



12.0 Community Resiliency

alone, Sandy destroyed or damaged 37,000 primary residences, left 8.7 million cubic yards of debris behind and left 2.7 million people without power (USA Today, 2013). In Monmouth County, power outages lasted 10-days on average. As development continues in floodprone areas, communities should be asking themselves how they can better prepare for future coastal storm events to ensure a quicker recovery process than experienced after Sandy.

The *Monmouth County Master Plan* Goals, Principles, and Objectives (GPOs) encourage planning and mitigation measures that protect and strengthen our municipalities against the increasing threat posed by severe storm events. For example, *Master Plan* Principle 3.6 promotes developing the capacity to adapt physically and economically to long-term environmental changes, emergencies, and natural hazards. According to FEMA, mitigation is the **only phase of emergency management specifically dedicated to breaking the cycle of damage, reconstruction, and repeated damage**. FEMA found that “a dollar spent from the federal treasury on FEMA mitigation grants potentially saves about \$3.65” on recovery efforts (FEMA, 2015). Further, since Sandy hit NJ, several grants and programs became available for communities to implement mitigation and resiliency practices (see 12.5 Additional Resources and Funding Opportunities), making mitigation cheaper and easier to implement which will result in less taxpayer money being spent on recovery efforts.

The Monmouth County Office of Emergency Management (OEM) manages hazard mitigation planning for the county through its [Multi-Jurisdictional Natural Hazard Mitigation Plan \(HMP\) for Monmouth County \(2015\)](#) which describes the county’s vulnerability to various natural hazards and provides actions and projects for reducing key risks. The *Monmouth County Master Plan* recommends a continued planning partnership with OEM and the adoption of the *HMP* update as an Element of Community Resiliency, recognizing that the *HMP* is the broadest approach to community resiliency at both the local and county

level (*Master Plan* Recommendation 12.1). Figure 12.2: Hazard Mitigation Planning includes the steps of hazard mitigation planning.

Figure 12.2: Hazard Mitigation Planning



Since New Jersey is a “Home Rule” state, municipalities rather than the county have control over land use and are given the legal responsibility to create and enforce zoning ordinances, development regulations, plans, studies, and reports that encourage hazard mitigation and resiliency. Monmouth County’s role in encouraging resiliency is to provide assistance, access to resources, and/or a regional forum to discuss resiliency tools and resources for its municipalities. Resiliency planning brings together all levels of government and integrates master plans, hazard mitigation plans, subdivision and stormwater regulations, zoning, and budgets to provide a comprehensive regional approach to resiliency. Through the *Master Plan*, the Division of Planning aims to be a proactive partner to communities seeking to increase their resiliency.

12.2 Existing Conditions

According to *The Impact of Superstorm Sandy on New Jersey Towns and Households* (Rutgers University, 2013), NJ communities incurred a total cost of damage exceeding \$37 billion from Superstorm Sandy. One reason for this high cost of storm damage is the state’s population density. The 2010 U.S. Census reveals that NJ is the densest state in America at 1,195.5 people per square mile of land area, putting a lot of people and property at risk to future coastal storms. A [Rutgers’ Community Hardship Index](#) revealed that Monmouth and Ocean Counties suffered the most overall damage in NJ, as displayed in [Figure 12.3: Community Hardship Index from Superstorm Sandy by New Jersey](#)

