)	\$13,494,200	\$378,400	\$239,582	\$617,982	5%
Church/Charitable (15D)	\$2,758,600	\$0	\$558,857	\$558,857	20%
Other Exempt (15F)	\$1,476,500	\$395,300	\$205,953	\$601,253	41%
Total	\$454,227,680	\$46,208,500	\$33,299,956	\$79,508,456	18%
Net Taxable Value	\$436,498,380	\$45,434,800	\$32,295,564	\$77,730,364	18%

CONCLUSION

The preceding analysis indicates that, *if no actions are taken to minimize future risk*, under the 2050 Sea Level Rise projection of 1.48 feet, 30% of the area of Borough, or over 76 acres – encompassing 240 parcels - would be exposed to flood inundation. The land value and the value of the structures currently constructed on the parcels subject to inundation would amount to over \$49 million dollars, or 11% of the net taxable assessed value of the community, based on the Borough’s present day valuation. By 2050, a 1% storm, coupled with projected sea level rise would the number of parcels that would be at risk of inundation would increase 5 fold, to over 1,180, exposing 87% of the area of the Borough to flooding. The loss in the Borough’s assessed value from the impact of such inundation is estimated to range from \$78 million to almost \$233 million, or from 18% to 53% of the total net taxable value of the community. In addition, the above analysis indicates that more than 90% of the area of the Borough’s residential areas and over 73% of its commercial areas are currently located within high-risk FEMA flood zones.

This vulnerability and exposure analysis is intended to serve as the basis for an informed discussion among the elected and municipal officials of Sea Bright Borough and between the municipal officials and the residents of the community about how best to prepare for and adapt to potential risks associated with projections of sea level rise and increasing flooding. A thorough assessment is the first step in a long process in which the Borough will need to decrease risk and vulnerability. The information presented in this report should better equip the Borough to make sound near- and long-term land use planning and development decisions and formulate efficient and effective public investment strategies to guide recovery management, reconstruction, resiliency and adaptation measures. To that end, the data raises several questions, including but certainly not limited to:

- What types of infrastructure should the Borough invest in that are most resistant to flooding, and can improve stormwater management capacity, particularly in those areas that are projected to be at risk?
- What strategies should the Borough pursue to protect residential and commercial development in vulnerable areas along the coastline as well as the infrastructure that serves these areas?

- What emergency response measures can the Borough put in place in the event that flooding makes critical evacuation routes impassable?
- What land use strategies can be employed to help gradually shift development to areas that would avoid or minimize risks of exposure to future flooding and inundation? How can those strategies be designed to best protect the safety of the residents at risk areas, retain community character and preserve the Borough's economic stability?
- How can the Borough most effectively engage residents in discussion about vulnerability as well short- and long-term strategies that would be most suited to respond to potential risk?
- In view of the fact that effect strategies to address vulnerability may entail regional responses, what are the appropriate county, state and federal-level partnerships the Borough needs to foster to help manage future challenges?
- What interim measures are needed, such as modifications/updates to floodplain management regulations, building codes and elevation standards to ensure public safety? Are current standards effective and what monitoring measures should be enacted to gauge the need for regulatory changes over time?

CHAPTER 4 GETTING TO RESILIENCE PROCESS AND RECOMMENDATIONS

As noted previously, the Borough participated in a “Getting To Resilience” process that was facilitated by Jacques Cousteau National Estuarine Research Reserve (JCNERR) staff. The Getting to Resilience process started as a facilitated discussion regarding the Borough’s strengths, weaknesses, and hurdles concerning resiliency.

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 Sea Bright this team included Read Murphy (Council, OEM Coordinator, CRS Coordinator), Mary Tangolics (Floodplain and Zoning official), Frank Lawrence (Volunteer Coordinator), Marc Leckstein (Council, Planning Board), Jaclyn Flor (Borough Engineer), and Steven Nelson (NJ Future Local Recovery Manager). 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 town on April 9th. JC NERR staff met with five representatives of Sea Bright and one representative of NJ Future. A discussion of the towns’ resilience strengths and weaknesses began the meeting and sections one and three of the questionnaire were completed. On April 16th, the questionnaire was completed with five representatives of Sea Bright and one representative of NJ Future meeting with JC NERR staff.

Upon completion of the GTR questionnaire, JC NERR staff analyzed the answers provided by the Borough of Sea Bright, 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 to help assist the Borough of Sea Bright’s decision makers as the Borough works to recover from Hurricane Sandy and become more resilient.

The majority of the recommendations are related to communications and outreach activities, including ensuring that residents and businesses are aware of their vulnerability to storm events and flooding. However, there are also recommendations related to Borough ordinances, maintaining records of various types in easily accessible locations, preparing a mitigation plan for properties that experience recurring flood damage, and capital improvements such as a continuous dune line.

These recommendations have been integrated into this report’s recommendations chapter and implementation matrix.

This draft is attached as **Appendix 1** *Getting To Resilience Recommendations Report*

CHAPTER 5 ASSESSMENT OF EXISTING PLANNING DOCUMENTS

As a necessary precursor to identifying priority actions that are most urgently needed to improve public safety, increase resistance from damage from future storms and stimulate economic recovery, eleven recent plans and studies were reviewed. These included the Borough’s master plan, several topic specific plans, the Borough’s emergency management plan and several studies were that performed as part of academic work. **Table 13** provides a list of the plans and studies reviewed for this SRPR.

Table 13: Planning Documents Examined

Name	Author	Date
Adapting to Coastal Climate Change	Rutgers Bloustein School	2012
Beach Management Plan	NJ DEP and US FWS	2006
Borough of Sea Bright Recovery Management Strategy	Laurie Johnson	2013
Coastal Monmouth Plan	Monmouth County	2010
Downtown and Ocean front Smart Growth Plan and Municipal Facilities Plan	Phillips, Preiss, Shaprio	2007
Emergency Operations Plan	Borough OEM	2013
Impediments to Home Repair and Recovery	Harvard Univ.	2013
Master Plan	various	1989, 1996, 2003
Monmouth County Multi-Jurisdictional Natural Hazard Mitigation Plan	Monmouth County	2009
Sea Bright 2020 (FEMA Community Recovery Plan)	FEMA/community	2013
Sea Bright NJ Resilient Rebuild	Rutgers Bloustein School	2013
Stormwater Management Plan	Maser Consulting	2005, 2007

A review of these eleven plans and studies reveals nearly 260 separate recommendations. These recommendations were then vetted to eliminate those that had already been accomplished or were no longer valid and those that were not urgently needed to improve public safety, increase resistance from damage from future storms and stimulate economic recovery.

As an example of some of the activities already completed or underway:

- most of the Beach Management Plan recommendations have been undertaken,
- a housing survey has just begun which will result in critical information for any housing programs, as well as basic information on the status of many houses,
- the Borough has hired an architect to design a new beach pavilion to replace the one destroyed by Sandy,
- the Corps has completed its beach replenishment project and there have been 2 dune grass plantings by volunteers,
- the Borough is actively collaborating with the NJ DEP and the US Corps of Engineers on seawall design and funding, a bulkhead ordinance to require raising bulkhead heights as part of land development is being drafted, and
- the Borough has been a very active participant in the County’s Hazard Mitigation Plan.

In addition to this rigorous review of existing plans and studies, the GTR process also required that existing plans and regulations were examined to determine how resilient the community was to flooding and storm events. Moreover, existing municipal procedures and processes, as well as policies and

notification actions were included in this analysis. More details are included in Chapter 4. This process yielded additional recommendations that were added to the Borough's list of potential projects.

This assessment of the Borough's existing planning documents, land-use regulations and other related regional or state plans are primarily intended accomplish three objectives:

1. Determine whether such documents contribute to or create obstacles for implementing the municipality's recovery strategies, and;
2. Determine the extent to which such documents account for the likelihood of future storms and impacts of climate change, most particularly sea-level rise in the case of coastal communities, and;
3. Recommend opportunities to modify, update and/or strengthen current plans and regulations to better equip the Borough to effectively accomplish recovery strategies and address climate changes.

While the Master Plan is the primary planning policy document for the Borough, several other plans and studies have been recently completed that were also reviewed for relevance to this SRPR and to the Borough's continuing recovery.

Master Plan

The Master Plan provides at least four goals, outlined below, that contribute to implementing the Borough's recovery strategies, including providing for safety from coastal flooding and storms. However, the Plan's goals and recommended actions do not account for the likelihood of future storms, climate change or sea-level rise. Therefore, a review of the current Master Plan is needed to add such considerations, and it is likely that a new Plan will need to be written. This should be supplemented by additional data gathering and analysis using geographic information system technology (GIS).

Goals relevant to rebuilding and recovery:

- to encourage municipal action to guide the appropriate use or development of all land in this Borough in a manner which will promote the public health, safety, morals, and general welfare
- to secure safety from fire, flood, panic and other natural and man-made disasters, specifically including the protection of life and property from coastal storms and flooding
- to insure that development within the municipality does not conflict with the development and general welfare of neighboring municipalities, the county and state, specifically to ensure development which is compatible with that of adjoining communities and the state's Coastal Areas Facilities Review Act
- to promote the conservation of historic sites and districts, open space, energy resources, and valuable natural resources in the Borough and to prevent sprawl and environmental degradation

Sea Bright 2020

(FEMA Community Recovery Plan) – did not articulate any goals.

Beach Management Plan

- provide a framework for cooperation among Borough, NJ Department of Fish and Wildlife Endangered Species Program and USFW in stewardship of federal and state listed endangered and threatened beach nesting birds and flora
- provide for the long term protection and recovery of species

- increase nesting success of birds (incl. piping plover, least tern)
- foster continued recovery of listed plant species (including seabeach amaranth, seabeach knotweed and seabeach sandwort)
- shift specific beach management responsibilities to Borough and citizens of Sea Bright

Recovery Management Strategy

Enhance leadership/management of Sea Bright recovery, Enhance Borough Recovery communication and collaboration, Expedite the restoration and sustainable rebuilding of SB's housing stock and to provide essential social services, Address immediate needs of businesses affected by Sandy, Complete the cleanup, repair and reconstruction of Borough's infrastructure and restoration of public services, repair and rehab Borough's flood mitigation structure and develop a long term flood hazard mitigation strategy, facilitate implementation of this Strategy through a structured action planning process, create a more integrated approach to managing the array of resources necessary to implement this strategy

Stormwater Management Plan

- Reduce flood damage, including damage to life and property
- Minimize, to the extent practical, any increase in stormwater runoff from any new development
- Reduce soil erosion from any development or construction project
- Assure the adequacy of existing and proposed culverts and bridges, and other in-stream structures
- Maintain groundwater recharge
- Prevent, to the greatest extent feasible, an increase in nonpoint pollution
- Maintain the integrity of stream channels for their biological functions, as well as for drainage
- Minimize pollutants in stormwater from new and existing development to restore, enhance, and maintain the chemical, physical, and biological integrity of the waters of the state, to protect public health, to safeguard fish and aquatic life and scenic and ecological values and to enhance the domestic, municipal, recreational, industrial and other uses of water
- Protect public safety through the proper design and operation of stormwater basins.

Adapting to Climate Change in Coastal Monmouth County

- to take climate change, SLR and storm data; combine with fiscal impact analysis and create 4 storm events (10-500 yr events) and 3 scenarios (rebuild, retreat, smaller subsidy from government) and recommend strategies.

Smart Growth Plan/Municipal Facilities Plan

- Be mindful of the needs of both the year-round and seasonal communities.
- Maintain the Borough as a quaint and small oceanfront town.
- Diversify the downtown retail mix to include a better grocery store and pharmacy, and small shops for local "real life" needs.
- In addition, promote in the downtown businesses with a regional draw, including upscale retail and restaurants, boutiques, art galleries, and outdoor cafes, to draw visitors.
- Improve and standardize façade design along Ocean Avenue.
- Consolidate scattered municipal facilities into a single structure, including, if possible, the municipal offices, the courts, and the Police Department.
- Consolidate emergency services into a cluster (first aid, police, fire).
- Build a larger, modernized Court facility.
- Update the zoning code: Revise the B-1 CBD district to promote appropriate infill in the downtown and create a new district to better regulate development on residential side streets

- Beautify the street.
 - Landscape or screen parking lot edges. If possible, relocate utilities underground or, as an alternative, consolidate to one side of the street. Plant street trees.
- Improve pedestrian safety and comfort, make it easier to cross road.
 - Improve safety at intersections with “bulb outs,” and raised/textured crosswalks
 - Improve width and continuity of sidewalks on east side of Ocean Avenue
 - Add landscaped center median (with turning lanes) to improve street-crossing safely
 - Reduce the number of curb cuts along Ocean Avenue
- Improve on-street parking supply, expanding into parking lot right of way if necessary and calm traffic as it moves through downtown.
 - Shift roadway east into municipal parking area, build space-efficient back-in diagonal on-street parking; or
 - At a minimum, construct back-in diagonal parking on west side of street, in front of the retail, thereby narrowing travel way.
- Make it easier for residents and those from nearby towns to walk and bike into town.
 - Create off-street bikeway or bike lane, connecting to Sandy Hook
- Use existing parking supply (both on-street and off-street lots) more efficiently.
 - Share municipal parking supply among public, retail, and beach visitors
 - Adjust time periods for on-street parking to facilitate its availability for shoppers
 - Prioritize side street parking for residential use, if allowed by NJDOT.
- Continue to replenish the beach, and develop anti-erosion strategies for winter storms.
- Expand sand dunes and plantings to stabilize the beachfront.
- Connect the gaps in the sea wall where feasible and appropriate.
- Expand access points over the sea wall, and expand the existing boardwalk.
- Expand public access to riverfront:
 - Create public “micro” parks at the end of certain streets (such as South and Beach Streets) that include benches for sitting, enjoying the view, and fishing.
 - Create riverfront public walkways as part of larger development sites, using Planned
 - Development District regulations.
- Beautify the public streetscape and provide incentives for private property owners to do same.

Monmouth County All Hazard Mitigation Plan

The Borough of Sea Bright is part of a multi-municipal effort overseen by the Monmouth County Office of Emergency Preparedness (OEM), to update a county wide Multi-Jurisdictional Natural Hazard Mitigation Plan. The first multi-jurisdictional plan was adopted in 2009. The current update is underway and a draft is expected summer 2014.

Representatives from Sea Bright have been active participants in the update process, which has included compiling extensive information on municipal activities and priorities, attending Core Planning Group meetings and attending training sessions.

Sea Bright, NJ Resilient Rebuild

Diversify Sea Bright’s economy and become more economically self sufficient

- Mitigate storm water and flooding;
- Pursue sustainable energy solutions;
- Reconfigure parking & circulation to achieve a more pedestrian friendly town
- Pursue resilient building design strategies;
- Reconfigure open and public spaces.

Borough Emergency Management Plan

Coastal Monmouth Plan Goals & Objectives

“To create a Vision and Planning Strategy for the Coastal Monmouth Region (CMR) by cooperatively addressing development issues on a regional scale in a manner that is sensitive to the region’s unique coastal setting, diverse community character, and critical environmental, cultural and aesthetic resources.”

The following objectives were also developed to guide the CMP process.

- Preserve and enhance area character and quality of life.
- Identify and assess current and future land use, economic development, natural resources, public services, transportation, and design issues including:
 - Development and redevelopment opportunities
 - Conservation strategies
 - Transportation strategies
 - Public infrastructure capacities and limitations
 - Alternative community design strategies
 - Regional mechanisms to encourage regional cooperation
 - Cooperatively prepare CMP for Regional Plan Endorsement.

Assessment of Zoning Ordinance for Borough’s Recovery Strategies

An summary assessment of Sea Bright’s land use patterns and zoning regulations was provided in Chapter 1 of this Report. The Borough has taken the proactive step of adopting a flood damage prevention ordinance, including requiring two (2’) foot of freeboard above base flood elevation. However, as the GTR process revealed, a thorough review of the ordinance, and other land use regulations, should be performed after the Master Plan is reviewed and updated.

Comparison with Regional/State (CAFRA, Coastal Monmouth Plan)

The Coastal Area Facility Review Act (CAFRA) was enacted by the state of New Jersey in 1973. The Act is designed to protect the vital shore areas of New Jersey from being overdeveloped. In accordance with CAFRA, residential development, commercial development, industrial development, and public development in these areas are regulated through permitting from the New Jersey Department of Environmental Protection (NJDEP). Development activities include construction, relocation and enlargement of buildings or structures; and all related work, such as excavation, grading, shore protection structures and site preparation structures, and site preparation. This includes any excavation, clearing or grading of dunes, placement of sand, construction of revetment and retaining walls and bulkheads, and filling or grading of beaches.

CAFRA zones extend through eight counties of New Jersey, from the coastline of Middlesex County south to Cape May County, west following the Delaware River to Salem County. The entire area of the Borough of Sea Bright is within a Coastal Environmentally Sensitive CAFRA Planning Area. Consequently, any development located on a beach or dune; any development located within 150 feet of the mean high water line or most landward limit of the beach or dune; all developments within 150 feet of the mean high-water line or most landward limit of the beach or dune that consist of three or more residential units, or commercial projects having five or more parking spaces or equivalent parking area, or any public or industrial development is regulated by and subject to a permit from NJDEP.

Further, CAFRA separates the coastal region into zones and centers where development is regulated by varying degrees. The Borough is located within the Coastal Environmentally Sensitive Planning Area. This area within the CAFRA boundary accommodates development at higher intensities in existing centers,

and discourages the development of public infrastructure facilities outside of centers, where low intensity development patterns are maintained.

CHAPTER 6 RECOMMENDATIONS FOR ACTION

Chapter 5 offers an overview of the plans and studies undertaken in preparing this Report. This review and vetting resulted in approximately 120 recommended actions, which were then consolidated into 34 actions (see Appendix 4, Potential Actions). The items in the remaining list were considered as “potential priority actions” and were further analyzed using the vulnerability assessment to determine which would require an alternatives evaluation. Any potential priority action that consisted of physical construction was included in the alternatives assessment.

While all of these 34 actions are important projects for the Borough, there are limited resources, both within the Borough and from others. Moreover, this SRPR process explicitly anticipates articulating those “priority actions that are most urgently needed to improve public safety, increase resistance to damage from future storms, and stimulate economic recovery” (NJ DCA). Therefore, a working group of Borough officials reviewed these potential priority actions and determined that there were 3 distinct goal areas for recommended actions – Enhancing Mitigation and Resiliency, Sustainable Land Use and Capital Projects, and Improving Communications and Outreach. Each of these goals has specific urgent projects within them and is described in more detail below.

1. ENHANCING MITIGATION & RESILIENCY

A) Long term mitigation plan for repetitive loss properties: Due to the Borough’s location between two rivers and the ocean and its topography, it has experienced significant damage from storm events over the last 20 years. According to FEMA Repetitive Loss Database, damage from just Hurricane Sandy, Hurricane Irene and the March 2010 storm resulted in over \$16,000,000 in federal NFIP and individual assistance payments to public and private property owners. Moreover, estimates of sea-level rise show increased inundation on a more regular and recurring basis over the next 30-80 years.

The Borough has responded to these issues by recently collaborating with NJ DEP on acquisition of 2 properties that were significantly damaged by Sandy. The buildings on these properties will be demolished, and the Borough intends to create passive open space or a park on the property. This will increase the amount of pervious coverage in the Borough, making it more resilient.

To provide greater resiliency, as well as provide more resistance to damage and minimize cost from future storm events, a long-term mitigation plan is recommended. It would provide a strategy for minimizing future damage from storm events and may include acquisition of properties, allowing properties to revert natural states, or other strategies.

B) Debris removal plan

Following the devastating damage from Hurricane Sandy, the Borough was faced with a significant amount of debris that needed removal. As there was no formal plan for this, the response was not coordinated or as efficient as it might have been. The Borough had not identified appropriate locations for temporary debris storage, nor did it have ready access to necessary debris removal equipment. A debris removal plan would include recommendations for equipment needs and deployment, and interim locations for debris removal.

C) Geographic Information System (GIS) Data: A significant obstacle to recovery from Sandy was the inability to locate infrastructure, particularly natural gas lines, and fire hydrants. The Borough does not currently have digital maps of the location of gas lines, storm sewers and outfall pipes, sanitary sewer, fire hydrants and road improvements. Due to the substantial debris that was present and the extensive amount of sand across the community, locating these critical facilities was hampered. Finding curbs and

streets was difficult to accomplish until significant amounts of sand and debris had been removed, as exact locations could not be identified by visual inspection alone.

While some of this data (such as some utility lines) may be available from private entities, public infrastructure is not digitally mapped with lat/long coordinates. A necessary component to future resiliency is to acquire this data where it exists and to create it where it does not. This will likely include manually locating essential infrastructure and creating digital data. Putting these locations in a digital format will allow faster response time.

As part of this GIS data gathering, historic storm data, coastal erosion history, and other information necessary to increase resiliency should be collected and digitized. In addition, areas of repetitive loss and substantial damage should also be digitally collected.

D) Borough organizational staffing/operational plan

The significant damage from Sandy was unprecedented in the history of Sea Bright. At the time of this SRPR report, there are still huge efforts being undertaken to respond, and Borough operations have not returned to normal. Indeed, no community would be able to effectively respond to a disaster of the magnitude of Sandy, as it was the second largest natural disaster in US history. However, the storm and response did highlight some areas of need regarding the provision of government services. An overall plan for staffing and operations is needed. This should not be limited to the current operations, but should include examining sharing services with other governments, co-locating municipal facilities and possibly municipal consolidation.

Moreover, a Continuity of Operations Plan (COP) should also be created, to ensure that primary essential services (beyond emergency operations) continue after a significant storm event. A COP 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.

2. PROMOTING SUSTAINABLE LAND USE & CAPITAL PROJECTS

A) Master Plan: The current Master Plan is outdated and in need of a complete re-writing. A new plan would provide a greater emphasis on resiliency and resistance to damage from future storms, as well as economic viability and revitalization. With the numerous plans that have been done for Sea Bright over the last 5-8 years and technological advances (such as GIS and social media), a more robust and inclusive Master Plan can be created.

B) Redevelopment plan

There are multiple vacant or underutilized properties in the Borough that would benefit from a formal redevelopment process. This includes both publicly owned property and privately owned property.

The Borough Council has recognized this and has authorized the Planning Board to initiate redevelopment planning. A key goal in this redevelopment will be economic resiliency. A redevelopment plan or plans would also articulate the vision for the future of Sea Bright, and thus lay the necessary foundation for future business development strategies.

C) Market Analysis and Plan

Hurricane Sandy created significant damage to downtown Sea Bright businesses and although many businesses have rebuilt, there are still several vacant storefronts and lots. In order to foster a more sustainable downtown retail/service sector, a marketing analysis and plan would provide an

understanding of the local and regional retail/service market and what retail/service businesses may be appropriate for Sea Bright.

D) Municipal facilities consolidation

With the damage to the beach pavilion, fire hall, library, department of public works, police station and EMS station, the Borough has been considering whether to consolidate some or all of its facilities. The Borough has already begun design of a beach pavilion facility to replace the one damaged by Sandy, which would include a new library. It has hired an architect and is in the midst of preliminary design. In addition, as part of this SRPR, conceptual design analysis has been done to create some alternatives for location and building programming. Any consolidation of facilities would be coordinated with any recommendations resulting from the Borough Operations Plan recommendation above.

E) Code enforcement enhancement

The significant damage to properties in the Borough has created issues and concerns related to public health and safety. Due to Sandy, there has been a significant number of vacant buildings and properties created. Increased code enforcement will allow more vigilance on these properties.

F) Capital improvement plan and projects (including Cityscape, bulkhead, seawall, other)

While the Borough does include a capital improvement program in its annual budget, a more rigorous approach may help determine priorities and timing among the many capital projects that the Borough desires. These projects include consolidating some municipal facilities and/or building new facilities, building bulkheads on Borough-owned property, completing the gap in the sea wall, undertaking a streetscaping for the length of Ocean Avenue, creating bicycle facilities, creating an enhanced dune line, Borough-wide landscaping, developing a parking deck, and others.

3. IMPROVING COMMUNICATIONS & ENGAGEMENT

A) Strategic Communications & Engagement Plan

The Borough has done a very good job at communicating with its residents through a variety of channels. Town hall meetings, an electronic newsletter sent out weekly, a resource center established with the aid of a local foundation and a revamped Borough website were all undertaken in the response to Sandy. In addition, the Borough has had a regular newsletter (the Sea Breeze) which is published quarterly, as well as a moveable sign board and staff that responds to in person and telephone call requests.

Nevertheless, there is a continuing need to enhance communications. In addition, communications and outreach are a very important component in the Community Rating System, and thus the Borough and property owners would benefit.

Therefore, an overall plan, with strategies, tactics, methods of communication and involving both internal communications (within the Borough government) and external (between the Borough government and the many stakeholders and constituencies) would address several needs identified in the many plans were examined. This might also include an emergency operations plan (or it might be a standalone plan) that would enhance response to disasters.

In the following chapter, these priority actions are shown in summary, with major tasks described, estimated costs, potential funding sources and lead entities. This Implementation Matrix is intended to be a summary of priority actions that the Borough desires, and is also intended to be a flexible blueprint that can be modified as conditions change, funding becomes available or technologies develop.

CHAPTER 7 IMPLEMENTATION MATRIX

Priority Project	Description of Project	Statement of Need (related to impact from Sandy)	Importance to Environmental/Economic Health of Community	Major Tasks	Estimated Costs	Potential Funding Sources and Resources	Phasing
Seawall	Repair damaged seawall and bridge the “gap” in the existing seawall	Seawall provides protection from storm surge and wave action. Areas not protected by the seawall sustained substantial damage. Existing seawall sustained damage due to wave action/debris and requires repairs	The Borough’s Commercial district lies landward of existing “gap” in seawall. These buildings require protection from storm surge and wave action. Storm surges also impact environmental health	Fund Design (Exempt from Permitting due to likely DEP Administration of Project) Construct Inspect	\$68,000,000	FEMA (90%), DEP (7.5%), Borough (2.5%)	3-5 years
Bulkhead	Raise bulkheads at ends of public streets to 7 ft. NAVD88, encourage private landowners to raise bulkheads to this same height	Flooding from the Navesink and Shrewsbury River caused significant damage.	Repeated flooding	Fund Design Permit (CAFRA Individual Permits for Osbourne Place & Beach Way, NJDEP Waterfront Development Permit for all locations) Construct Inspect	\$1,831,952	DEP	2-3 years
Master Plan	Prepare a new Master Plan for the Borough	The impact of Sandy raised awareness of the Borough’s vulnerability and need for resilience. The Borough’s existing master plan is outdated and does not address these issues.	Master Plan provides basis for protecting public health and safety and properties.	Fund Solicit Input Write	\$50,000	DCA PSPAG (Phase II Project), Borough	6 months – 1 year

Redevelopment Studies & Plan Preparation	Conduct Redevelopment Studies and, if such properties meet the statutory criteria to be designated as a redevelopment area, develop a redevelopment plan/plans for these properties	Sandy damage resulted in several vacant and demolished buildings, leaving abandoned buildings and vacant land. The Borough also seeks to investigate redevelopment opportunities for some Borough owned property.	Redevelopment can create incentives for private investment, while crafting area redevelopment plans provides the Borough with flexibility to implement its vision while focusing on getting to resilience	Fund/Write	\$65,000	DCA PSPAG (Phase II Project), Borough	Study – 2 months, Plan Preparation -1 – 3 months acquisition and redevelopment – dependent on market conditions
Debris Removal Plan	Create a plan for debris removal after storm events	The impacts of Sandy highlighted need to establish a protocol and system to ensure efficient and speedy debris removal.	Delayed removal of debris can negatively impact public health and essential services in the Borough.	Fund/Write	\$25,000	DCA PSPAG (Phase II Project)	9-12 months
Code enforcement enhancement	Enhance code enforcement activity as it relates to vacant/abandoned properties	Sandy caused widespread damage to homes, leaving many homes vacant and in disrepair, which has created a need for stronger code enforcement to protect public health and safety and preserve the integrity of the Borough.	Derelict or abandoned buildings create public health and safety issues and negatively impact the Borough's sense of place and community pride and morale.	Hire additional code enforcement staff, streamline enforcement tracking and process	Enforcement Tracking evaluation process: \$7,500; Additional Staff: \$40,000 per staff person	DCA PSPAG (Phase II Project) (enforcement tracking only), Borough	Enforcement tracking/evaluation – 1-3 months Staffing – 1-3 months
Strategic Communications and Outreach Plan	Develop a plan that establishes protocols for internal and external communications and outreach, including traditional media and social media	Recovery from Sandy has been more difficult due to difficulty in communications. Increased engagement can enhance resiliency and preparedness	Sandy revealed inadequacies of existing methods of communications, specifically related to telecommunications and radio to radio communications.	Fund, Evaluate and Improve methods, Write	\$50,000	DCA PSPAG (Phase II Project), FEMA (public safety grants)	6 months – 1 year
Capital Improvement Plan	Develop a 5 year intensive CIP and update it annually.	Sandy created a huge demand for capital projects and the Borough needs to review/analyze them in order to prioritize and find funding	The Borough needs to consider priorities to maintain public health and safety and increase resiliency.	Fund, Write	\$30,000	DCA PSPAG (Phase II Project)	
Borough Organizational Plan	Including staffing, operations, IT, potential shared services, potential co-locating with surrounding municipalities, COP	Borough operations were severely impacted by Sandy and continue to be affected	Borough operations are critical to residents' and businesses' needs related to public health and safety	Fund, Write	\$50,000	League of Municipalities, Rutgers Center for Local Gov't	

Mitigation Plan	Develop a plan that recognizes the impact of repetitive loss properties and properties that have sustained substantial damage from storms, and recommends measures to reduce future impact	FEMA data shows that there are areas with repetitive losses from Sandy, Irene and the March 2010 storm.	The Borough continues to remain vulnerable to coastal storms and sea-level rise. Developing a mitigation plan will increase resiliency, especially related to repetitive loss properties.	Fund, Write	\$50,000	DCA PSPAG (Phase II Project)	
GIS data	Conduct field survey of Borough Infrastructure (i.e., water, storm sewer, natural gas)	Recovery from Sandy was significantly hampered by lack of location information for infrastructure, which slowed essential repairs to ensure adequate operation of infrastructure.	Creating a database of Borough infrastructure will allow the Borough to assess the vulnerability of same, but will allow the Borough to locate and repair infrastructure impacted by storm events.	Fund, Conduct field survey to located infrastructure, digitize data and create database and hard copy mapping	\$50,000	DCA PSPAG (Phase II Project)	6 – 12 months
Municipal Facilities Plan	Design and construct a multi-purpose municipal building that may include Borough operations, Fire Department, OEM, First Aid, Police and DPW	Sandy caused substantial damage to the firehouse, police and EMS facility and the rendered existing Borough hall and DPW facility inadequate	State of the art and adequate space for facilities will provide for more effective delivery of government services. A centralized municipal facility will allow for more efficient government coordination and centralized location from which to deploy response.	Design, Permitting, Construction, Inspection	\$9.5 million - \$13 million	Borough	2-6 years

<p>Cityscape Plan for Rt 36</p>	<p>Design and build an enhanced Route 36 (Ocean Ave), that will include a downtown streetscape, bicycle and pedestrian facilities</p>	<p>Sandy resulted in significant damage to Route 36. Designing and building a more resilient cityscape/streetscape can reduce future damage by being better equipped to handle the effects of storms.</p>	<p>An improved streetscape will contribute to enhancing the “sense of place” and community in Sea Bright while incorporating design elements intended to increase resiliency while also reducing potential pedestrian vehicle conflicts and providing a more attractive appearance to potential investors.</p>	<p>Fund, Develop and Evaluate Design Elements Design Permit (NJDOT Highway Access Permit, Soil Erosion and Sediment Control, NJDEP Waterfront Development Permit and/or CAFRA Individual Permit) Construct</p>	<p>\$45,000 - \$60,000</p>	<p>DCA PSPAG (Phase II Project) - \$50,000, remaining from NJDOT, TAP, County</p>	<p>2-3 years</p>
<p>Market Analysis and Plan</p>	<p>Undertake a market analysis and plan for downtown Sea Bright</p>	<p>Sandy created significant damage to most businesses in Sea Bright, there are still a significant number of vacant storefronts and lots downtown.</p>	<p>To understand potential retail and service sector business types that would fill a need within the existing market</p>	<p>Fund, Write</p>	<p>Fund, Write</p>	<p>DCA PSPAG (Phase II Project)</p>	<p>6 months</p>

Appendix 1: Getting To Resilience Report Recommendations

Borough of Sea Bright “Getting to Resilience” Recommendations Report

Prepared by the Jacques Cousteau National Estuarine Research Reserve

April 2014



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 communities in reducing 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 can enhance the outcomes of the evaluation by providing community-specific recommendations, guided discussions with municipal representatives, a vulnerability analysis, and municipal plan reviews.

The Borough of Sea Bright was heavily impacted by Superstorm Sandy in 2012 and continues to recover and rebuild. Located on a barrier spit that ends with Sandy Hook to the north, the Borough is susceptible to flooding from the Shrewsbury River on the western shore and overwash and flooding from the Atlantic on the eastern shore. At times in the Borough's history, Sandy Hook has become isolated from the rest of the barrier spit and Sea Bright has bordered an inlet. After experiencing periods of severe erosion over the past hundred years, Sea Bright is now protected along the ocean side by a large seawall made of rock and concrete and is mostly bulkheaded along the river. During Sandy, the seawall was breached or overwashed in many locations, allowing widespread flooding and leaving behind several feet of beach sand in many locations.

As part of a combined letter of agreement between the Borough of Sea Bright and New Jersey Future, New Jersey Future outlined a scope of services that would be provided to the towns through their Local Recovery Planning Manager Program. These services included providing guidance, technical assistance, project management, and staff support to develop and implement effective long term recovery and resilience strategies; assist Sea Bright to rebuild in a manner that anticipates and responds to future severe storms and sea level rise; and to promote planning principles that were endorsed in town resolutions requesting that NJ Future provide a Local Recovery Planning Manager.

The JC NERR's participation is highlighted under *Task 6.1 Existing Conditions Analysis and Vulnerability Assessment* of the "Letter of Agreement Between Borough of Sea Bright, and New Jersey Future". The recommendations given by JC NERR at the end of the Getting to Resilience process are part of this task that add to the deeper evaluation that NJ Future will be doing as the Vulnerability Assessment of Sea Bright. The assessment will be based on detailed mapping of the characteristics described in part 1 of the "Elements of a Vulnerability Assessment" summary attached to the Letter of Agreement. The assessment shall evaluate potential impacts of a range of hazards (coastal storm events/flood patterns, category 1-4 hurricanes, erosion, flooding, sea level rise, storm surge) for past events, existing conditions, and year 2050 and 2100 planning horizons.

The Getting to Resilience process started as a facilitated discussion regarding the Borough's strengths, weaknesses, and hurdles concerning resiliency. Sea Bright noted a wide variety of projects that have been undertaken as a result of Sandy impacts that are strengthening the community's resiliency. The Borough is working with the New Jersey Department of Environmental Protection (NJ DEP) to close

breaks in their seawall in damaged sections and to finish closing the seawall in the incomplete section in the center of town. Cutoff walls and installing additional boulders below ground level may also be utilized in order to prevent scouring and future damages. Sea Bright has an agreement in place with the NJ DEP and the United States Army Corps of Engineers (USACE) to receive regular beach nourishment when necessary. Replenishment took place again shortly after Sandy. Prior to replenishment, the beach had experienced such severe erosion that the ocean reached the sea wall at many locations during normal high tides. The Borough has built dunes in many locations and uses volunteer donations and labor to plant them with dune grass.

A large emphasis is being placed on raising the bulkhead elevations on Borough property to 7 feet NAVD88. Work is continuing to educate private property owners to mirror this work and other avenues of influence, such as new ordinances and codes, are being explored to make the elevation of the bulkhead line continuous. As with many other coastal municipalities in New Jersey with low elevations, the stormwater system often allows tidal waters to push up the roughly 65 outfall pipes and into streets. To combat this issue, the Borough is looking at installing flapper valves at outfall pipes that are Borough property.

The Borough has adopted all FEMA flood maps and has set their building code to include a freeboard of 2 feet, higher than the 1 foot state requirement. The Borough has also assisted homeowners to find funding to raise their buildings through Reconstruction, Rehabilitation, Elevation, and Mitigation (RREM) Program funding and donations available from private organizations. Thanks to Community Development Block Grant (CDBG) funding, a new stormwater pump station is being constructed. At other pump stations, the electrical panels have been raised to prevent damage during extreme flooding events such as Sandy. Pump stations and back up generators that did receive flood damage during Sandy have been repaired. The Borough is looking to secure funding to rebuild or relocate the firehouse and emergency stations that were damaged during the storm as well.

The planning board is firmly behind establishing a resilient community through its decision making process on project approvals and the Borough supports resilience efforts. The group attending GTR meetings felt that the work of NJ Future and JC NERR will provide the guidance and opportunities necessary to become resilient. As most planning documents within the town are due for updates or new municipal plans are being written, the present is the best time to tackle resiliency initiatives.

The Borough identified numerous challenges to resilience efforts within the community. Private properties limit the ability to make changes in many locations. These include the numerous private beach clubs on the ocean side and the private properties that line the riverfront. These private properties may present a hurdle when looking to form continuous dune lines or bulkhead standards. Though the Borough is looking to address backflow in the outfall pipes of the the stormwater system, many outfall pipes are not Borough owned and could present a threat even after Borough outfalls are equipped with valves to prevent flooding. Being a low lying municipality, flooding is the Borough's major hazard and there are very few safe locations to move cars to during flood events. Many items in town such as dumpsters and cabanas are not secured to the ground and have the potential to become projectiles during flooding and periods of heavy wave overwash. All of these challenges were taken into consideration when planning this recommendations report.

Methodology

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 Sea Bright this team included Read Murphy (Council, OEM Coordinator, CRS Coordinator), Mary Tangolics (Floodplain and Zoning official), Frank Lawrence (Volunteer Coordinator), Marc Leckstein (Council, Planning Board), Jaclyn Flor (Borough Engineer), and Steven Nelson (NJ Future Local Recovery Manager). 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 towns on April 9th. JC NERR staff met with five representatives of Sea Bright and one representative of NJ Future. A discussion of the towns' resilience strengths and weaknesses began the meeting and sections one and three of the questionnaire were completed. On April 16th, the questionnaire was completed with five representatives of Sea Bright and one representative of NJ Future meeting with JC NERR staff.

Upon completion of the GTR questionnaire, JC NERR staff analyzed the answers provided by the Borough of Sea Bright, 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 Community Resiliency Specialist Christopher Huch to help assist the Borough of Sea Bright's decision makers as the Borough works to recover from Superstorm Sandy and become more resilient.

Recommendations

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

Sea Bright should examine the current number of outreach programs it runs and determine what it would take to gain additional 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. Outreach is one of the easiest sections to gain points in the CRS and one Sea Bright should focus on heavily.

It would be beneficial to develop a Program for Public Information (PPI) which would help to organize outreach, continue to include the current methods and avenues for outreach, and gain additional CRS credits. 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. For guidance on establishing a PPI, visit http://crs2012.org/uploads/docs/300/developing_a_ppi_2-24-12.pdf.

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

After Sandy, Sea Bright staff have led talks on various flood related topics which can be worth significant CRS credits if they become annual outreach meetings and they meet CRS guidelines. Section 320 of the

CRS discusses a wide variety of outreach projects and initiatives that can be covered. By continuing to discuss the importance of planning for flooding, the Borough can set an example to its residents 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 Borough 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.

3. Look into becoming 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. For more information, visit <http://www.stormready.noaa.gov/howto.htm>. Becoming a StormReady Community results in CRS credits.

4. Make sure all flood maps are available on the town website, at Borough Hall, and at the future Sea Bright Library or nearby library in Rumson.

Sea Bright 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 . Maintaining a link to FEMA’s website on the Borough website is highly recommended and should highlight a section that deals specifically with flooding and other coastal hazards rather than Sandy recovery.

5. Communicate the different information available within different pages of the Borough website to be easily accessible to the public.

The Sea Bright website is currently being updated. This is the perfect opportunity to set the site up to highlight flooding and coastal hazard risks according to CRS outreach criteria. Once again, by establishing a PPI, the process for establishing this section of the website and subsequently updating it will be defined, documented, and eligible for CRS credits.

6. Transfer personal knowledge, documents, and other records of coastal storm and flooding event damages to digital format and place on a shared Borough 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 municipal 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. Hard copies of documents and other records should also be digitized for preservation and access. Given the small size and sometimes limited hours of Borough staff, 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.

7. Adopt the latest version of FEMA’s flood maps and rewrite elevation and freeboard requirements in a Flood Damage Prevention Ordinance as based upon the Best Available Flood Hazard Data or the most stringent version of FEMA’s flood maps.

The Borough may desire to amend the current Flood Damage Prevention Ordinance by using language available in the current NJ DEP recommended Ordinance. Writing new requirements as related to the Best Available Flood Hazard Data, it should allow for change over time as FEMA's maps are redrawn regularly. While it had been decades since FEMA had remapped the FIRMs in our area, the remapping process was long overdue and can be anticipated to take place with a much 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 adding "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 than the 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. 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. Both actions can result in a large amount of CRS points in the Higher Regulatory Standards section.

8. Ensure the public is aware of any changes to FEMA's flood maps as they are updated and if those updates result in changes to the Borough'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 Borough. For every release of a map update, the Borough 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 Borough's Flood Information webpage may help to alleviate questions the public may have as each map is updated, thereby reducing the workload on Borough staff.