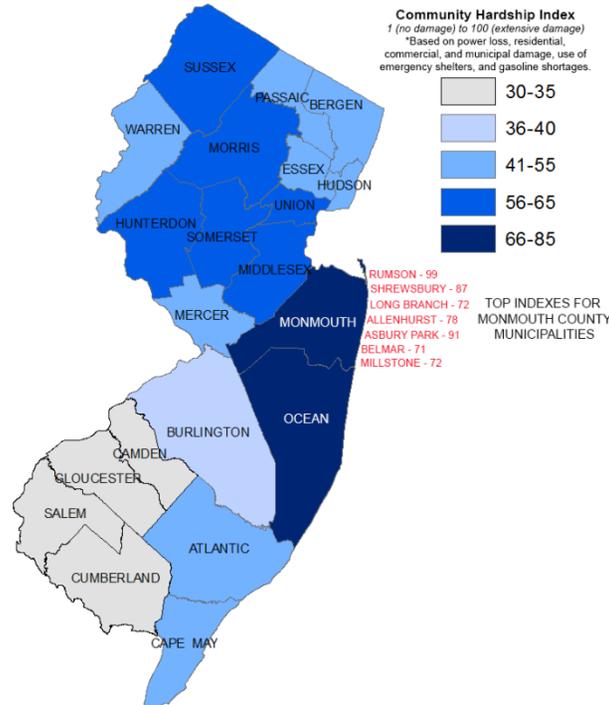


[County](#). The index was based on the number of power outages, residential damage, residents in shelters, and gasoline shortages and ranged from a 1 (no damage) to a 100 (most extensive damage). Monmouth County scored the highest index in NJ an 84, followed by Ocean County with the score of 73. Within Monmouth County, Rumson had the third highest Index in the state and first highest in Monmouth County with an Index of 99, based on Rutgers criteria.

As a result from Sandy, the [New Jersey Department of Community Affairs \(DCA\)](#) found 5% of Monmouth County households had “severe” or “major” damage, a total of 11,467 housing units. Monmouth County was also the second highest county in the state for severe or major housing damage, representing 20% of all severe or major housing damage in NJ. Most of the housing units that experienced severe or major damage in the county were located in Keansburg, Highlands, Union Beach, and Sea Bright (DCA, 2013). In terms of the dollar amount, four Monmouth County municipalities made the list of top ten municipalities in NJ to receive FEMA Public Assistance: Atlantic Highlands (\$17,220,000), Union Beach (\$5,940,000), Keansburg (\$5,740,000), and Belmar (\$5,320,000). Monmouth County also had the longest average power outage in the state at ten days (Rutgers University, 2013).

The New Jersey Department of Community Affairs (DCA) developed the [New Jersey Recovery Dashboard](#) to report on their progress of building of a more resilient NJ to residents. The dashboard provides current

Figure 12.3:
Community Hardship Index from Superstorm Sandy
by New Jersey County



Source: Rutgers University "The Impact of Superstorm Sandy on New Jersey Towns and Households" (2013)

information on homeowner assistance programs, rental housing and renter programs, economic development, infrastructure programs, government entity support, supportive services, planning and administration, and Rebuild by Design initiative. This comprehensive website tracks recovery efforts and allows for county specific analysis.

The NJ Resiliency Network, a program of Sustainable Jersey, produced the [Post-Sandy Municipal Needs Assessment for Long-Term Recovery and Resiliency Planning](#) in March of 2015. The three major challenges facing NJ municipalities are facing:

1. The need to improve the rigor and quality of municipal risk and vulnerability assessments
2. The need to expand and deepen local flood hazard risk reduction and resilience efforts
3. The need to harden critical public infrastructure, particularly energy systems, to withstand shocks and stresses.

Key findings also indicate most at-risk municipalities have not adequately addressed their vulnerability and they prioritize funding needs for resiliency of critical infrastructure as opposed to flood protection measures. It was also found municipalities are not looking at long-term resilience strategies but more focused on needed improvements to energy supply. The report provides informative data on our municipalities and outlines next steps to meeting municipal resiliency needs.



12.2.1 Implementation of Best Management Practices (BMPs)

The term BMPs relates to practices, or combination of practices, that aim to preserve the environment, reduce pollution, and enhance quality-of-life for residents. BMPs in Resiliency are practices and strategies specific to helping protect communities from storm events and speeding up the recovery process. Since NJ follows “Home Rule” policy, the Division of Planning encourages its municipalities to use BMPs in their master plans and development regulations to implement community resiliency at the local level.