The new RISK map products from FEMA include a GIS layer depicting the "changes since last FIRM" which will help the Borough in describing the changes in flood zones on individual properties and for the Borough as a whole. A description of this data set can be found at: <http://www.region2coastal.com/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 are with the maps, the more likely they will take appropriate actions.

9. Sea Bright should 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 quickly become a problem in coastal areas. These areas could include any waterfront that is not bulkheaded and has experienced erosion. Factors that could amplify erosion (sea level rise, surge) should be defined. Over the last 150 years, the oceanfront and riverfront shoreline positions have changed dramatically. The Borough should make an effort to identify and document the areas of erosion. Acquiring erosional rates and shoreline positions can be done through several avenues including the Stockton Coastal Research Center's beach profile data set

(<http://inraweb.stockton.edu/eyos/page.cfm?siteID=149&pageID=9>) and the USGS Coastal Shoreline Change data set (<http://marine.usgs.gov/dsasweb/#>). Identifying erosional hotspots and their potential impacts on homes and infrastructure can allow for mitigation actions that may prevent erosion from becoming a future problem. In the same mindset, unwanted deposition from shoaling and runoff can also be problematic for storm water management and navigation in waterways. Large-scale replenishment projects often change the erosional patterns of beaches as well so a change should be expected after each USACE project is completed. Having information on the patterns prior to these project can be used to gauge the project's success and help to improve the design for future replenishment projects. Keeping information on coastal erosion can result in CRS credit in the Erosion Data Maintenance (EDM) section.

10. Sea Bright should identify sea level rise as a hazard in town plans and consider disclosing hazard risks to potential buyers and real estate agents.

Even with the lowest level of predicted sea level rise Sea Bright will experience significant impacts in the near future. 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 by 2050 sea level rise is expected to rise 1.3 feet along the Jersey Shore. By 2100 sea level rise is projected to rise 3.1 feet along the Jersey coast. While sea level rise is a monumental challenge to coastal areas, the challenge cannot be tackled until it is properly identified. Disclosing these risks to the public using various techniques also may result in CRS credits.

11. Create a detailed mitigation plan for areas that experience repetitive loss.

Repetitive loss properties can be a large burden on towns over time. By creating a mitigation plan for these areas, the Borough 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 large CRS credits.

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

Sea Bright has very limited areas of land left that still have natural floodplain functions. Floodplains can absorb runoff and mitigate flooding issues. This can be done utilizing a variety of techniques including wetlands restoration, planting natural vegetation, reducing sediment compaction, and creating a natural profile. Returning 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 \$112 million in 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).

13. Focus on creating a continuous dune line and re-establish dune grass and other natural vegetation.

"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)

After surveying the beach profile in Sea Bright post-Sandy, the Stockton Coastal Research Center recommended an engineered dune system with two ridges to reduce damages from wave run up in future storms. While the Borough's seawall is the last line of defense during a storm, it has been shown that dunes are an effective way of combatting storm damage. A strong dune system in front of the Borough sea wall can add more protection and also prevent the sea wall from sustaining costly damages during storms. A continuous dune line would prevent wave energy from reflecting off of the sea wall, causing an increase in erosion and scouring. Dunes absorb wave energy and release sand supplies onto the beach during storm events, increasing the amount of time it takes for wave energy to reach the sea wall. A dune line would also help to eliminate the overwash of the sea wall that resulted in sand being deposited throughout the town, requiring a costly and time intensive cleanup. Low lying dune fields were no match for Sandy's waves and sand actually piled up against the seawall, creating for a ramp effect that allowed waves and sand to surge over the top of the seawall. Fees from programs such as beach badges can help to assist in the funding for dune projects.

A dune system should be continuous as cut throughs for beach access allow wave energy to erode the dunes rapidly. The presence of the sea wall on the backside of the dune also increases the likelihood that cut throughs in the dune would cause rapid erosion due to the reflective nature of the wall. Access should be over the top of the dune in specific and limited locations to protect dune vegetation. The Borough should reach out to the NJ DEP and the USACE to discuss whether future replenishment projects will have a dune system included. The Christie administration has made dune systems a priority for storm protection and there is much discussion regarding Monmouth County's lack of dunes in replenishment designs post-Sandy. By inquiring about adding dunes to future replenishment designs, the USACE might agree to take on the cost of dune system design, construction, and planting in future projects.

14. 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 area 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>

15. Have township municipal officials participate in FEMA training courses.

While going through the GTR questionnaire, it was expressed that many Borough 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 independent 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.

16. Explore the possibility of creating a Community Emergency Response Team (CERT).

CERT programs can provide volunteer support to first responders, provide assistance to victims, help to organize volunteers at disaster sites, and collect disaster information to support first responder efforts. While Ocean County has teams, Sea Bright should create its own CERT program according to CRS standards which would result in achieving CRS points as well as a stronger community.

17. Adopt a Continuity of Operations Plan.

A Continuity of Operations Plan (COP) 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 COP 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. JC NERR is able to provide example COP plans from the Borough of Avalon 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.

18. 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 Borough move to create them. Further content regarding this recommendation can be found below in the section titled, "Coastal Hazard Incorporation in Planning".

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 towns 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.

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 Borough 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 Borough’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 county’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. Most areas of the Borough of Sea Bright’s 100-year floodplain are highly developed. Both residential 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 Sea Bright, 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 Borough'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.

Sea Bright, with its low relief, faces additional flooding issues. Several areas of the Borough commonly flood during storms. Sea level rise will increase flooding hazards. New Jersey is particularly vulnerable to sea level rise. During this century, as sea level rises, shorelines could retreat significantly in parts of the Borough. Narrow bay beaches and wetlands at low elevations, both important habitats, would be lost to even a modest rise in sea level and erosion of the oceanfront would increase. 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 Borough 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 federal agencies to regularly update the Borough 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. *Participate in the Community Rating System to receive flood insurance premium credits.*
10. *Consider code changes that will limit impervious surfaces.*
11. *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 and were either requested by Borough staff or recommended by JC NERR staff during GTR meetings. As part of launch of the New Jersey Roadmapper website, the site will host community profiles that include municipal mapping profile packets that will be available for future download. These maps can and should 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.

Repetitive Loss & Severe Repetitive Loss (some events provided in the appendix, working to secure more)

Repetitive Loss and Substantial Damage maps can be used to identify “problem” areas. Depending on the location and size of these areas, the Borough 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.

Storm Surge (SLOSH Category 1, SLOSH Category 2, & SLOSH Category 3) (provided in the appendix)

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.

Sea Level Rise 1-3 feet with Critical Facilities (Supplied in Appendix)

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 Borough can better understand future flooding risk and plan accordingly. As much of the Borough is near current sea level, Sea Level Rise maps should be utilized heavily for municipal planning documents.

Shoreline Change (Erosion analysis supplied in Appendix)

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. Some shoreline change maps are available from USGS at <http://marine.usgs.gov/dsasweb/#>.

Overlays of Hazards and Populations, Infrastructure, and Building Footprints (coming at future time in municipal profile)

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

Natural Resources, Historical Resources, Cultural Resources, & Economic Resources (coming at future time in municipal profile)

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 Sea Bright to make decisions on protecting certain resources through retrofitting historical buildings or protecting natural resources by allowing for natural floodplain functions.

Sea Level Rise and Surge Vulnerability

As much of the Borough of Sea Bright is at or near current sea level, fluctuations in sea level through surge events and trends towards higher sea level are of great significance. Analysis of SLOSH maps show that as hurricane strength increases, potential surge impacts will increase in scope and severity as one would expect. SLOSH models indicate we should expect flooding on a similar scale of Sandy for powerful Category 1 hurricanes. SLOSH models for Category 2 and 3 storms show a much more dire situation with flooding covering covering the entire town in both scenarios with enough inundation to cause damage to the emergency operations center at the Community Center (3-6 feet of flooding above ground level in Category 2 SLOSH, 6-9 feet in Category 3 SLOSH). All SLOSH scenarios flood the critical evacuation routes of Ocean Avenue, the base of the Shrewsbury River Bridge, and the base of the Route 36 bridge off of the barrier island. Although storms of this magnitude are very rare for our area, they remain a possibility that requires attention and planning.

Even the relatively low end scenario of one foot of sea level rise will require adaptation as numerous street ends will see fairly regular tidal inundation. Our best estimates for the arrival of one foot of sea level rise is before 2050. As sea level rise is expected to accelerate this century, three feet of sea level rise is very likely before 2100 (see table below).

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.

Two feet of sea level rise sees regular tidal flooding migrating east up side streets. Three feet of sea level rise will result in regular tidal inundation in many areas west of Ocean Avenue, with sections of Ocean Avenue also seeing inundation. Unfortunately, the downtown section of the Borough appears to be most vulnerable to sea level rise. Any level of inundation due to regular tidal flooding will have large scale impacts on emergency response. Sea level rise will also result in greater impact of storm events as a surge atop a higher sea level will be more dramatic than the same surge atop a lower sea level. Necessary adaptation to sea level rise and the heightening of other hazards such as surge must 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 Sea Bright based off of the answers given in our Getting to Resilience questionnaire, discussions with JCNERR staff, and reviews of the Borough Master Plan and other documents. These sections represent the current state of the Borough but also include planned projects, uncompleted projects, and recommended actions deemed to be within the Borough’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. (Must be done in the future)
- **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 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 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 2.5 if erosion is mapped)

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, 2.11, 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, 2.11, 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)
- **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)

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 2.5.2)
- **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)
- **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 1.14, 2.5.2)

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)

- **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, 2.11, 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. (could get training)

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

- **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, 2.5)
- **New Study (NS):** Up to 290 points for new flood studies that produce base flood elevations or floodways. (Could be eligible if other elevation studies have been or are going to be done)

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 5.9, 5.12)
- **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 3.5, 5.9, 5.12 (if buyouts restored))
- **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 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. (Might be eligible for X zone designations)
- **Emergency warning dissemination (EWD):** Up to 75 points for disseminating flood warnings to the public. (GTR 4.9)
- **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 4.9, 4.9.6)
- **Critical facilities planning (CFP):** Up to 75 points for coordinating flood warning and response activities with operators of critical facilities. (GTR 4.9)

- **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, 3.5.4, 3.5.5, 3.6.1 [if further training of staff takes place])
- **Freeboard (FRB):** Up to 500 points for a freeboard requirement. (GTR 1.14, 5.4, 5.5)
- **Foundation Protection (FDN):** Up to 80 points for engineered foundations. (GTR 1.14)
- **Coastal A Zone Requirements (CAZ):** Up to 500 points 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 1.14 [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 2.5)
- **FIRM Maintenance (FM):** Up to 15 points for maintaining copies of all FIRMs that have been issued for the community. (GTR 2.5)
- **Erosion Data Maintenance (EDM):** up to 20 points for maintaining coastal erosion data. (Could easily be done by maintaining Stockton CRC data and USGS shoreline datasets)

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.

- **Repetitive Loss Area Analysis (RLAA):** Up to 140 points for a detailed mitigation plan for a repetitive loss area. (GTR 1.11, 1.12)
- **Floodplain management planning (FMP):** 382 points for a community-wide floodplain management plan that follows a 10-step planning process. (GTR 3.4, 3.4.1, 3.5 [if new plan written])

Section 520: Acquisition and Relocation: To encourage communities to acquire, relocate, or otherwise clear existing buildings out of the flood hazard area. (GTR 1.11, 1.12)

- **Critical facilities (bCF):** Points awarded for facilities that have been acquired or relocated. (if any emergency facilities end up being relocated)

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 5.3, 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. (Stormwater updates, outfall pipe valves)
- **Coastal Erosion Protection Maintenance (EPM):** Up to 100 points for maintaining erosion protection programs in communities with coastal erosion prone areas. (GTR 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, 4.5.5)

- **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 2.11, 4.8)
- **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 4.3 [if current warning system is expanded])
- **Emergency warning dissemination (EWD):** Up to 75 points for disseminating flood warnings to the public. (GTR 2.11, 4.3, 4.7)
- **Critical facilities planning (CFP):** Up to 75 points for coordinating flood warning and response activities with operators of critical facilities. (GTR 2.11, 4.7)

Appendix

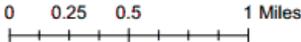
**Sea Bright Borough
1 Feet of Sea Level Rise**

Legend

- Municipality
- ▲ Schools
- Fire Stations
- Law Enforcement
- Assisted Living
- Hospitals
- Evacuation Routes
- 1ft SLR

Year 2010 Population: 1412

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 and is centered on target municipalities.



Map Author: Bryan Serino
Rutgers, New Brunswick
Center for Remote Sensing
and Spatial Analysis



Sources: Esri, DeLorme, USGS, NPS, Sources: Esri, DeLorme, HERE, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, Swis, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

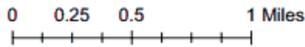
**Sea Bright Borough
2 Feet of Sea Level Rise**

Legend

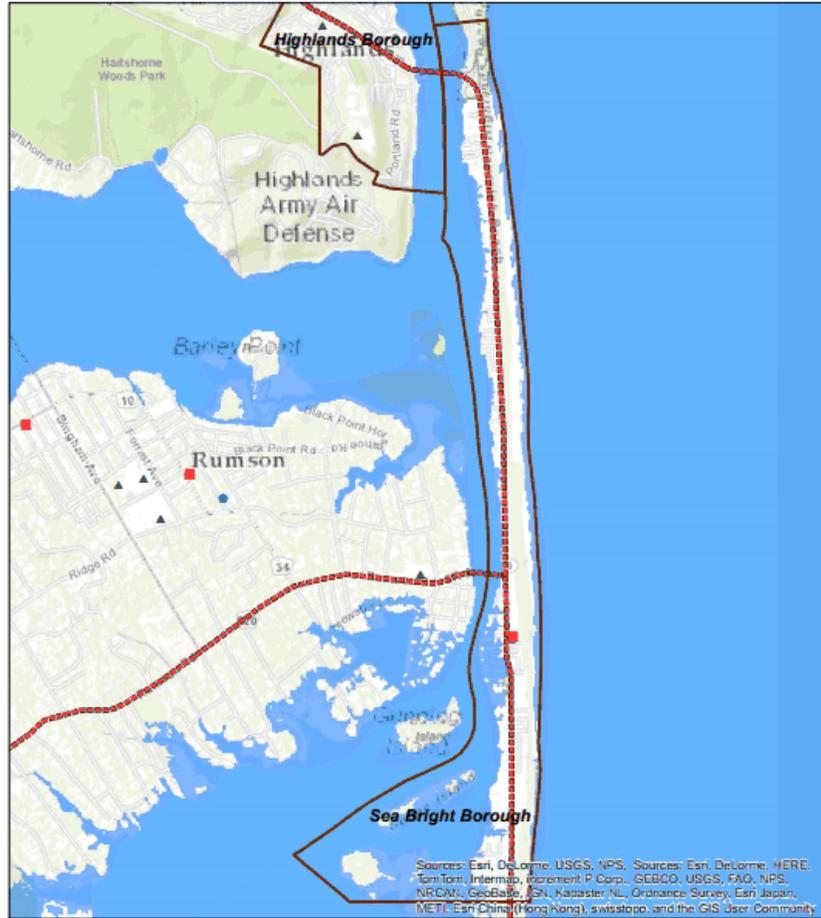
- Municipality
- ▲ Schools
- Fire Stations
- Law Enforcement
- Assisted Living
- Hospitals
- Evacuation Routes
- 2ft SLR

Year 2010 Population: 1412

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 and is centered on target municipalities.



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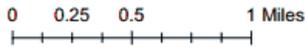
**Sea Bright Borough
3 Feet of Sea Level Rise**

Legend

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

Year 2010 Population: 1412

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 and is centered on target municipalities.



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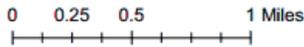
**Sea Bright Borough
1, 2, and 3 Feet of Sea Level Rise**

Legend

- Municipality
- ▲ Schools
- Fire Stations
- Law Enforcement
- Assisted Living
- Hospitals
- Evacuation Routes
- 1ft SLR
- 2ft SLR
- 3ft SLR

Year 2010 Population: 1412

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 and is centered on target municipalities.



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Source: Esri, DeLorme, USGS, NPS, Source: Esri, DeLorme, HERE, Esri, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeBCO, Esri, Kossler, NLS, Orange Survey, Esri, JRS, METI, Esri, China (Hong Kong), swisstopo, and the GIS User Community

**Sea Bright Borough
Category 1 SLOSH Model**

Legend

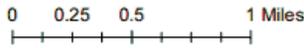
- Municipality
- ▲ Schools
- Fire Stations
- Law Enforcement
- Assisted Living
- Hospitals
- Evacuation Routes

Category 1 SLOSH

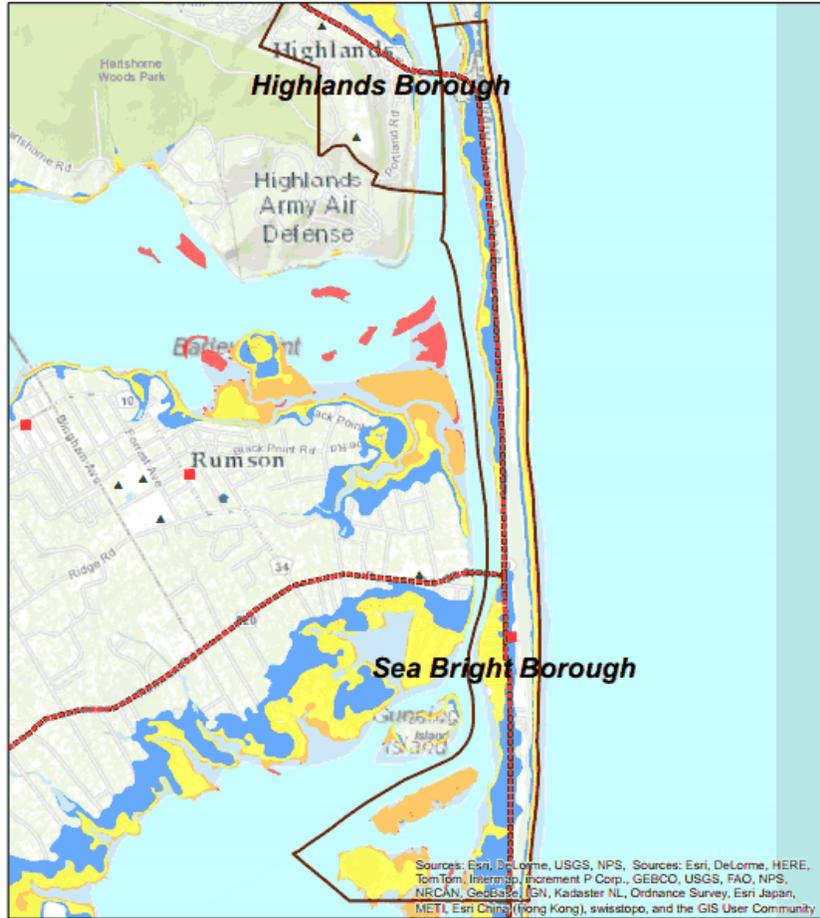
- 0 - 3 Feet Above Ground Level
- 3 - 6
- 6 - 9
- > 9

Year 2010 Population: 1412

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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Sources: Esri, DeLorme, USGS, NPS, Sources: Esri, DeLorme, HERE, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeBCO, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

**Sea Bright Borough
Category 2 SLOSH Model**

Legend

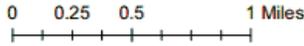
- Municipality
- ▲ Schools
- Fire Stations
- Law Enforcement
- Assisted Living
- Hospitals
- Evacuation Routes

Category 2 SLOSH

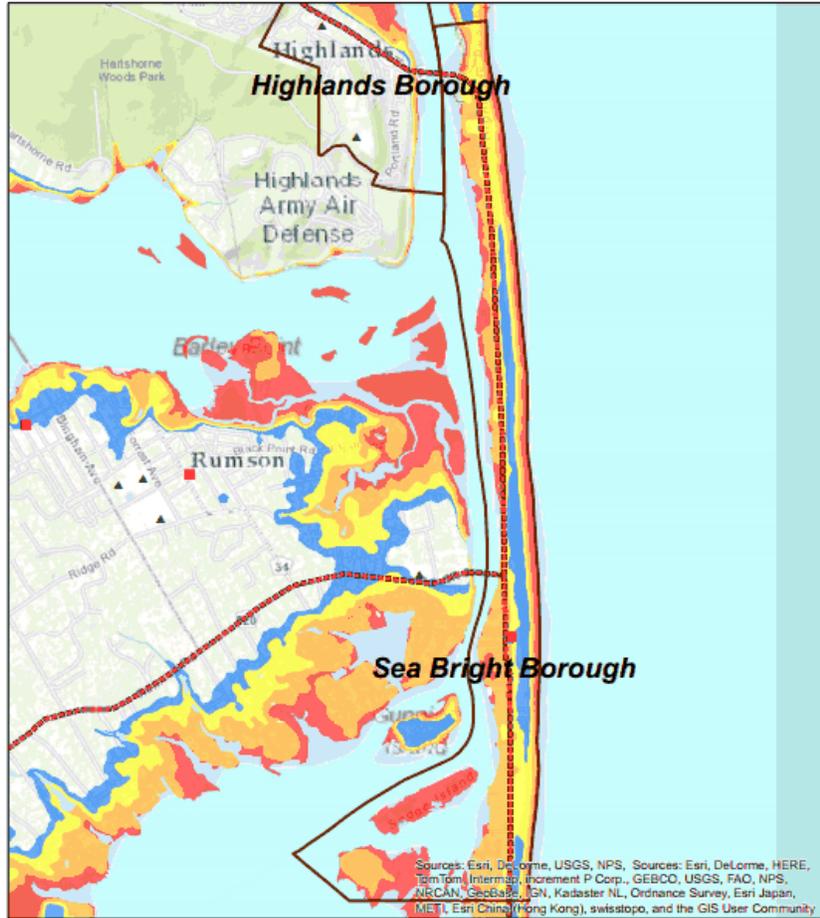
- 0 - 3 Feet Above Ground Level
- 3 - 6
- 6 - 9
- > 9

Year 2010 Population: 1412

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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**Sea Bright Borough
Category 3 SLOSH Model**

Legend

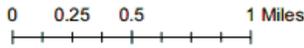
- Municipality
- ▲ Schools
- Fire Stations
- Law Enforcement
- Assisted Living
- Hospitals
- Evacuation Routes

Category 3 SLOSH

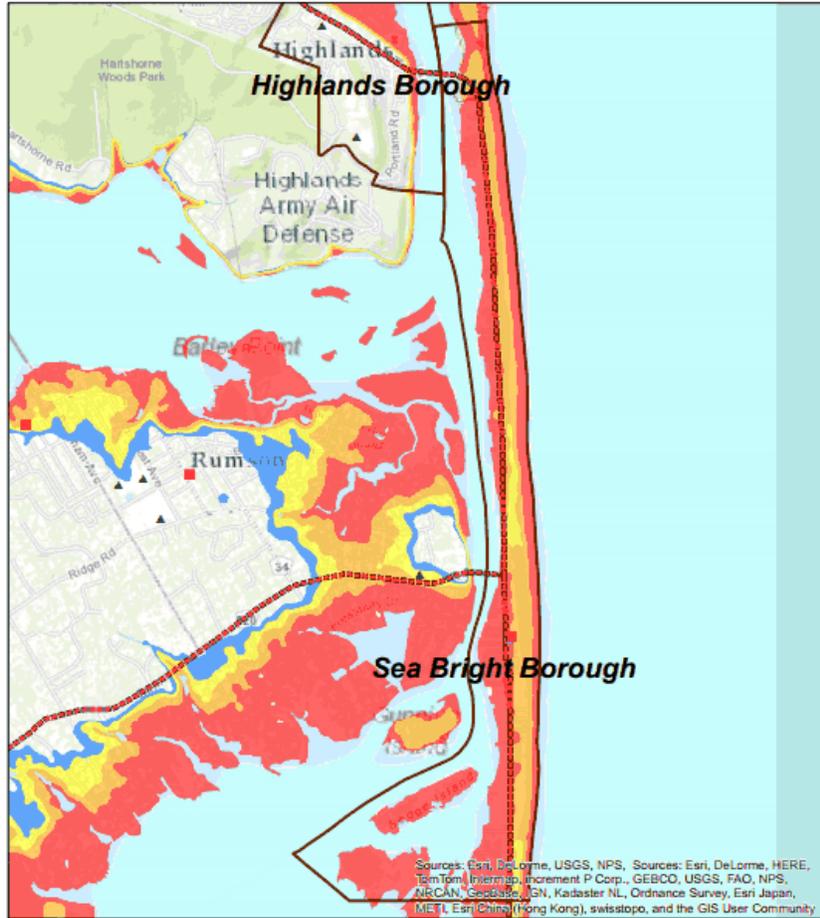
- 0 - 3 Feet Above Ground Level
- 3 - 6
- 6 - 9
- > 9

Year 2010 Population: 1412

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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Sea Bright Historical Erosion Data

Sandy Erosional Impact:

Stockton's Coastal Research Center Sandy Impact

Link to full report:

<http://intraweb.stockton.edu/eyos/coastal/content/docs/sandy/northernMonmouth.pdf>

December 12, 2012

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. The analysis for the northern 15 survey sites starting at Roosevelt Avenue in Deal moving north to Via Ripa Street in the Borough of Sea Bright, NJ. The three Sandy Hook National Seashore sites were not included because the beaches were closed due to finding old military ordnance items on the beach following Sandy. Survey work along the three Raritan Bay survey sites remains to be completed, but will all be included in the final report on Raritan and Delaware Bay sites plus all the oceanfront natural areas such as Sandy Hook, Island Beach State Park, and other Cape May County sites. The fieldwork was completed November 26, 2012 as clean-up work continued to remove debris. Any sand excavated from roadways was being returned to the beach and is included in the survey cross section since it is now part of the post-Sandy beach. This initial report is focused on the impact to municipal dunes and beaches from Hurricane Sandy. The damage details have been organized specific to each municipal segment of the county shoreline starting at Roosevelt Avenue in Deal and ending at the northern profile site in Sea Bright, NJ before entering Sandy Hook National Seashore. The coastal segment between Long Branch to Sandy Hook was the shoreline where the New York District Army Corps of Engineers conducted its Phase I Shore Protection Project between 1994-1996 (initial contract for Monmouth Beach to Sea Bright) and 1997-1999 (for Monmouth Beach to Long Branch).

There have been several maintenance contracts conducted in this reach to address erosional "hotspots" (1997, 1999, 2002, 2010 and currently in Monmouth Beach December 2012). The 2011 Coastal Center 25-year report evaluated the sand quantity remaining within this reach at the 12 sites within the project extent at between 14% and 116% of the initial placement volume. The phase I reach between Sandy Hook National Seashore and the Elberon/Long Branch border did have several maintenance fills (1997, 1999, 2002, 2009, a minor addition in 2010 and the current project underway in late 2012). However, there are two significant points of erosion that have hampered the overall project success. There is a large rock groin at the Cottage Road site (#179) that blocks sand movement along the beach. Since sand moves north, this site is perpetually starved for sand moving into the area from the south. The second location is #173 at West End in Long Branch where the project ends moving south. Elberon and Deal did not participate in the initial project, so sand leaves West End moving north leaving erosion the only avenue open. No sand arrives from the south. The best evidence for this was the limited success for the 2009 maintenance project focused on the West End site that declined by over 50% between 2009 and 2011. The Morris Avenue location 5,000 feet north benefited within 6 months however.

Another issue with the Long Branch to Sea Bright segment of the Army project was the failure to include a significant dune system in the original plan. The presence of the 28-foot high Sea Bright seawall and a 20+foot high natural bluff in Long Branch armored with rock and steel allowed the dune to become more or less an afterthought to the project's effectiveness. Initially, two lines of sand fence were erected in Sea Bright with grass planted between them. No initial ridge of sand was designed or built, so the dune system evolved naturally as grass spread and the wind transported material toward the

fencing. As a result after 12 years, the dune was irregular, varied greatly in width and elevation and was positioned a considerable distance from the rock wall. There was no dune system in Long Branch due to a very high tourism usage. Grass plants did colonize at the toe of the rock revetment, but no consequential dunes developed.

The major observation was that Sandy's waves were dramatically higher upon breaking than they were further south, especially south of the center of rotation for the storm. Damage seen in Deal and Elberon demanded that waves exceeded 30 feet in NAVD 88 elevation levels on breaking on the bluff. The Pullman Avenue site saw two homes with foundation elevations at +28 feet destroyed and a third of the lot transformed into empty space where the land once stood. The Lake Tackanassie site was obliterated and the entire Long Branch boardwalk on the top of the bluff was destroyed.

These huge breakers essentially bulldozed the berm, beach and irregular dune system to the base of the massive Sea Bright seawall, and then ramped up that slope, over the wall and slammed down onto the space between the highway and the wall. The gaps in the seawall were exploited in a devastating manner in the Borough of Sea Bright especially in the town center where the municipal public beach is located in a gap in the rock seawall. Sandy just blasted through this gap with awful consequences.

Beach/Dune Damage Assessment by Municipal Island Segment: To measure the erosion, 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. Using the data from those sites surveyed for fall 2012 NJBPN survey, completed in Monmouth County by October 12, 2012, provides a good baseline for damages that occurred during the hurricane. For those sites not yet surveyed, data from spring 2012 was used for comparison. Data collected at the 15 oceanfront beach profile locations was done November 12-26, 2012 using RTK GPS and extending from the reference location, across the dunes, beach and into the surf to wader depth and by traditional survey methods (swimmers going to -16 feet of water) at those sites not yet surveyed during NJBPN fall 2012 survey. By the 12th, it was clear that sand recovery was well under way as a berm had been deposited on the erosional surface generated by Sandy with a substantial offshore bar present in water less than 5 feet deep offshore. However, in some locations massive amounts of sand had been transported inland and were being returned to the beach. Very little sand was transported over the bluff or steel wall in Long Branch, but wave damage was evident from moving water. Substantial sand volumes were moved over the Sea Bright seawall and through the gaps in the rock wall. This was being hauled back to the beach.

Profile Locations: Site locations in Deal, Elberon, Monmouth Beach and Sea Bright were not surveyed during fall 2012 prior to the arrival of Sandy, the Long Branch sites were surveyed on October 5 & 8, 2012 and all sites again post-Sandy through November 26, 2012 (Figure 1). This report covers the New York District Corps of Engineers Monmouth County Shore Protection project's initial Phase I where sand was placed from the border with the National Sea Shore, south through Sea Bright, Monmouth Beach, and Long Branch, NJ late in the 20th Century into the first two years of the 21st Century. Maintenance work was done on Phase I beaches in places, but none has been performed on the southern segment (Phase II) between Asbury Park and Manasquan Inlet. Based on the performance of the fill project, clearly the dune system's design needs to be evaluated and a new approach implemented along this pair of Monmouth County reaches as the post-storm data is processed and analyzed.

Sunset Court, Sea Bright;

The next location north of Cottage Road maintained 45% of the initial sand volume placed in 1999. The repeated deposition of maintenance material at Cottage Road moved north through this location. There was no dune, other than grass here and there among the rocks of the seawall. Storm waves over-

topped the wall in quantity and caused flooding and debris damage that kept the highway closed for weeks to general traffic. A lower, narrower beach remains, but the restoration process is underway just to the south.

Sea Bright Municipal Beach;

The peninsula widens here to include commercial businesses on both sides of Ocean Avenue plus parking for the beach. However, no rock seawall extended across a several hundred foot gap at the municipal beach. An ancient timber bulkhead was the back shot position for the survey and it had gaps cut in it to allow easy public access to the beach. The resulting storm wave damage and tidal flooding was intense and destruction was widespread and devastating. The situation was made worse because both the fire company and the police station were located between the municipal beach and Ocean Avenue. Both were gutted by waves. Debris impacted businesses on the west side of Ocean Avenue while the storm surge flooding into Raritan Bay flowed up the Shrewsbury and Navesink River Estuaries compounding the disaster. While the beach is still present, it is narrower and lower in elevation with a massive amount of sand moved landward into Sea Bright Borough.

Sea Bright Public Beach, Sea Bright;

The next location north was obtained by NJ State purchase 25 years ago and converted into a public bathing area with some off-street parking. There was a modest dune at the toe of the rocks, but the waves ramped up and over the rocks using that sand as a deposit forming the ramp. In addition there was a timber bulkhead protecting a 20-foot wide gap in the rock seawall at this location. Sandy blew through the timber section and poured into Ocean Avenue with sand, debris and lots of salt water. This compounded the water coming in from Raritan Bay making flooding the worst ever recorded. This beach contained 98% of the initial Federal project's fill material as of fall 2011. No dune existed other than grass growing at the toe of the rock seawall. The post-Sandy survey showed a narrower and lower elevation beach with an as yet unknown ratio of sand lost offshore versus sand transported through the gap or over the seawall.

Shrewsbury Way, Sea Bright;

This site was the only northern Monmouth County site along Phase I Federal project that had exceeded the initial sand volume placed on the beach (116%). Even so, the storm waves broke over the Sea Bright seawall as they ramped up the sand against the rocks allowing wave run-up to crest the 28-foot wall. The beach profile was reduced in elevation and width.

Via Ripa, Sea Bright;

This northern location lies just south of the bridge to Atlantic Highlands across the entrance into the Shrewsbury and Navesink Estuaries. The beach was at 74% of the initial Federal project placement sand volume and waves ran up and over the wall, but in a lower magnitude based on the sand found landward of the wall. Also, there was a much smaller ramp leading to the top of the wall on the sea side. Located closer to the fetch limit produced by Long Island, perhaps the waves were simply smaller.

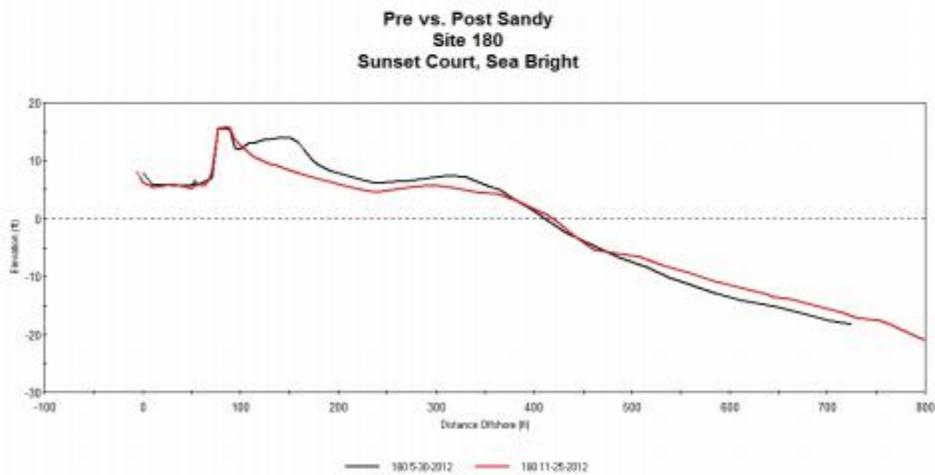
Individual Site Descriptions: Each location was surveyed following Hurricane Sandy between November 12 and 26, 2012. The profile lines were surveyed using RTK-GPS with data points on the dune, beach and shallow offshore regions or using a total station electronic transit at sites where the fall 2012 surveys were not completed prior to Sandy. Because not all sites were surveyed to closure depth following Sandy, all sand loss figures apply to the dune/beach system only and do not account for a percentage of sand dragged offshore by Sandy's waves, to return later in time. This recovery process was clearly already underway at all locations as of November 12th.

NJBPN 180 – Sunset Court, Sea Bright

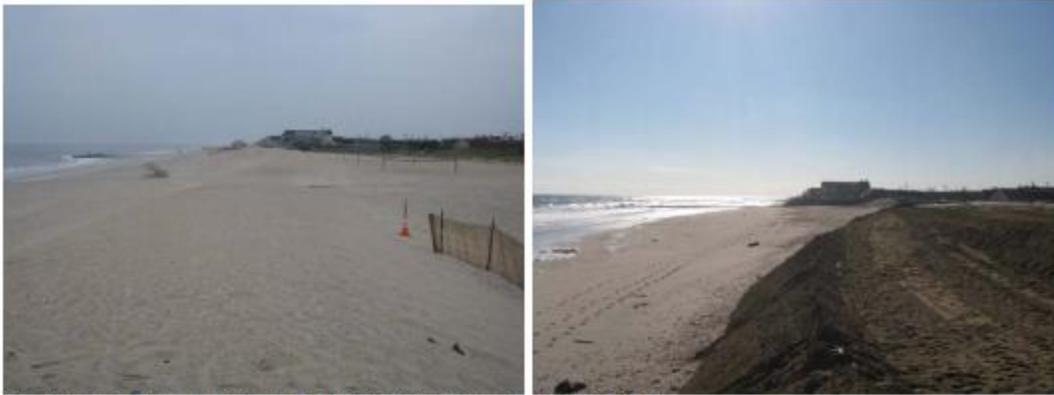


The photographs above were taken on May 30, 2012 (left) and November 21, 2012 (right).

Figure 12. This site was the recipient of sand from the initial Federal beach nourishment project. The left photograph shows the variety in height, width and vegetation density associated with the naturally developed dunes seaward of the seawall along the Sea Bright shoreline. Sandy's waves pushed sand into a gentle ramp up the seaward rock slope and allowed the wave bores to pour over the wall into Ocean Avenue and associated properties with a vengeance. Sand was also transported well seaward as the post-storm survey shows.

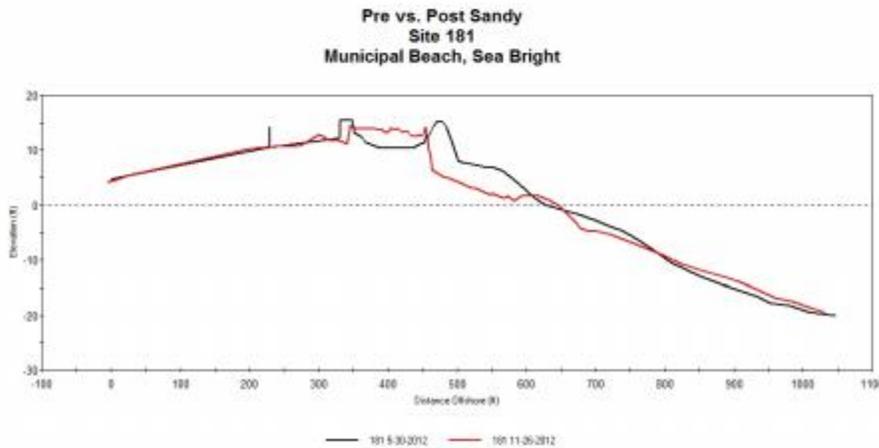


NJBPN 181 – Municipal Beach, Sea Bright



The photographs above were taken on May 30, 2012 (left) and November 21, 2012 (right).

Figure 13. This site was the most heavily damaged along the northern Monmouth County shoreline because there was a gap in the rock seawall at the municipal beach protected by dunes (but with large grade-level pedestrian gaps) and an aging, low bulkhead separating the beach from the municipal services landward. Sandy blasted through these defenses and wrecked the fire and police departments plus extensively damaged the businesses on both sides of Ocean Avenue. The wave surge added to the tidal flooding coming in from Raritan Bay up the Navesink and Shrewsbury Rivers, so Sea Bright was battered from both directions, especially right here. The irregular high zone landward of the dune and seaward of the timber boardwalk is sand gathered from the streets and hauled back to the beach to act as a temporary barrier. The cross section appears to show the transfer of sand landward into Sea Bright because this location does not have a significant volume deposited offshore as compared to the others where longer profiles were taken.

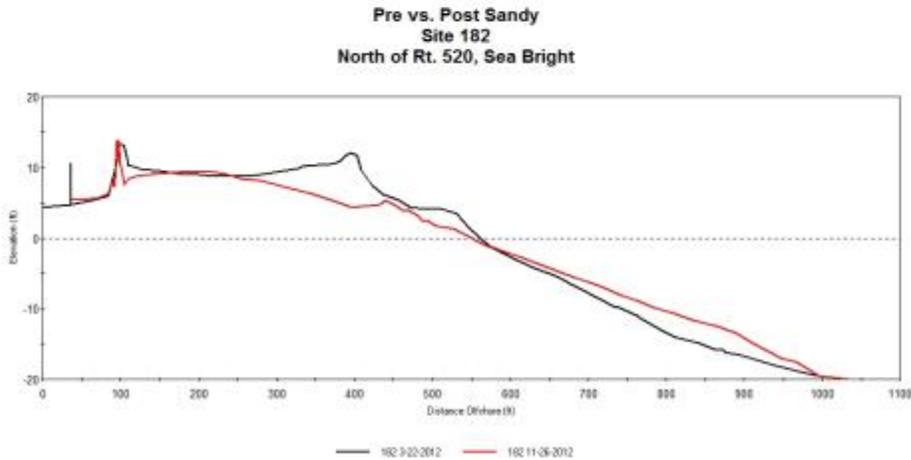


NJBPN 182 – Public Beach, Sea Bright



The photographs above were taken on March 22, 2012 (left) and November 21, 2012 (right).

Figure 14. At this location, low, wide dunes established naturally following the initial Federal beach nourishment project did not stop the wave damage. Sand volumes have been relatively stable since that time. Hurricane Sandy's storm surge and waves relocated sand from the dune and berm both landward to the rocks, over the rocks and to the nearshore. A second gap was a 20-foot wide break in the rock seawall that had a timber barrier. This failed allowing torrents of sea water into the Sea Bright business area at the north end. The deposition of sand offshore was less than the quantity removed from the beach/dune system, but it appears as if closure was achieved including sand lost except for the quantity transported landward into the community.