Stormwater Management: A majority of Monmouth County’s coastal communities have high densities in floodprone areas. High density equates to more impervious surfaces (roofs, streets, parking lots), resulting in more stormwater runoff. Runoff occurs when stormwater does not naturally infiltrate back into the ground through soils, roots, and plants. By not doing so it collects debris, household chemicals, fertilizers, and/or other waste contaminants as it drains through a collection system before getting discharged into nearby bodies of water. During Sandy, Monmouth County municipalities experienced heavy stormwater runoff from excessive rain, storm surges, and nearby flooding of rivers, streams, and lakes, sometimes all three at once. Standing floodwater remained in neighborhoods for days. To improve infiltration of stormwater, towns can implement stormwater management practices that aim to collect stormwater runoff onsite or create natural ways to get runoff back into the ground before it can cause erosion, flooding, and damage to habitats, property, and infrastructure. With changes in the amount, timing, and intensity of rain events, in combination with increasing land development patterns, the need for better managed stormwater runoff needs to be addressed.

The benefit of a green infrastructure approach to resiliency is it can be implemented at any location by any level of government or individual. Property owners have the option to capture stormwater through rain gardens, vegetated rooftops, and/or rain barrels. Municipalities have

Borough of Spring Lake Model Ordinance

The Borough of Spring Lake in Monmouth County adopted an ordinance that requires an underground recharge system for residential developments. This ordinance requires the grading and drainage of lots to secure proper drainage and to prevent the collection of stormwater while minimizing the destruction of existing vegetation and the alteration of the existing topographic features of properties. Recharging onsite helps prevent saltwater intrusion and groundwater-related land subsidence.

Spring Lake Borough Ord. No. 14-2003

Roof leaders and sump pump drains shall not be permitted to spill at or through the curb of any street in the Borough. Roof leaders and sump pump drains for all new structures or additions with a building footprint of 750 square feet or greater shall be piped directly to dry wells or seepage pits to be installed on the lot. The dry wells or seepage pits shall meet this criterion: **[Added 12-16-2003 by Ord. No. 14-2003]**

- (1) Each dry well or seepage pit shall provide a minimum of 75 cubic feet of storage volume exclusive of the perimeter stone. A minimum of one cubic foot of storage volume exclusive of the perimeter stone shall be provided for each 12 square feet of roof area tributary to the dry well.
- (2) The dry wells shall be a minimum of two feet above the groundwater table and have a minimum of one foot of cover. They shall be located a minimum of 10 feet from any structure or property line and shall not be located under an impervious surface.
- (3) The dry well shall be placed on, and be surrounded on the sides by, a six-inch layer of stone wrapped with a geotextile material to prevent migration of the backfill material into the stone.
- (4) Overflows to the yard surface shall be provided at each leader pipe in case of back up of the dry well.



stormwater management options of “soft vegetation edges” around coastal lakes to help infiltrate lake overflow during storm events, create bioretention facilitates and rain gardens alongside roadways, permeable pavers as roads and parking lots, and/or hyper-absorbent street design to help clean and manage stormwater (Sasaki/Rutgers/Arup Proposal, Rebuild by Design, 2014).

The U.S. Environmental Protection Agency (EPA) has several tools in their Climate Action Plan Toolkit that helps plan for stormwater management. EPA’s [Stormwater Management Model](#) allows “engineers and planners to evaluate the performance of water infrastructure while considering future climate change projections...to determine the benefits of resiliency decisions to reduce local economic burden and protect communities” (EPA, 2015). Secondly, the EPA has a [Stormwater Calculator](#) that can be used by homeowners and developers to estimate

the amount of rainwater and frequency of runoff on a specific site. The calculator helps local officials and property owners be better informed as to how runoff may vary based on historical weather and potential future climates so that when strong storms hit, communities will be prepared for what areas are at risk for flooding and how to manage those high-risk areas.

For more information on Stormwater Management, see 13.0 Sustainable Places Element.