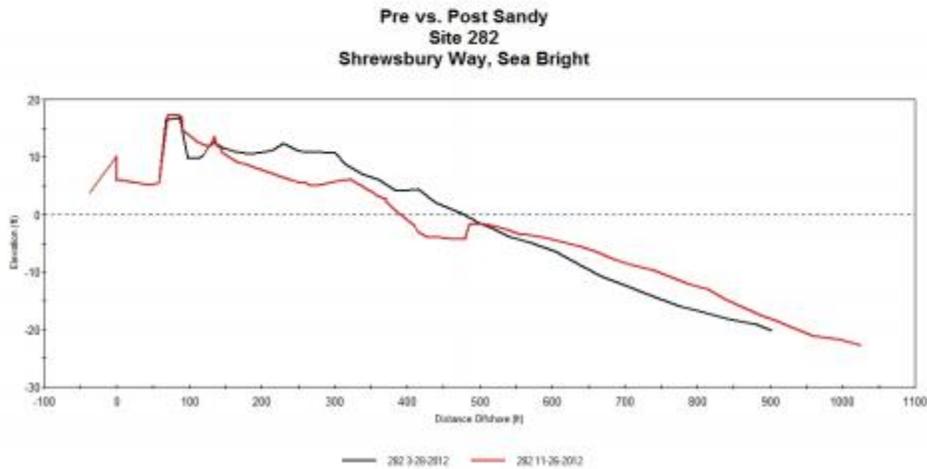


NJBPN 282 – Shrewsbury Way, Sea Bright



The photographs above were taken on March 28, 2012 (left) and November 26, 2012 (right).

Figure 15. This site was included in the initial Federal beach nourishment project but did not include an engineered dune. A low, wide dune field was established surrounding a pair of fence rows built immediately following beach restoration and planted with grass between them. The left photograph shows the natural development of the dune system over the past 12 years. The site has gained in sand volume since the project (116% of the initial sand volume placed by 2011). Hurricane Sandy's storm surge and waves created a ramp of sand adjacent to the seawall and transported sand both further landward with back-rush carried to the nearshore bar. Substantial sand volume was deposited offshore below the zero elevation datum. The normal length surveys here documented this process.



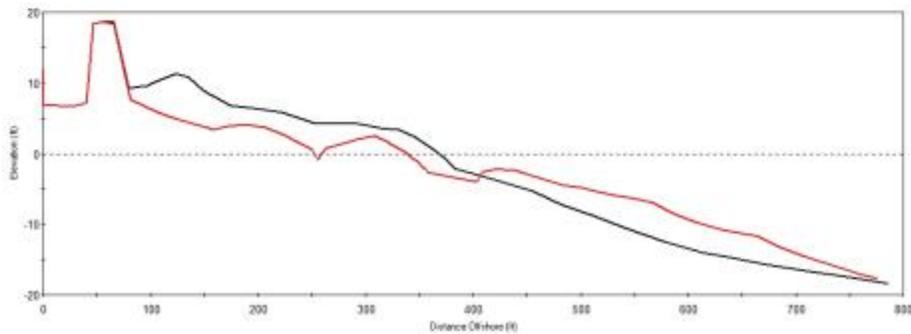
NJBPN 183 – Via Ripa Street, Sea Bright



The photographs above were taken on March 21, 2012 (left) and November 26, 2012 (right).

Figure 16. This site was near the northern limit of the initial Federal beach nourishment project and has experienced only moderate sand losses since that time. An engineered dune was not constructed due to the presence of the seawall with the sand placed in the berm. A low dune established naturally between two parallel rows of sand fence. Hurricane Sandy's storm surge and waves moved sand to the nearshore bar, most of which is post-storm recovery as seen in the right photograph's right edge. This location was surveyed to the normal distance offshore following Sandy and as can be seen, the sand deposited offshore approximates the volume lost above the crossing point on the two surveys. Above Datum: the loss amounted to -34.101 cu. yd/ft, while below the datum; the gain was 35.500 cu. yd/ft. Since this site did not see extensive over-topping of the seawall, the net change to a depth of -18.11 feet NAVD88 actually was a gain of 1.40 yds³/ft. Therefore, in spite of huge waves, a massive storm surge, and a strong southerly littoral drift current during Hurricane Sandy, the beach at this site has been shown to have had nearly a zero change in net sand volume.

Pre vs. Post Sandy
Site 183
Via Ripa St, Sea Bright



Summary & Conclusions

<i>Roosevelt Ave. Deal to Via Ripa St. Sea Bright Post-Sandy Site Volume Changes</i>				
Site Location and Number	Site Sand Volume Change (cu yds/ft)	Dune Failure (Y or N)	Date of Recent Beach Fill	
Deal	170	No Data Yet	Bluff Retreat	Never
Elberon	171	-13.60	Bluff Retreat	Never
Long Branch	272	-71.38	Y	Never
Long Branch	173	-23.97	Bluff Retreat	1999
Long Branch	174	-40.72	Bluff Retreat	1999
Long Branch	175	-46.76	No Dune	1998
Long Branch	176	-62.07	No Dune	1998
Long Branch	177	-45.87	No Dune	1997
Monmouth Beach	178	-69.38	Y	1994
Monmouth Beach	179	-48.83	No Dune	1994
Sea Bright	180	-22.60	Y	1995
Sea Bright	181	-16.70	Y	1995
Sea Bright	182	-31.20	Y	1995
Sea Bright	282	-37.13	Partial	1996
Sea Bright	183	-34.10	Y	1996

Figure 17 shows a table of sand loss volumes per foot of shoreline at each of the Northern Monmouth County sites. No beach nourishment was done at the three southern sites because Allenhurst/Loch Arbor, Deal and Elberon declined to participate in the project. The hightide ownership issues were the major stumbling block. Because there was a high sediment bluff in Long Branch fronted with a rock revetment and a very high bathing use demand on the beach space, no dune was designed into this project. Sea Bright’s shoreline was defended solely by a 28-foot rock wall that had served as the only form of shore protection during the decades prior to the NY District Corps Project, and this zone was not designated as needing dunes. Fencing was installed along the Sea Bright section and planted between the rows of fence. Natural processes served to allow dunes to develop over 12 years, but with no general design specifications, the process was pretty random. A significant recommendation would be to re-assess the view on creating a wide, double ridge of sand to provide a higher level of storm protection to serve as a blocker for wave run-up that went over the seawall. More importantly, efforts must be made to close the two gaps in the rock wall in the central section of Sea Bright with huge dunes or extend the wall with a serious barrier to seal these two entry points from future waves.

Stockton’s Coastal Research Center 25 Year Report for Monmouth County

The following information has been taken from the 25 year report of 2011 from the Coastal Research Center of the Richard Stockton College of New Jersey. The following information is that which refers to Sea Bright or neighboring areas that influence Sea Bright erosional rates.

“Monmouth County contains 36 profile stations, making it the most densely surveyed county. There are three sites along the Raritan Bay shoreline and the complexity of coastal construction along the Atlantic shoreline demanded a greater number of profile stations to cover the variety of coastal shoreline features present in the county.

Monmouth County received the benefit of the largest, most expensive and most comprehensive beach nourishment project ever in the United States beginning in 1994. Completed by the New York District Army Corps of Engineers (USACE) for \$210,000,000, this project continued in three phases until the year 2000. In all, 21 miles of the county shoreline were restored with a 100-foot wide berm and a dune system built in all locations where practical (a total of 6.1 million cubic yards of sand). The only gaps in the entire project where no sand was placed on the beaches were in the communities of Loch Arbor,

Allenhurst, Deal and Elberon because these communities would/could not provide the necessary real estate easements from owners. This fact divides the restored shoreline into two filled segments: one from the Sandy Hook National Seashore south to the Long Branch/Elberon boundary; then no fill to the Asbury Park boundary; and the second segment from Asbury Park to the Manasquan Inlet. The National Park Service also piggybacked onto the Federal project operations and placed sand onto the erosional zone within the Sandy Hook Park boundary, thus adding to the length of the fill.

Maintenance fills have been completed following two strong storms in 1998, hot-spot erosion in Monmouth Beach in 1997 and 2002, and in southern Long Branch in March 2009. The southern Long Branch project extended south of West End Avenue and north toward Broadway Avenue. Funds in the amount of \$2,961,000, \$3,305,000 and \$1,316,000 were appropriated for Fiscal Years 2006, 2007 and 2008, respectively. This funding was used to design and construct approximately 2400 linear feet of beach re-nourishment in South Long Branch. Since completion in 2001, the southern segment (Asbury to Manasquan) has not required maintenance.

TREND ANALYSES: To celebrate the 25 years of surveying each site had the computations generated for the annual fall-to-fall changes in shoreline position and sand volume across the length of the survey and a set of graphs made to show the annual changes, then the cumulative summation of each year's gain or loss to generate trends similar to the select few done in 2010. The trend analysis extends back 17 years for those cross sections added when the program went to twice annually in 1994.

The sites within the Federal project's two zones of construction all show the scope of the project's impact on the shoreline and sand volume available to the site. Many sites, especially, between Asbury Park and Manasquan Inlet have trends in sand volume over 100% of the sand volume initially placed. While the trend is downward in Long Branch and Sea Bright, it must be remembered that those in opposition to this project earnestly predicted that "All the Sand would be GONE" in 3-5 years. The surveys support a far different result with sites like McCabe Avenue in Bradley Beach (103% of placed volume) and Brighton Avenue in Spring Lake (135% of placed volume 12 years after the project without any further maintenance. The maximum value is 325% of the placed volume remaining at 5th Avenue in Belmar due to the presence of the Shark River jetty and a very low initial need for sand placed by the USACE. The low for the retention occurred in Ocean Grove with 59% remaining 12 years later.

Site 179, Cottage Road, in Monmouth Beach has been an enigma due to persistent, rapid loss of sand deposits. Observations made the past two years may lead to possible reasons. There is a massive stone groin protecting the Monmouth Beach Club property positioned about 500 feet south of this site. In the absence of northeast storms the dominant littoral currents are directed to the north, so the sand moves north away from the groin and the Cottage Road site and is not being replaced by significant material traveling north around the groin. By the fall 2009 survey the site was devoid of sand, the dune was gone and the beach was wet at low tide, not far from the conditions existing here prior to the beach fill. Following the 2009-2010 winter storm season, sand had reappeared as a dry beach fronting the rocks, a minimal, but significant improvement when compared to the fall 2009 survey situation. The littoral currents were reversed by the northeasters and were increased in magnitude during the storms. However, the groin protecting the Beach Club served to impound the sand and did not allow sediment to pass further south and the profile site beach accumulated sand during the period of severe weather. If this is the case, this location will be a perpetual "Hot Spot" for erosion.

Though there was a substantial loss of sediment from the beaches of Monmouth County in the 2009-2010 winter storm season, the county remains over 13 million cy of sand above the amounts in the 1993 beaches (Figure 7). However, between 2010 and 2011 the storm trend reversed with Hurricane Irene

and one significant northeast storm in late October 2011 yielding a small but hopeful positive sand volume increase (174,000 cubic yards). The CRC has computed a loss rate number for the 21 miles of USACE managed beaches and without any further sand volume added, the emplaced fill will be 100% gone in 56 years by 2068.

Examination of the sand transport rate into the National Seashore at Sandy Hook has shown that the entire sand volume loss between Elberon, Long Branch, Monmouth Beach and the park boundary with Sea Bright is seen as deposition between the park boundary and Gunnison Beach site (that DOES NOT count any of the sand north of Gunnison to the tip of the Sandy Hook spit). If the sand does leave the northern developed Monmouth County shoreline it will be located in the growth added to the National Seashore.

Thus far no significant funding has been appropriated to conduct maintenance beach nourishment projects for Monmouth County. Suitable sand dredged from the maintained channel in the Shrewsbury River estuary was pumped across the barrier and seawall to add sand to the Monmouth Beach (55,000 cy) erosional hot spot (Site 179). No other beach restoration projects have been authorized by local municipal governments.

Link to full report:

http://intraweb.stockton.edu/eyos/coastal/content/docs/2011_NJBPN_report/monmouthco2011.pdf

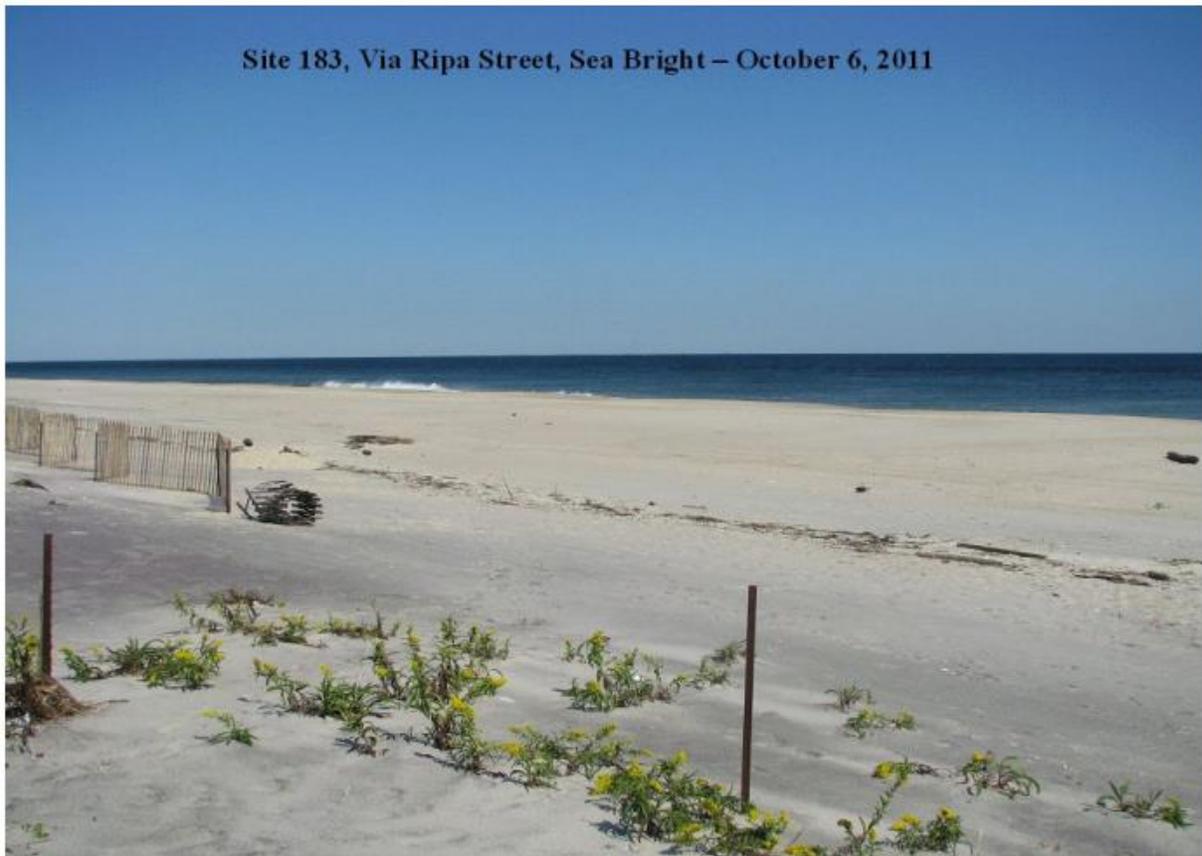
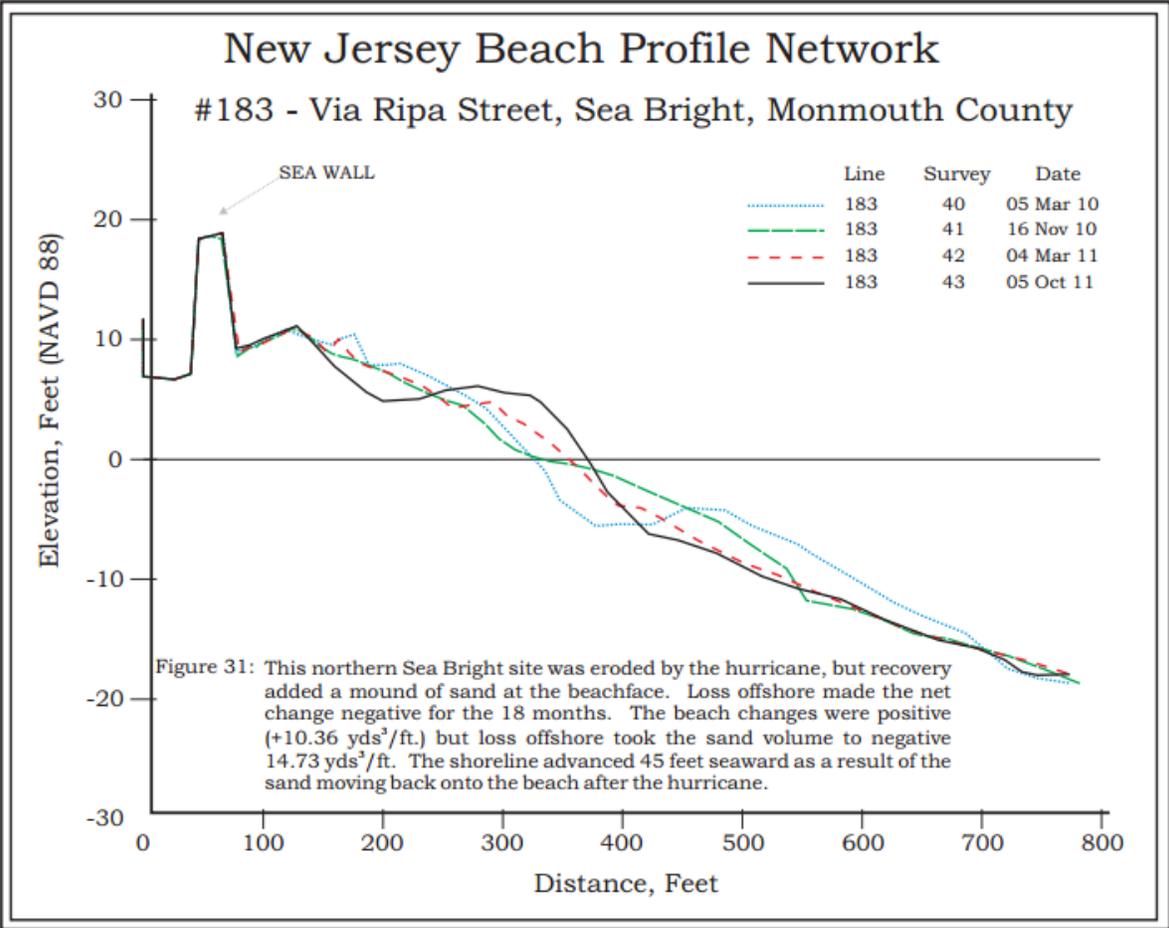


Figure 30. Shown above is the view looking northeast from the dune at Via Ripa Street in Sea Bright, NJ.



VIA RIPA STREET, SEA BRIGHT- SITE 183

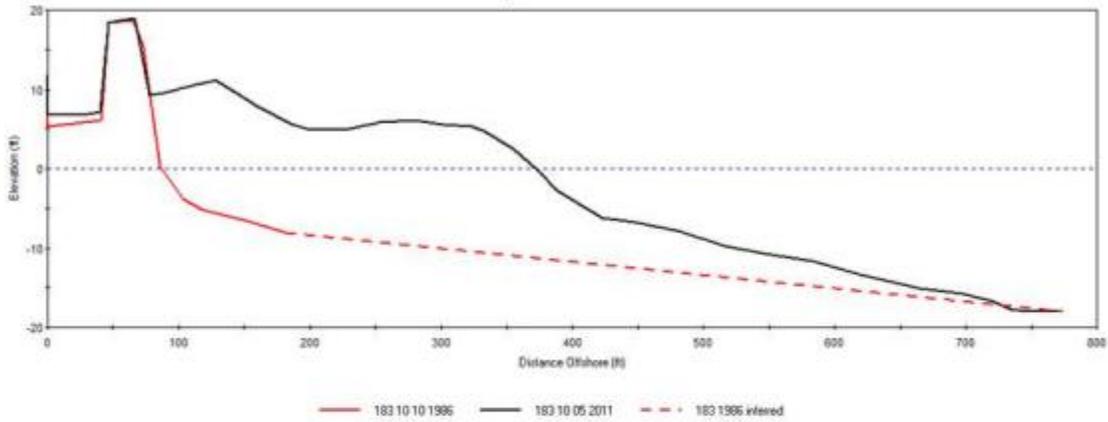


Figure 32. This site is located within the Monmouth County Federal beach nourishment project and has experienced only moderate sand losses since the 2002 maintenance fill. (Left photo October 10, 1986 [view to the north]; right photo October 3, 2011 [view to the north]).