Natural Resiliency and Living Shorelines: Among the most effective management practices of resiliency is using nature to defend against coastal storms. Natural resiliency, also known as Living Shorelines, uses natural (e.g. plants, sand, and rocks) and manmade structural materials to provide shoreline protection, maintain valuable habitat, and protect

Bradley Beach Maritime Forest

In 2013, a partnership of local nonprofits, universities, and private sector engineers took an empty parking lot in Bradley Beach’s northeast corner that lies between the beach and a coastal lake and converted it back into its vegetative state: a maritime forest. It is the third line of defense against large coastal storms for the Bradley Beach community; the primary dunes are first and then the secondary dunes. The forest is designed to infiltrate water and protect the coastal lake and community from storm surge. The forest reduces risk, protects against flooding and storm damage, addresses stormwater problems, and improves biodiversity and local water quality. The maritime forest was a Monmouth County Planning Board’s 2014 Planning Merit Award recipient.



Before Imagery
Source: Google Maps



Parcel Design
Source: AECOM



Living shoreline and maritime forest, June 2016
Source: Mary Ellen Scott



the built environment against storms. Examples include maritime forests, tidal wetlands, salt marshes, submerged aquatic vegetation, dune systems, and estuarine reefs to dissipate wave energy (see Oyster Restoration example in Section 12.4.2 State and Federal Partnership Efforts, U.S. Navy and Department of Defense).

[Figure 12.4: Average Ecosystem Service Value per Acre](#) displays the ecosystem service value flows in 2004-dollar amount for NJ. Monmouth County is highlighted in red; the Figure reveals the Bayshore (north Monmouth County along the Raritan Bay) has the richest ecosystem service value in the county at \$8,001 to \$12,000. Subsequently, the Bayshore experienced the most storm damage during Superstorm Sandy. Therefore, the Bayshore has an opportunity to invest in its rich ecosystem to encourage natural resiliency. For more information on Living Shorelines, visit [NOAA's Restoration Center](#).

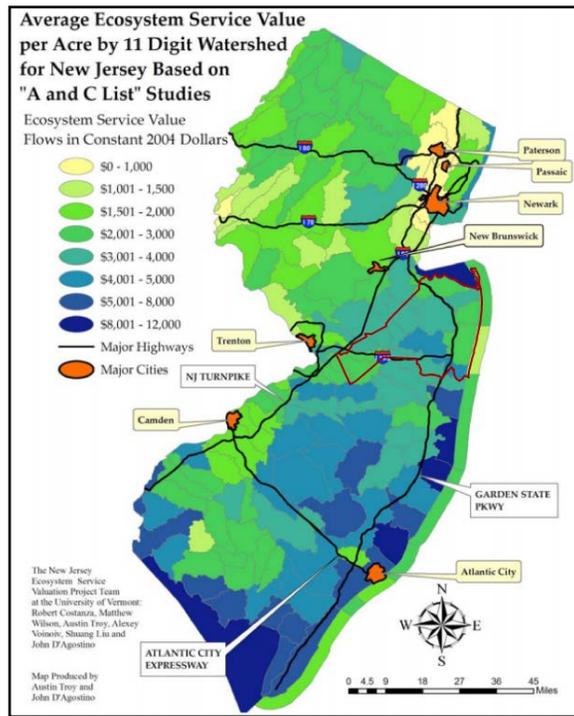


Figure 12.4: Average Ecosystem Service Value per Acre

Resilient Construction: Our state is unique in that it requires all structures in the Special Flood Hazard Areas (SFHAs), or the land area covered by floodwaters of the base flood, to be one foot above the Base Flood Elevation (BFE). Municipalities may be stricter with their codes if they so choose. This additional requirement is called “freeboard” and represents an additional factor of safety above a flood level. The positive impact of stricter building codes is that they improve a town’s Community Rating System (CRS) classification (meaning cheaper flood insurance premiums) and lower flood damage risk. Other requirements such as raising utilities and generators above the BFE help structures maintain power during strong storm events.

An Emerging Issue related to stricter building codes is that property owners attempting to elevate their homes and/or businesses above the BFE, sometimes find that compliance means proposing a structure that



Elevated Commercial Space in Sea Bright

Source: Mary Ellen Scott





Elevated Houses in Sea Bright

Source: Brittany Ashman

will exceed the maximum building height allowed by municipal zoning. Therefore property owners must seek a zoning variance, making it harder and more expensive to comply with the BFE. If municipalities face this issue, the adoption of a new ordinance allowing structures to elevate above the maximum building height when attempting to comply with the NFIP and/or the state law would make it easier for property owners to elevate above the BFE.