25-Year Coastal Changes at Site 183, Via Ripa, Sea Bright, Monmouth Co.

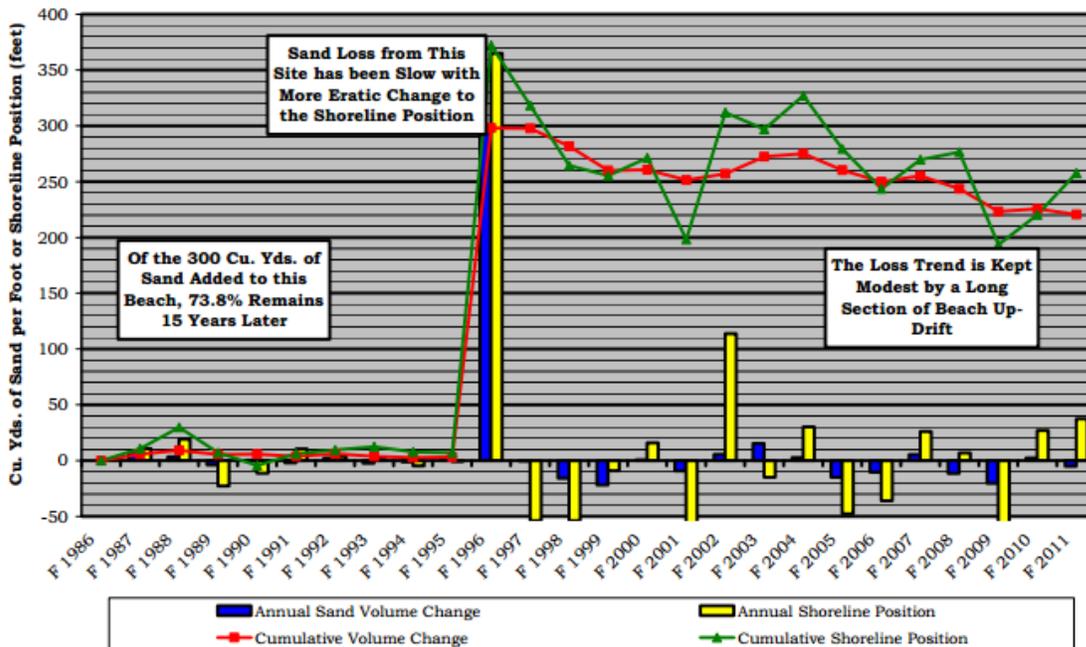
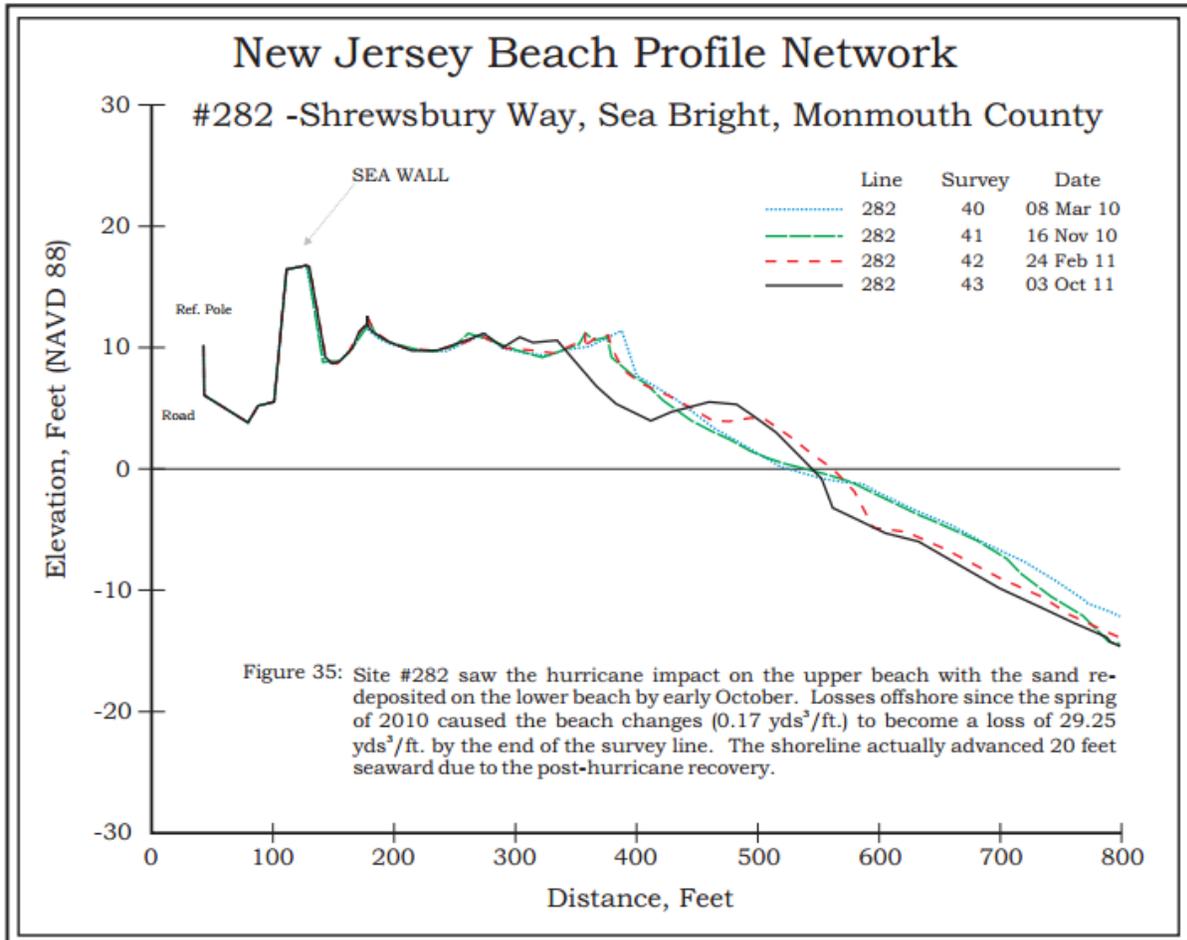


Figure 33. The first surveys recorded a dry beach only during the lowest of tides at this site, with little variation in shoreline movement followed until the Federal beach nourishment project commenced in 1995.



Figure 34. Shown above is the view looking south from the dune toe at Shrewsbury Way in Sea Bright, NJ.



SHREWSBURY WAY, SEA BRIGHT- SITE 282

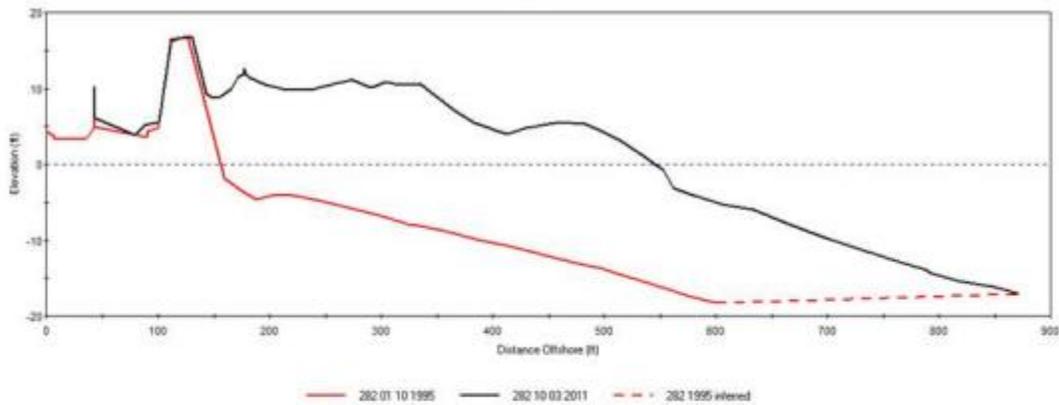


Figure 36. There was no beach during the initial survey at this location. The 1996 Monmouth County Federal beach nourishment project added over 273 cu/ft and advanced the shoreline 471 feet. Since then, this site has remained relatively stable. (Left photo November 2, 1995 [view to the north]; right photo October 3, 2011 [view to the north]).



17-Year Coastal Changes at Site 282, Shrewsbury Way, Sea Bright, Monmouth Co.

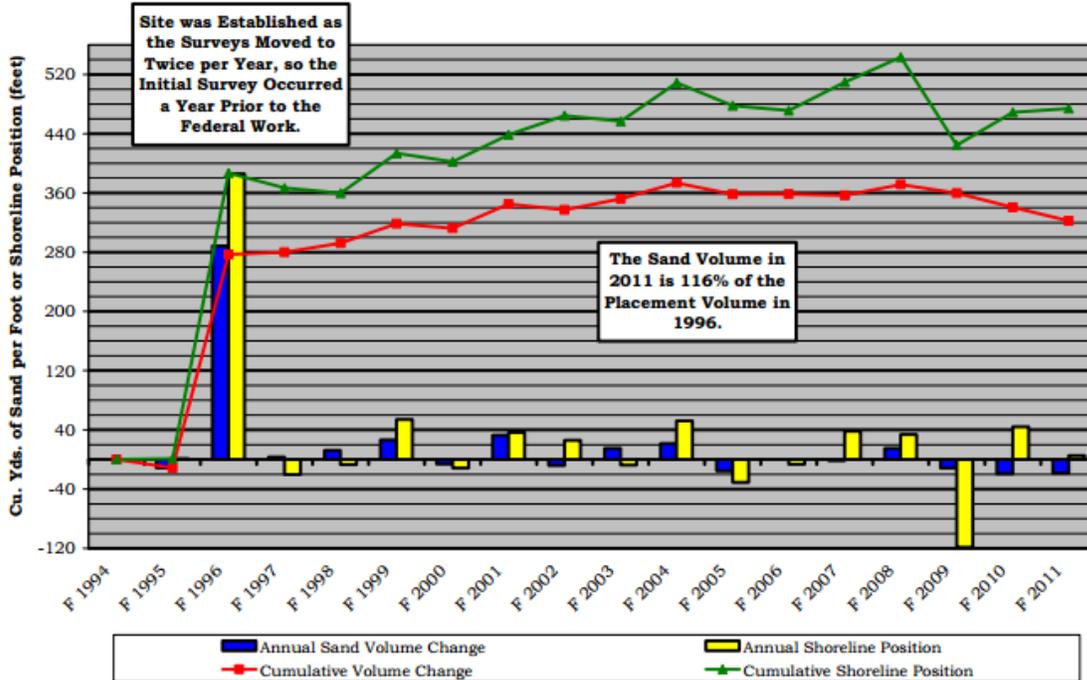
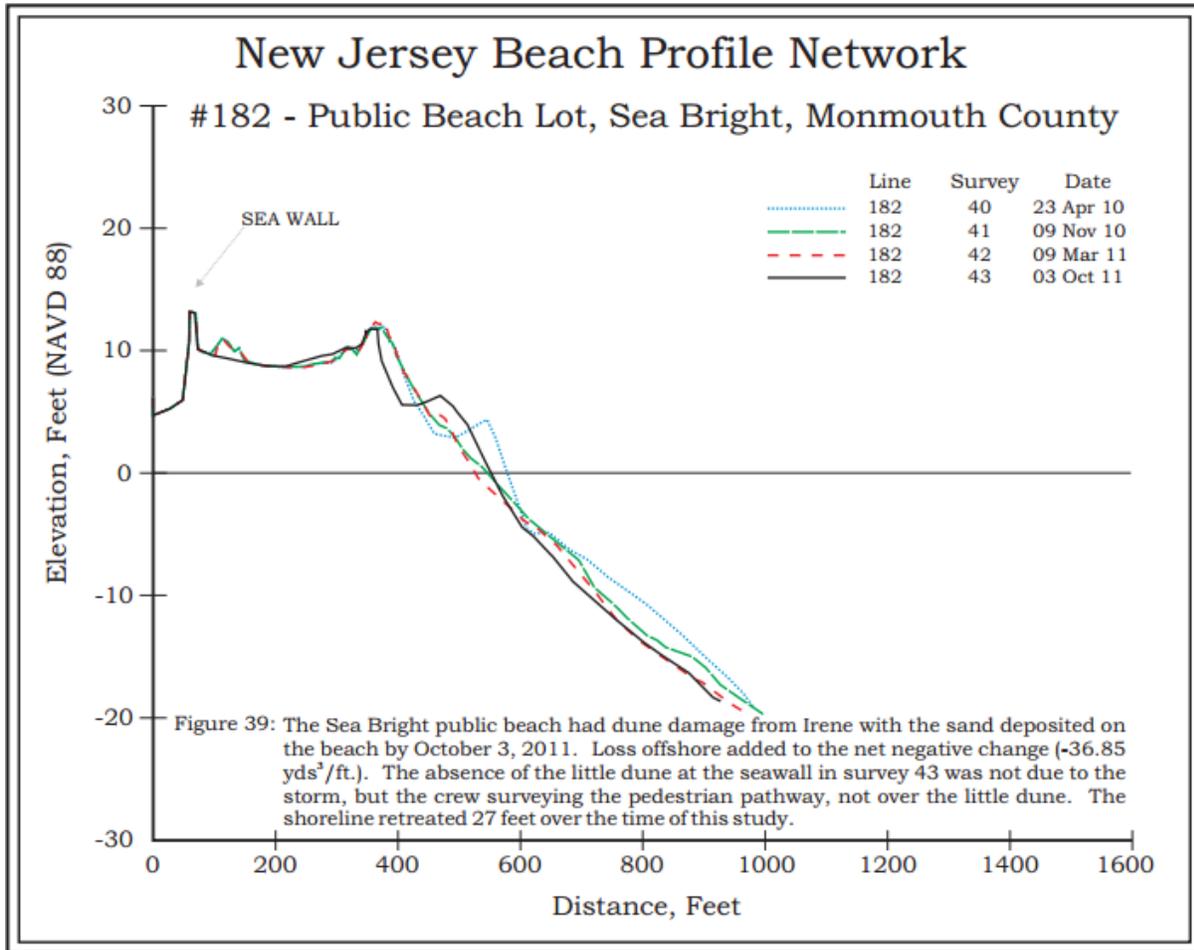


Figure 37. This site was added in 1994 as a result of the State's purchase of this segment of the Sea Bright shoreline for public use. Prior to the Federal project, there was no beach at the seawall. Sand also has moved north to this site as the Federal project adjusted through time.

Site 182, Public Beach, Sea Bright – October 3, 2011



Figure 38. Shown above is the view looking north from the berm at the public beach in Sea Bright, NJ.



PUBLIC BEACH, SEA BRIGHT- SITE 182

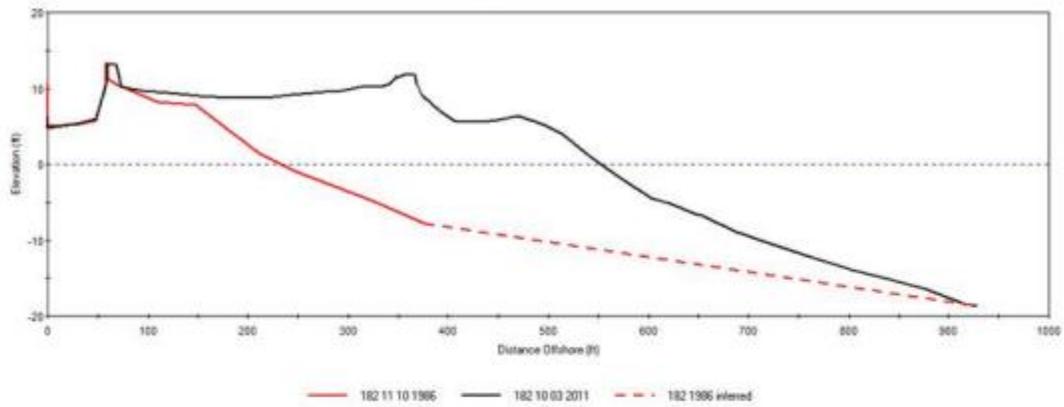


Figure 40. This site is located between two groins and had a dry beach when it was established in 1986. The 1996 Federal beach nourishment project added over 305 cy/ft to this site. Since that time, the beach and nearshore have had minimal sand losses. (Left photo October 11, 1988 [view to the north]; right photo October 3, 2011 [view to the north]).



25-Year Coastal Changes at Site 182, Public Beach Lot, Sea Bright, Monmouth Co.

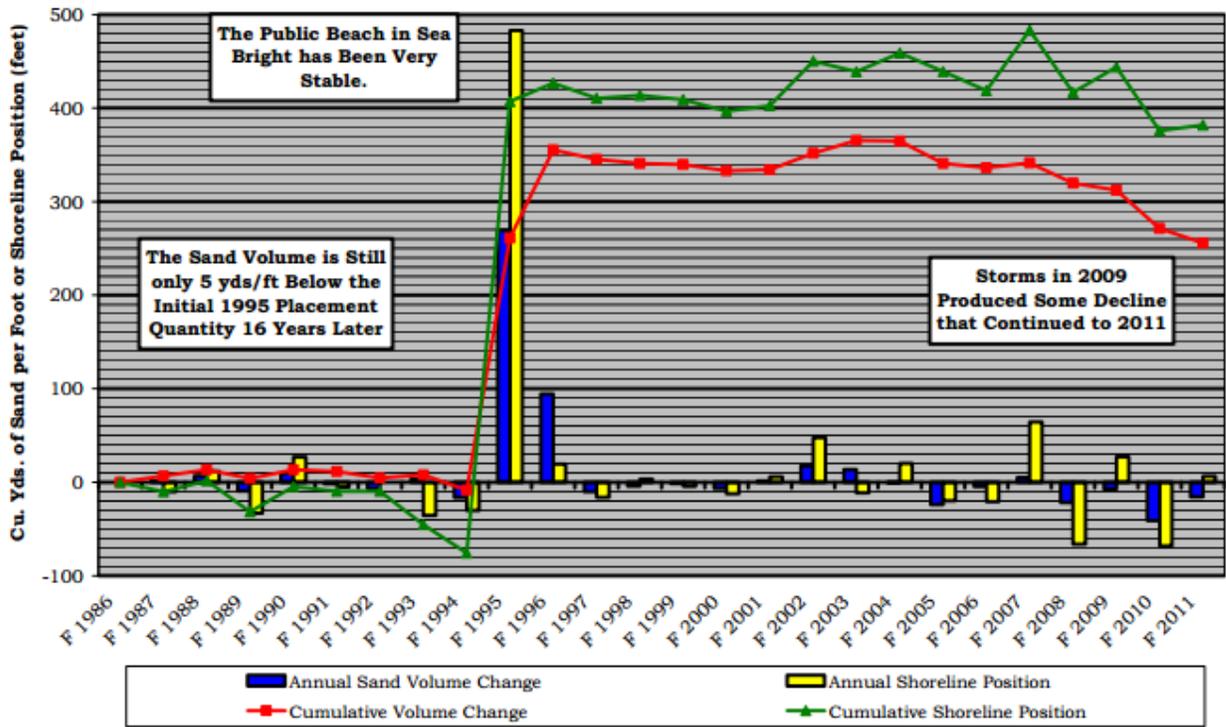
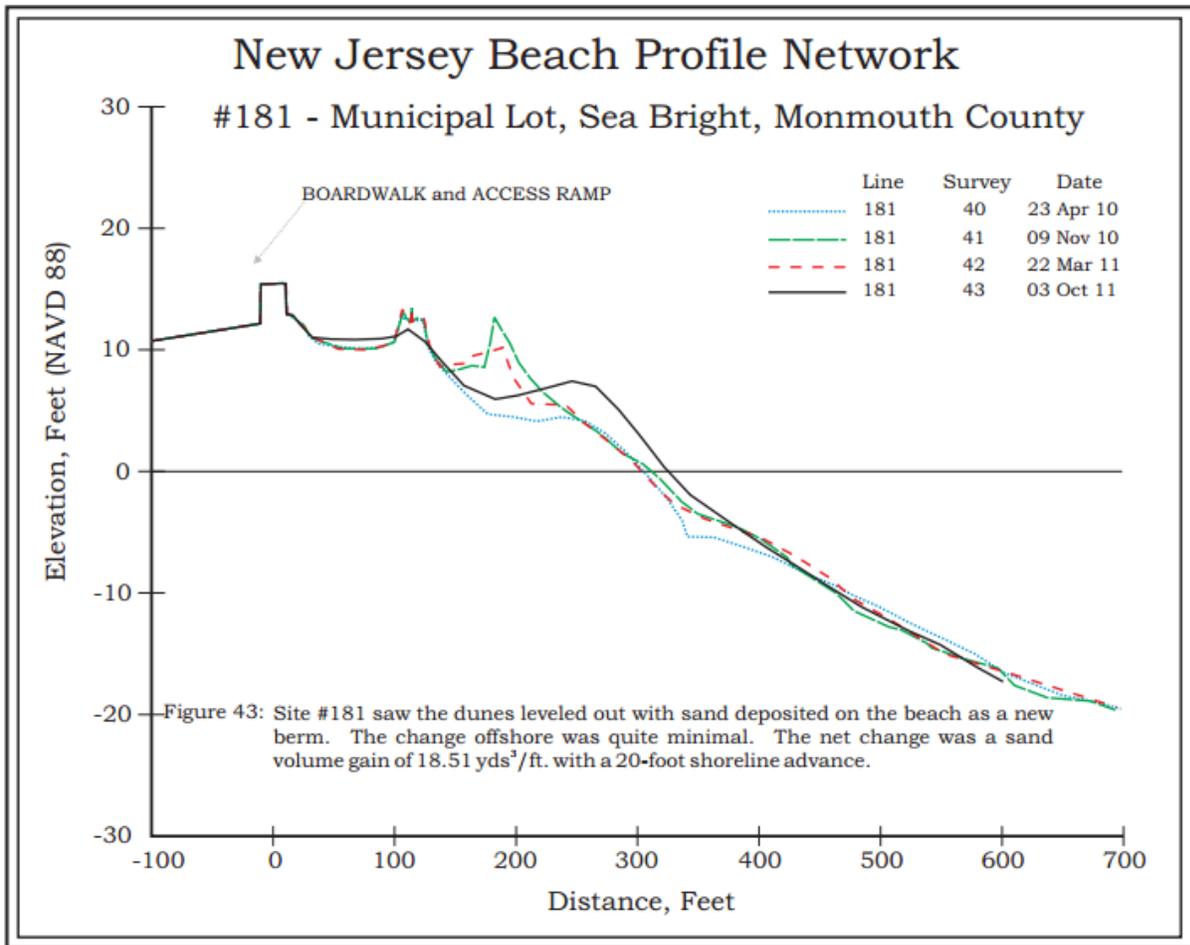


Figure 41. Due to the Federal beach nourishment project, dunes have thrived where none existed prior to the project. Sand was added to this site in the 2002 maintenance fill. Losses have been minor since the project was completed.



Figure 42. Shown above is the view looking south from the dune at the municipal beach in Sea Bright, NJ.



MUNICIPAL BEACH, SEA BRIGHT- SITE 181

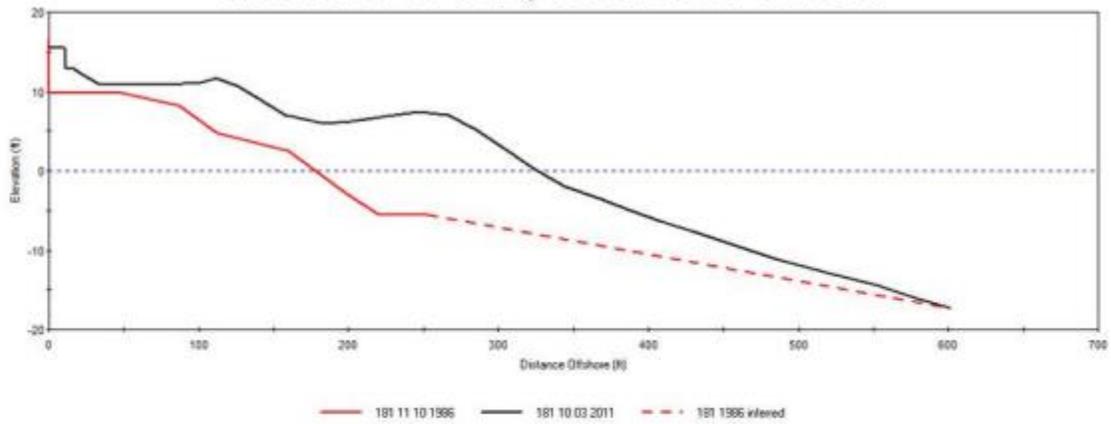


Figure 44. The present dune crest is in the same location as the 1986 berm crest. This site received sand during the Monmouth County Federal beach nourishment project and 2002 maintenance fill. (Left photo October 12, 1988 [view to the east]; right photo October 3, 2011 [view to the north]).



25-Year Coastal Changes at Site 181, Municipal Beach, Sea Bright, Monmouth Co.

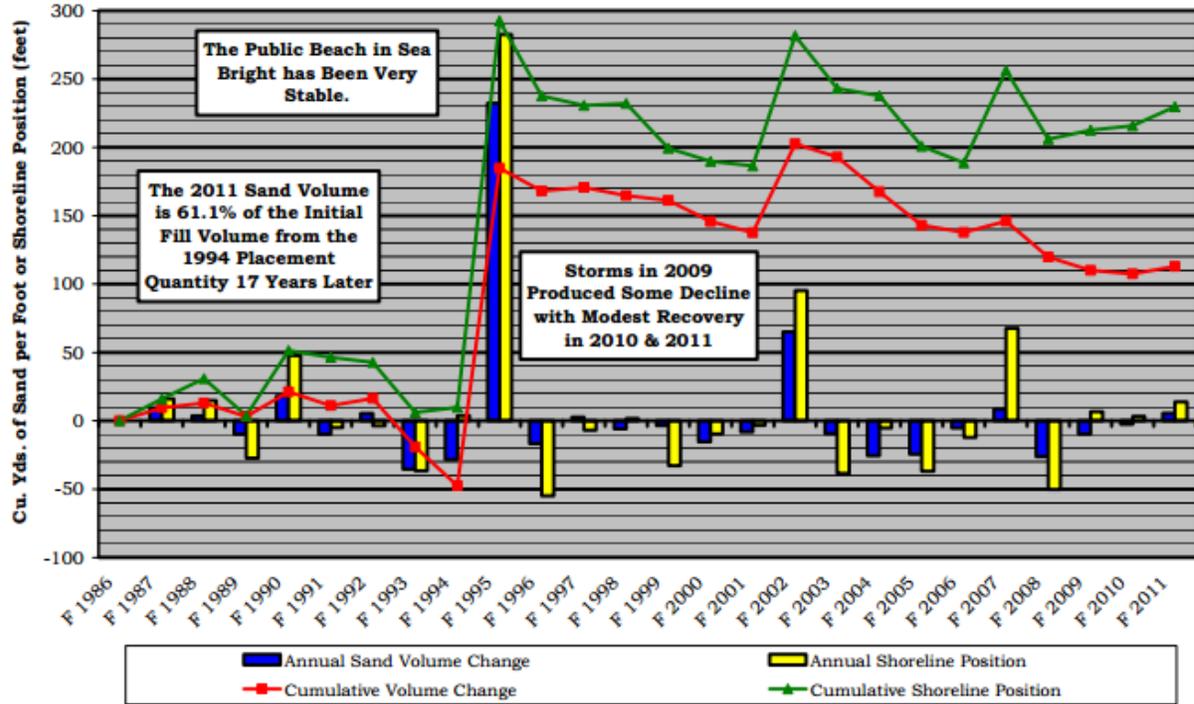
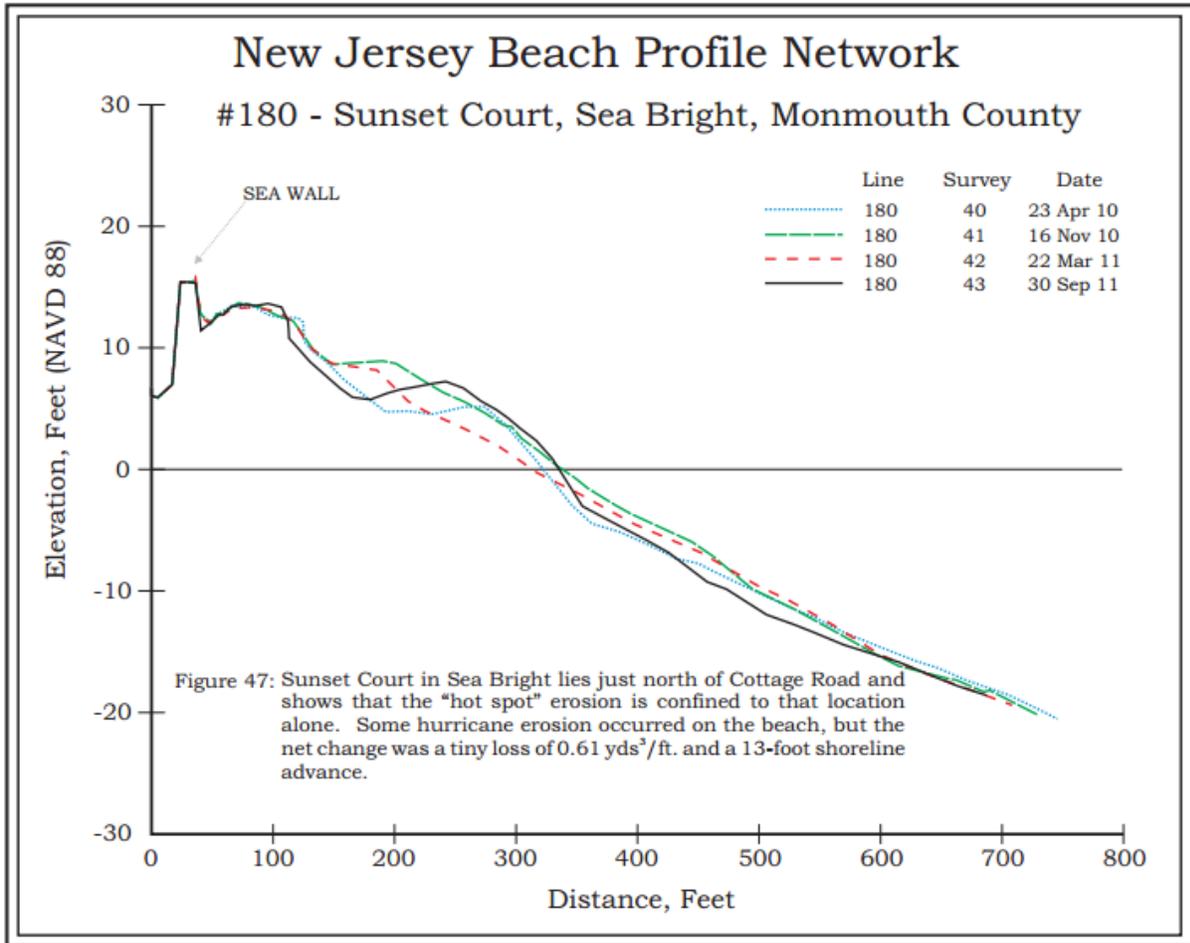


Figure 45. This site was added in order to show the retention rates of the northern Sea Bright beaches for the Federal project sand deposits. Placed in 1995, the shoreline lost material, but was restored in 2002 to levels exceeding the initial deposit. Seven of the past eight years saw loss rates that have nearly reduced the 200 yds²/ft. to half that amount. Sand lost from Sea Bright ends up in Sandy Hook adding to the National Seashore beach.



Figure 46. Shown above is the view looking north from the berm at Sunset Court in Sea Bright, NJ.



SUNSET COURT, SEA BRIGHT- SITE 180

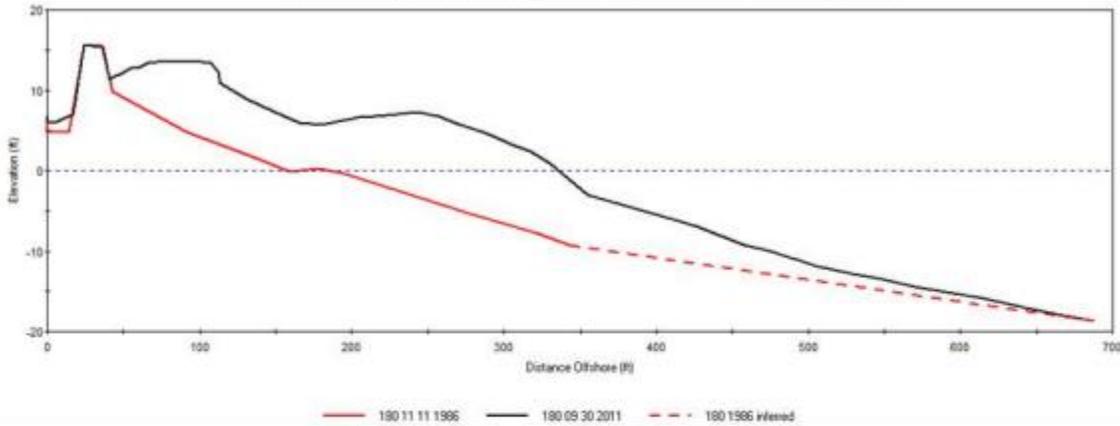


Figure 48. A wide dune field established at this site following the 1995 Monmouth County Federal beach nourishment project. Maintenance sand was added in 2002. Since that time, there has been a gradual loss of sand and shoreline retreat. (Left photo October 7, 1987 [view to the north]; right photo September 30, 2011 [view to the north]).



25-Year Coastal Changes at Site 180, Sunset Court, Sea Bright, Monmouth Co.

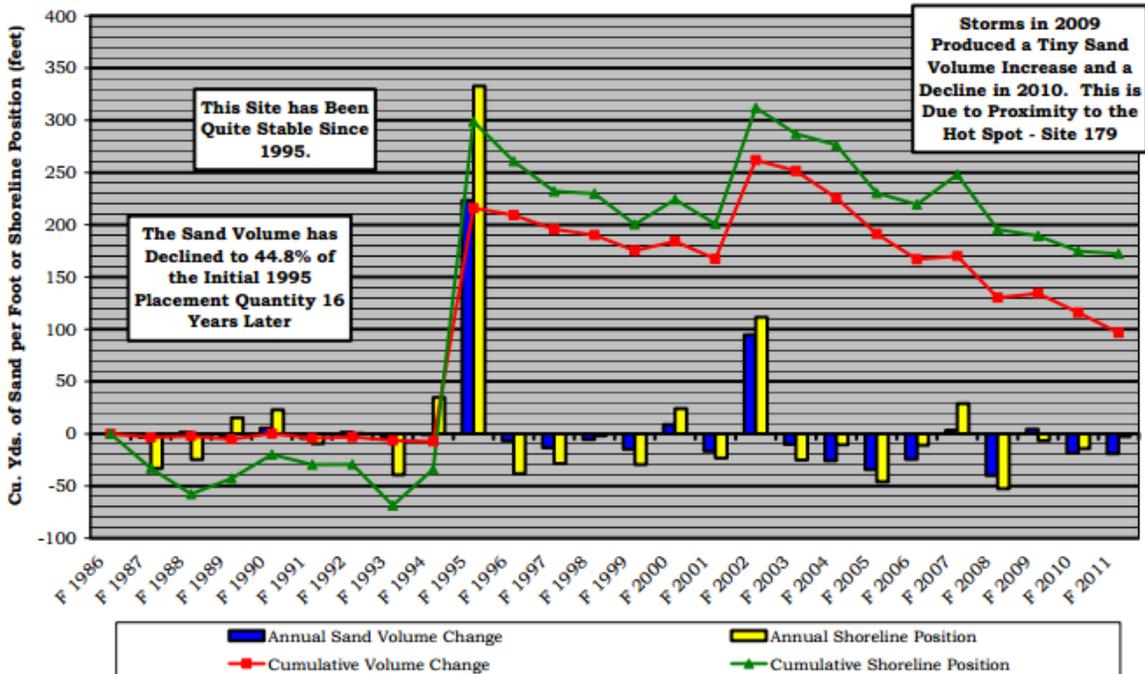


Figure 49. Prior to the Federal beach nourishment project and maintenance fill, this beach at this site was very narrow and susceptible to storm damages. The site has lost volume since the Federal projects as sand moves northward during project adjustment.

Historical Shoreline Positions

An examination of USGS shoreline information shows that the shoreline in 1836 was positioned further east of the current extent of the replenishment project design. During that time period, Sandy Hook was either an island or attached to the mainland. This resulted in Sandy Hook being completely isolated from Sea Bright, leaving the end of the north end of town as the location for an inlet between town and Sandy Hook or as the end of the barrier spit when Sandy Hook was a mainland feature. By 1899, the shoreline position had retreated to the current position of the seawall in many locations. The shoreline meandered often over the next 100 years until the beach replenishment project was completed in the area in the 1990's, returning much of the Borough's shoreline to close to the former width it had enjoyed in the 1800's. Sandy initially caused significant shoreline retreat in the Borough before sand pulled offshore began migrating back to the shoreline and reattaching to the beach face. A subsequent replenishment project also re-established the shoreline position to the location designated by the design specifications of the USACE. To examine shoreline positions further using this dataset, visit <http://marine.usgs.gov/dsasweb/#>.

Appendix 2: FEMA Flood Zones

Flood zones are geographic areas that FEMA has defined according to varying levels of flood risk and type of flooding. These zones are depicted on the published Flood Insurance Rate Map (FIRM) or Flood Hazard Boundary Map (FHBM).

Special Flood Hazard Areas – High Risk

[Special Flood Hazard Areas](#) represent the area subject to inundation by 1-percent-annual chance flood. Structures located within the SFHA have a 26-percent chance of flooding during the life of a standard 30-year mortgage. Federal floodplain management regulations and mandatory flood insurance purchase requirements apply in these zones.

Zone	Description
A	Areas subject to inundation by the 1-percent-annual-chance flood event. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown.
AE, A1-A30	Areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. BFEs are shown within these zones. (Zone AE is used on new and revised maps in place of Zones A1–A30.)
AH	Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are 1–3 feet. BFEs derived from detailed hydraulic analyses are shown in this zone.
AO	Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are 1–3 feet. Average flood depths derived from detailed hydraulic analyses are shown within this zone.
AR	Areas that result from the decertification of a previously accredited flood protection system that is determined to be in the process of being restored to provide base flood protection.
A99	Areas subject to inundation by the 1-percent-annual-chance flood event, but which will ultimately be protected upon completion of an under-construction Federal flood protection system. These are areas of special flood hazard where enough progress has been made on the construction of a protection system, such as dikes, dams, and levees, to consider it complete for insurance rating purposes. Zone A99 may be used only when the flood protection system has reached specified statutory progress toward completion. No BFEs or flood depths are shown.

Coastal High Hazard Areas – High Risk

[Coastal High Hazard Areas](#) (CHHA) represent the area subject to inundation by 1-percent-annual chance flood, extending from offshore to the inland limit of a primary front al dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources. Structures located within the CHHA have a 26-percent chance of flooding during the life of a standard 30-year mortgage. Federal floodplain management regulations and mandatory purchase requirements apply in these zones.

Zone	Description
V	Areas along coasts subject to inundation by the 1-percent-annual-chance flood event with additional hazards associated with storm-induced waves. Because detailed coastal analyses have not been performed, no BFEs or flood depths are shown.
VE, V1-V30	Areas along coasts subject to inundation by the 1-percent-annual-chance flood event with additional hazards due to storm-induced velocity wave action. BFEs derived from detailed hydraulic coastal analyses are shown within these zones. (Zone VE is used on new and revised maps in place of Zones V1–V30.)

Moderate and Minimal Risk Areas

Areas of moderate or minimal hazard are studied based upon the principal source of flood in the area. However, buildings in these zones could be flooded by severe, concentrated rainfall coupled with inadequate local drainage systems. Local stormwater drainage systems are not normally considered in a community’s flood insurance study. The failure of a local drainage system can create areas of high flood risk within these zones. Flood insurance is available in [participating communities](#), but is not required by regulation in these zones. Nearly 25-percent of all flood claims filed are for structures located within these zones.

Zone	Description
B, X (shaded)	Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by a levee. No BFEs or base flood depths are shown within these zones. (Zone X (shaded) is used on new and revised maps in place of Zone B.)
C, X (unshaded)	Minimal risk areas outside the 1-percent and .2-percent-annual-chance floodplains. No BFEs or base flood depths are shown within these zones. (Zone X (unshaded) is used on new and revised maps in place of Zone C.)

Undetermined Risk Areas

Zone	Description
D	Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities .

Appendix 3: Alternatives Assessment

The Borough’s existing planning documents recommend that the Borough explore and/or implement a variety of actions related to land use, parking and circulation, land development, government services, housing, utilities, and resiliency and sustainability. The following subsections evaluate potential alternatives for each of the recommended actions identified by the Borough’s policy documents and consider the potential locations (where applicable), anticipated costs and anticipated timeframes associated with each alternative.

Action: Consolidation of Municipal Facilities

The consolidation of municipal facilities was under consideration by the Borough prior to Sandy. However, as noted in the Existing Conditions, Impacts and Critical Infrastructure Assessment, Borough Hall, the library, police station, fire station, first aid building and DPW building all sustained significant damage due to Sandy. Some facilities, including Borough Hall and the DPW building, have been repaired and rendered habitable. However, the police station, first aid building and fire station require substantial repairs. In addition, the Borough has hired an architect who is developing a design for a combined library and beach pavilion. Moreover, since Sandy, the Court offices and Courtroom have been relocated to Oceanport, and thus all alternatives presented here exclude court facilities. The Borough anticipates the following municipal space needs:

Facility	Previously Existing Space	Estimated Required Space
Municipal Offices	1,300	4,000
Council Chambers	1,500	1,500
Police Department	1,800	3,000
Fire Department	3,500	4,500
First Aid Squad	900	4,000
OEM	100	1,000
Public Works	3,900	4,000
Recycling Center	6,000	6,000
TOTALS	19,000	28,000

*space measured in square feet (sq. ft.)