Another resilient reconstruction strategy for municipalities is to adopt a Design Flood Elevation (DFE), or the elevation adopted in zoning or building codes that is equal to or greater than the BFE. Building to a DFE can minimize damage to buildings when flood levels exceed the BFE, reduce flood insurance premiums, and prolong building life. Towns

should consider incorporating DFE into their building and zoning codes as a preventative measure in places that will become prone to the effects of sea level rise.

Dry and Wet Floodproofing: When elevating a structure is not an option, floodproofing can be a resilient option. The difference between [wet](#) and [dry](#) floodproofing of a structure is that dry floodproofing is designed to keep water out whereas wet floodproofing is designed to allow water to flow in and out of the structure. According to FEMA, a dry floodproofed structure is made watertight below the level that needs flood protection to prevent floodwater from entering. Advantages of dry floodproofing are it is less costly than other retrofitting methods, does not require additional land that may be needed for levees and floodwalls, and may be fundable under FEMA mitigation grant programs. It is important to note that dry floodproofing cannot be used to bring a substantially damaged or substantially improved residential structure into compliance with the community's floodplain management code or law. Dry floodproofing requires



Floodproofing the vestibule of a storefront

Source: NFIP



advance warning to install, does not minimize the potential damage from high velocity flood flow and wave action, and is not aesthetically pleasing although such measures are temporary. Examples of dry floodproofing solutions include flood planks, aqua fences, watertight doors, drop down barrier doors, and bottom hinged barriers. According to FEMA, wet floodproofing includes permanent or contingent measures applied to a structure that prevents flooding damage while allowing floodwaters to enter the structure or area. Generally, this includes properly anchoring the structure, using flood resistant materials below the BFE, protection of mechanical and utility equipment, and use of openings or breakaway walls (FEMA, 2015).

Land Use Planning Techniques: A common land use technique in planning for natural disasters is to use an overlay zone to identify vulnerable areas such as flood hazard zones, hillsides, aquifers, coastal zones, and historic or scenic districts. Some towns have even posted signs or used smartphone apps to display when someone is in a hazard area. This is similar to NFIP's CRS High Water Mark (HMW) Initiative that uses signs on public and private buildings to show the high water mark from flood events. According to the National Disaster Preparedness Training Center, proactive shoreline regulations is another land use technique that works to preserve the shore and public access, facilitate the relocation of roads and other infrastructure away from the shore, help wetlands migrate inland, and facilitate the inland migration of barrier islands.

A strategy for resilient land use is unified zoning, which is a framework for regional coordination among jurisdictions (e.g. state, county, and municipalities) that directly integrates hazard mitigation and local comprehensive plans. Unified zoning carries out hazard mitigation through both development regulations and public expenditures. According to FEMA, development regulations are most effective when they are reinforced by a comprehensive master plan, developed with input from all of the stakeholders (including emergency management

agencies), supplemented by proactive measures (capital improvement plans, property owner incentives), and integrated into strategies that respond to emerging issues (sea level rise).

Town of Bourne, Massachusetts

The Cape Cod Commission worked with managers from 15 towns, including the Town of Bourne, on an emergency preparedness handbook. Bourne's handbook identified hurricane-related damage as a primary threat and included measures in its master plan and zoning bylaws to protect against flood and weather damage, bank erosion, sea level rise, and sand migration. The town has plans to redevelop the Village of Buzzards Bay by relocating structures outside and/or elevated above the flood inundation zone. The town also used zoning and development regulations to create a Floodplain Overlay District (FOD) with exact boundaries defined by the 100-year base flood elevation shown on the FIRM and further defined by a Flood Insurance Study (FIS). All development within the FOD, including structural and nonstructural activities, whether permitted by special permit, must comply with the State Building Code which addresses floodplain and coastal high hazard areas in addition to the Massachusetts State DEP's Wetlands Protection Regulations, Inland Wetlands Restrictions, Coastal Wetlands Restrictions, and Minimum Requirements for the Subsurface Disposal of Sanitary Sewage. Substantial damage and substantial improvements are subject to cumulative costs, and prohibited uses in the FOD are mobile homes, campers, mobile home parks, and campgrounds. Also in the Zone VE, any manmade alteration of sand dunes are prohibited since it would increase potential flood damage.