The following subsections evaluate two (2) potential alternatives and three conceptual site layouts for the consolidation and expansion of municipal facilities, with each alternative contemplating the acquisition of the former Allied Lumber property to the north of Borough Hall. The first alternative contemplates renovating and retrofitting the existing Borough Hall building to provide new Borough offices, new Council Chambers, and a new police station within the current building. The second and third alternatives propose to demolish the existing Borough Hall building and construct a new municipal complex on both lots, but differ in the proposed layout of the new municipal complex. A basic estimate of potential costs for each alternative is also outlined below. It should be noted that the estimates below are provided for budgetary purposes only, and do not reflect costs relating to site work, hazardous materials disposal, permits, temporary facilities, soft costs, furniture, specialized equipment, etc. Further development of designs and options will allow for refinement of estimated costs.

Alternative 1: Retrofit and Expand the Existing Borough Hall to House All Borough Facilities

- Retrofit and Rehabilitate Borough Hall to Include Renovated Municipal Offices and Council Chambers

- Construct a Building Addition to Borough Hall that Provides Separate Facilities for the Police Department, Firehouse, First Aid, Office of Emergency Management and Department of Public Works

Facility	New	Rehabilitated	Total
Municipal Offices	0	4,000	4,000
Council Chambers	0	1,500	1,500
Police Department	2,800	0	2,800
Fire Department	4,500	0	4,500
First Aid Squad	4,000	0	4,000
OEM	1,000	0	1,000
Public Works	4,000	0	4,000
TOTALS	16,300	5,500	21,800

*space measured in square feet (sq. ft.)

Approximate Cost of Alternative: \$9,306,500

Estimated Property Acquisition Cost, Block 19, Lot 2	\$1,326,500.00
Borough Hall/Council Chambers	\$2,860,000.00
Police Department	\$1,120,000.00
Fire/OEM/First Aid/Public Works	\$4,000,000.00

Implementation Timeframe: 2-4 years

Note: The map entitled *Alternative 1, Conceptual Layout Plan, Borough Hall Renovation and New Municipal Services Complex* depicts a conceptual site layout in accordance with this alternative.

Alternative 2 and 3: Demolish and Construct New Municipal Complex on Existing Borough Hall Site and Property to the North to House All Borough Facilities

This alternative proposes to demolish the existing Borough Hall building and subsequently construct a new municipal complex on the Borough Hall property and the property to the north. The maps entitled *Alternative 2 Layout, Municipal Facilities Consolidation, New Borough Hall and Municipal Services Complex* and *Alternative 3 Layout, Municipal Facilities Consolidation, New Borough Hall and Municipal Services Complex* each depict a potential layout for the new municipal complex.

Facility	New	Rehabilitated	Total
Municipal Offices	4,000	0	4,000
Council Chambers	1,500	0	1,500
Police Department	2,800	0	2,800
Fire Department	4,500	0	4,500
First Aid Squad	4,000	0	4,000
OEM	1,000	0	1,000
Public Works	4,000	0	4,000
TOTALS	21,800	0	21,800

*space measured in square feet (sq. ft.)

Approximate Cost of Alternative: \$10,446,500

Estimated Property Acquisition Cost, Block 19, Lot 2	\$1,326,500.00
Borough Hall/Council Chambers	\$4,000,000.00
Police Department	\$1,120,000.00
Fire/OEM/First Aid/Public Works	\$4,000,000.00

Implementation Timeframe: 3-6 years

Action: Downtown Streetscape and Traffic Calming Improvements

Downtown streetscape and traffic calming improvements will enhance the Borough’s “sense of place” by beautifying the streetscape and increasing safety for pedestrian and bicyclists. Such streetscape improvements should be considered for and concentrated on Ocean Avenue (Route 36) between Peninsula Avenue and Village Road. Streetscape and traffic calming improvements may include the following elements:

Traffic Calming	Streetscape
<ul style="list-style-type: none"> • Textured crosswalks 	<ul style="list-style-type: none"> • Planting strips
<ul style="list-style-type: none"> • Curb bumpouts 	<ul style="list-style-type: none"> • Decorative lighting
<ul style="list-style-type: none"> • Raised intersections at signals 	<ul style="list-style-type: none"> • Decorative pavement/sidewalks
<ul style="list-style-type: none"> • Speed Tables 	<ul style="list-style-type: none"> • Unified wayfinding signage
<ul style="list-style-type: none"> • Dedicated bike lane striping 	<ul style="list-style-type: none"> • Street trees
<ul style="list-style-type: none"> • Back in angle parking 	

Alternative1 – Conventional Design: Construct Conventional Streetscape and Traffic Calming Improvements

One alternative to consider is the construction and installation of conventional streetscape and traffic calming improvements. The construction of these improvements will serve to enhance the aesthetics of the Borough, increase safety for pedestrians and bicyclists, and encourage both walking and bicycling in the Borough’s downtown.

Approximate Cost of Alternative: \$1,400,000.00

Permitting	\$5,000.00
Administration	\$57,000.00
Engineering/Inspection	\$183,000.00
Construction	\$1,140,000.00

Alternative Implementation Timeframe: 18-24 months from start of construction

Alternative 2 – Resilient Design: Construct Streetscape and Traffic Calming with an Eye toward Resiliency and Sustainability

Given the vulnerability of the Borough to sea-level rise, flooding, storm surge and power interruption, the Borough may also consider implementing traffic calming and streetscape improvements that may help to mitigate the effects of flooding, storm surge and power interruption during such events. These improvements may include:

- Permeable/porous pavement
- Stormwater planters
- Rain Gardens/Bioswales
- Off-grid renewable lighting (hybrid wind and solar)

Specifically, these design elements will reduce the amount of stormwater runoff, allow for an increased rate of stormwater infiltration, and mitigate the safety related effects of power interruption within the Borough. However, it should be noted that these design elements may require increased maintenance to ensure proper function, and may result in higher maintenance costs to the Borough. In addition, the implementation of hybrid wind-solar off-grid renewable lighting will require support of NJDOT and JCP&L if this alternative will be implemented in the Borough.

Approximate Cost of Alternative: \$1,584,000

Permitting	\$5,000.00
Administration	\$57,000.00
Engineering/Inspection	\$183,000.00
Construction	\$1,304,900.00

Alternative Timeframe: 18-24 months from start of construction

Action: Undertake the Redevelopment of Targeted Public and Private Parcels

Redeveloping the following parcels will increase the Borough’s tax base, reduce the appearance and effects of blight, return properties to effective use, and result in an aesthetic improvement to the Borough:

Property	Block	Lot	Ownership
Shrewsbury River Properties	13	13, 14, 15, 18, 20, 21, 22	Private
	14	12, 14	Private
	15	5, 8, 10, 12	Private
Sea Bright Pharmacy	15	2	Private
Sea Bright Cleaners	15	3	Private
Sea Bright School Property	15	4	Private
Post Office/Rumson Bridge	17	4, 5	Private
Municipal/Peninsula Parking Lot	23	1, 2.01, 2.02	Public

The Borough may redevelop the above properties through one of the following alternatives:

Alternative 1- Use Redevelopment Law: Undertake the Redevelopment Process in Accordance with the Requirements of the Local Redevelopment and Housing Law (LRHL)

The Local Redevelopment and Housing Law (LRHL), P.L. 1992, c.79 (N.J.S.A. 40:12A-1 et seq.), governs local redevelopment in the State of New Jersey and provides municipalities with the authority to designate “areas in need of redevelopment,” prepare and adopt redevelopment plans for designated redevelopment areas, and to undertake redevelopment projects for designated areas. The LRHL sets forth a prescribed redevelopment process that includes the following steps:

1. The Governing Body adopts a resolution directing the Planning Board to undertake an investigation of the property(ies) in question (the study area) to determine whether the properties meet the statutory criteria to be designated as an “area in need of redevelopment”. The resolution, and all subsequent notices, studies and plans for the study area, must specify whether the study area will be a “condemnation” area (where municipality may exercise the power of eminent domain) or “non-condemnation” area (where the municipality may not utilize eminent domain to acquire property);
2. The Planning Board completes its investigation on the property(ies) and holds a public hearing on the investigation. If the Planning Board finds sufficient evidence to designate the area as an “area in need of redevelopment,” the Board adopts a resolution recommending the Governing Body designate the area as an “area in need of redevelopment”;
3. The Governing Body, acting on the Planning Board’s recommendation, adopts a resolution designating the area as an “area in need of redevelopment” and either:
 - a. Directs the Planning Board to prepare a redevelopment plan for the redevelopment area; or

- b. Prepares a redevelopment plan for the redevelopment area and refers the plan to the Planning Board for review and comment.

- 4. The Governing Body, upon receiving the plan from the Planning Board (3.a.) or receiving a communication from the Planning Board regarding the plan (3.b.), adopts the redevelopment plan for the redevelopment area.

After adopting the above steps are completed, the Governing Body may solicit proposals from qualified redevelopers to redevelop the property(ies) in accordance with the provisions of the adopted plan. The Governing Body may also select a qualified redeveloper(s) to redevelop the property and may enter into redevelopment agreements with the designated redeveloper(s) to facilitate the redevelopment of the area.

Approximate Cost of Alternative: \$65,000 - \$10,082,500

Preliminary Investigation and Redevelopment Study	\$30,000 - \$37,500
Redevelopment Plan Preparation	\$35,000 - \$45,000
Property Acquisition* (optional)	\$6,000,000 - \$10,000,000

*Based on Market Value Determined via Tax Data

Implementation Timeframe: 3 months – 10 years

Study and Plan Preparation: 3 months – 1 year

Acquisition and Redevelopment: 1 – 10 years

Alternative 2 – Do not use Redevelopment Law: Market Development Opportunities and Await Private Redevelopment of Property

The Borough may seek to market opportunities for redevelopment to attract private investors and redevelopers to acquire and redevelop property within the Borough. This process would result in minimal cost to the Borough but would likely result in longer timeframe as noted below.

Approximate Cost of Alternative: \$2,500 - \$20,000

Implementation Timeframe: As determined by market conditions

Alternative 3– Undertake a Combination of Redevelopment Law & Private Marketing of Development Opportunities

The Borough may seek to implement a combination approach that utilizes the LRHL to designate target properties and also undertake a marketing campaign to attract private investors and redevelopers to acquire and redevelop property within the Borough. This process would result in some cost to the Borough but would likely facilitate greater activity than relying solely on marketing redevelopment opportunities within the Borough.

Approximate Cost of Alternative: \$32,500 - \$42,000

Implementation Timeframe: As determined by market conditions

Action: Construct a Downtown Parking Deck

Constructing a downtown parking deck will alleviate the existing shortfall in parking experienced by residents and visitors during the summer months. A downtown parking deck may also reduce parking-related traffic and congestion as residents and visitors move throughout the Borough in search of parking, and will provide adequate parking to serve municipal services located in the Borough’s downtown.

The alternatives below contemplate the construction of a parking deck that contains 475 parking spaces. This is slightly more than the 460 spaces currently being constructed at the municipal lot on Ocean Avenue across from River Street.

Alternative 1- On Borough Property: Construct a New Parking Deck on Borough-owned Property

Constructing a parking deck on Borough-owned property will eliminate property acquisition costs and will provide a centralized location for a parking deck to address the parking demands generated by downtown business and beach activities.

Approximate Cost of Alternative: \$12,795,000

Design & Permitting	\$225,000
Construction & Inspection ²⁷	\$12,570,000

Implementation Timeframe: 2-4 years

Alternative 2 – On Private Property: Acquire Private Property(ies) and Construct a New Parking Deck

Acquiring a tract of land within the Borough and subsequently constructing a parking deck will preserve the existing uses taking place on Borough-owned property. However, this alternative will require the Borough to acquire a property or a number of properties to accommodate the construction of a parking deck, which will result in substantial property acquisition costs.

Approximate Cost of Alternative: \$13,920,000

Land Acquisition*	\$1,125,000
Design & Permitting	\$225,000
Construction & Inspection ²	\$12,570,000

*Based on estimate of 2.5 acres of land required for parking garage and average per acre land value for 2013 per Borough Tax Records.

Implementation Timeframe: 3-5 years

Alternative 3 – No Build: Do Not Construct a New Parking Deck and Rely on Reconstruction of Municipal Parking Lot for Future Parking (No Action)

The “no build/no action” alternative will not result in an increase in the amount of parking to serve downtown Sea Bright. The municipal parking lot is currently being reconstructed and will contain 481 spaces.

Cost of Alternative: \$1,136,734.75 (per bid award)

Implementation Timeframe: Less than one year

Action: Prepare a Cityscape Plan for the Length of Ocean Avenue (Route 36)

Ocean Avenue (Route 36) is the Borough’s main thoroughfare, running north to south along the entire length of the Borough. As a roadway under state jurisdiction and as a designated state highway, Ocean Avenue presents a significant barrier to pedestrians, and lacks adequate pedestrian and bicycle facilities in many areas throughout the Borough. Creating a more pedestrian and cyclist friendly thoroughfare will require extensive coordination between the Borough and NJDOT.

Alternative: Engage NJDOT to Develop a Joint Cityscape Plan for the Length of Ocean Avenue

The Joint Cityscape Plan, developed in conjunction with NJDOT, will serve to establish typical details and design standards for the implementation of roadway and right-of-way improvements aimed at

²⁷ Estimated at a cost of \$70/sq. ft. based on RSMeans Cost Data

enhancing safety for pedestrians and bicyclists, beautifying the streetscape, and reducing traffic conflicts. The plan will also contain recommendations for suggested areas of improvements, prioritize location of improvements and outline the types of improvements recommended by location.

Approximate Cost of Alternative: \$45,000 - \$60,000

Coordination with NJDOT	\$15,000
Plan Development and Development of Standards and Details	\$45,000

Implementation Timeframe: 2-3 years

Action and Alternative Considerations

The development of a Cityscape Plan should take into consideration the impact of sea-level rise and storm surge on the Borough, and should contain recommendations regarding techniques and design principles aimed at mitigating the effects of these events. In particular, the development of the Cityscape Plan should incorporate elements that increase permeability storage capacity to mitigate the effects of flooding within the Borough. The recommendation of design principles and structures intended to make the Borough more resilient will likely result in an increased cost of implementation over comparable improvements that do not incorporate design/resiliency techniques.

Action: Relocate All Above Ground Utilities Underground

Given the Borough’s vulnerability to high speed winds, above-ground utilities, including electrical and telecommunications infrastructure, are susceptible to damage and interruption. However, relocating utilities underground may present a new set of difficulties related to repair, replacement and post-storm recovery. According to Jersey Central Power & Light (JCP&L), there are approximately seven miles of distribution lines and 270 utility poles within the Borough.

Alternative 1 – Relocate Underground: Relocate Above Ground Utilities Underground Borough-wide

Relocating above ground utilities underground will require a significant capital investment and coordination efforts from utility providers, NJDOT and the Borough. This activity may also require utility line relocation in order to avoid utility conflicts, which may result in additional capital costs. This alternative will result in Borough-wide traffic disruptions due to required excavation and relocation activities taking place within the right-of-way. Activities associated with utility relocation may also increase wear and tear on Borough roads, and may reduce the amount of time required between roadway resurfacing.

Burying above ground utilities may increase the resiliency of Borough infrastructure, as this activity will reduce the vulnerability of power and telecommunications lines to wind-related damage. However, relocating these utilities will increase the cost and timeframe of repair and maintenance as utilities become less accessible and repairs and maintenance require excavation and traffic disruption. Additionally, underground utilities may be more vulnerable to the effects of flooding.

Alternative Cost: \$1 million - \$5 million (split between coordinating agencies)

Implementation Timeframe: 3 – 7 years

Alternative 2 – No Action: Take No Action and Retain Above Ground Utilities

Retaining above-ground utilities will continue to leave certain Borough infrastructure vulnerable to storm-related damage due to wind. However, retaining above-ground utilities will likely minimize costs associated with repairs, replacement, and service interruptions. Similarly, above-ground utilities will

require less time to repair and will minimize repair-related disruptions because above-ground utilities are easily accessible and do not require excavation to access.

Cost of Alternative: \$0

Implementation Timeframe: None (no implementation required)

Action: Construct a Boardwalk along the Beachfront

Constructing a beachfront boardwalk will enhance Sea Bright's "sense of place" and will provide an invaluable community amenity to residents and visitors alike. However, wooden plank boardwalks are among the more vulnerable coastal amenities with regard to storm surge. Therefore, the construction of a boardwalk within the Borough should take place on the existing sea wall or should be constructed to provide protection from storm-related wave action, surge, and flooding.

Alternative 1 – On Existing Sea Wall: Construct a Boardwalk on the Existing Sea Wall

Approximate Cost of Alternative: \$5,000,000 - \$8,000,000

Implementation Timeframe: 2-5 years

Alternative 2- Strengthened Boardwalk: Construct a New Boardwalk that Doubles as Protection from Storm Surge for Public and Private Property

The construction of a new boardwalk along the beachfront may incorporate design elements that provide increased protection from storm surge and wave action associated with storm events. Constructing a new boardwalk along the beachfront should incorporate precast concrete construction for enhanced durability and longer life, and should incorporate dunes and grasses, vegetated berms and hard structural components to absorb storm surge and wave action. The boardwalk must be constructed above the established base flood elevation (BFE) to protect against a minimum 100-year storm event. This alternative will require extensive design, permitting, and multi-jurisdictional coordination between the Borough, NJDEP and the Army Corps of Engineers.

Cost of Alternative: \$25,000,000 - \$40,000,000

Implementation Timeframe: 7-10 years

Appendix 4: Potential Actions

1. Bicycle facilities (on/off road, amenities, maps, signs)
2. Boardwalk construction ALT. 1 – On Sea wall, ALT. 2 – Strengthened Boardwalk (see Alternatives Assessment for details)
3. Borough organizational structure improvements (incl. staffing, structure, space, equipment, operations, Continuity of Operations plan, training)
4. Branding & Promotion
5. Bulkhead (incl. bulkhead ordinance)
6. Business Development Strategy (incl. marketing study, food tourism, summertime market, tented marketplace, permitting process review, year round promotions)
7. Business district elevated
8. Business district flood-proofed
9. Capital Improvements Plan (Long Term) created
10. Cityscape Plan for length of Ocean Ave (incl street trees, cross walks, widened sidewalks, bike paths/lanes/shared use)
11. Code enforcement enhancement
12. Communications & engagement strategy (public forums on priority projects, communications with residents, businesses, visitors, advocacy, involving neighbors, internal, CRS recommendations on record keeping)
13. Community Emergency Response Team (CERT) created
14. Design guidelines – residential and commercial
15. Downtown parking deck ALT. 1 – On Borough Property, ALT. 2 – On Borough Property, ALT. 3 – No Action (see Alternatives Assessment for details)
16. Downtown Streetscape (incl. traffic calming) ALT 1- Conventional Design, ALT. 2 – Resilient Design (see Alternatives Assessment for details)
17. Dune creation and planting
18. Events/programming/active recreational activities (incl. temp uses on beach)
19. Housing rehab/rebuild assistance (post-housing survey)
20. Land Development Regulation revisions for resiliency (incl. natural mitigation techniques, permeable ground cover, rezonings)
21. Landscape Plan for Borough
22. Master Drainage Plan created
23. Mitigation Plan for repetitive loss properties (incl. returning land to floodplain) created
24. Muni technology upgrade
25. Municipal facilities consolidation ALT. 1 – Rehab Borough Hall & Police, New First Aid/Fire/OEM/DPW, ALT. 2 & 3 – New Borough Hall & Police, New First Aid/Fire/OEM/DPW (see Alternatives Assessment for details)
26. Municipal parking lot to be used as event/activity space
27. Parking (on-street) for downtown (parking regulations, enforcement, layout of spaces, allowing non-retail to use permit parking)
28. Parking for beach (off-Borough lots in Rumson, muni-fee lots on private vacant properties, fee for muni lot)
29. Parking for residents (permit parking, off-street requirements, access to parking along seawall)

30. Redevelopment of: Lot parcel, Block 13, downtown infill, peninsula house, muni parking lot, old Borough hall, bank-owned properties, vacant properties. ALT. 1 – Using Redevelopment Law, ALT. 2 – Not using Redevelopment Law (see Alternatives Assessment for details)
31. Riverfront access plan and ordinance
32. Sea wall gap constructed and repairs made
33. Special Improvement District created
34. Underground utilities ALT. 1 – Place Underground, ALT. 2 – No Action (see Alternatives Assessment for details)