County Level

In 2008, the Kauai County government in Hawaii adopted a proactive shoreline ordinance that requires new buildings on small lots (less than 5,000 square feet) to be set back 40 feet from shoreline plus 70 years multiplied by the average annual erosion rate (for structures greater than 5,000 square feet, it is 100 years). The primary purpose of this setback ordinance is to preserve the beneficial functions of coastal resources, preserve lateral public beach access, improve public safety and property value protection, avoid shoreline armoring, and prohibit the alteration of primary coastal dunes except to add more sand (James F. O'Connell).

State Level

Florida has a Coastal Construction Control Line (CCCL) which establishes an area of jurisdiction in which special siting and design criteria are applied to future development. Structures located seaward of the CCCL must be designed and built to withstand the high winds and storm surges that come with strong storm events. These standards may be more stringent than those already applied in the rest of the coastal building zone because of the greater forces expected to occur in the more seaward zone of the beach during a storm event.

12.3 Emerging Issues and Long Range Challenges

Although there are several different funding sources available for Monmouth County residents trying to rebuild, a funding gap remains between federal assistance and the cost of rebuilding (e.g. home elevation, building permits, and reliable contractors). According to a Monmouth University poll taken two years after Sandy hit (October 2014), nearly 60% of property owners impacted still needed money to rebuild or elevate their homes. The poll also determined that most of those property owners were unaware NJ had a program to help pay mortgages, rents, and bills during the rebuilding process (NJ.com). Even

if residents were awarded assistance to rebuild, many assistance programs expire after two years. Property owners are left with mortgage payments, rebuilding costs, and rent on their temporary homes, potentially causing homes along the shore to slip into foreclosure. This was an emerging trend in the Bayshore Region where a majority of homes in foreclosure were damaged during Sandy.

12.3.1 Connecting Communities to Funding: In an attempt to better connect residents and businesses to funding opportunities, a year after Sandy hit, NJ nonprofit organizations and academic institutions started working with affected communities to provide free training on resiliency tools and maps, strategies and community outreach, and connect them with federal and state assistance. Two examples include the Jacques Cousteau National Estuarine Research Reserve (explained in 12.4.4 Partnership Efforts) and the New Jersey Resiliency Network, which is facilitated by the nonprofit Sustainable Jersey and partners with resource providers to match their tools and services to communities in need. In order to understand the specific needs of a community, the network created an online survey asking local officials to provide their top recovery and resilience issues and identify their interest in recovery services. As of 2015, the network received assessments from 86 municipalities in NJ, revealing these Emerging Issues:

"...most at risk municipalities have not adequately assessed their vulnerability to future storms, municipalities need technical expertise in all areas of flood resiliency planning and projects, and municipalities prioritize funding to critical infrastructure, energy supply, and back-up power improvements over funding for flood protection and long-term resilient strategies."

12.3.2 Changes to the [National Flood Insurance Program \(NFIP\)](#) and Impacts on Policy Holders: Congress created the NFIP in 1968 (through the National Flood Insurance Act) to help property owners financially protect themselves from flood events. The NFIP underwrites almost all



residential flood risk in the U.S. and allows homeowners, renters, and business owners in participating communities (local jurisdictions that adopt and enforce ordinances that meet or exceed FEMA requirements to reduce the risk of flooding) to purchase flood insurance from the government, with the goal to lower dependency on *post-disaster* federal assistance. The NFIP is in partnership with the local government (adopts and enforces minimum federal regulations for floodplain management), the county and state (oversight, NFIP coordination, assistance to local government), the Federal Government (funding/coordination for flood maps, federally backed flood insurance, Executive Orders), and the private flood insurance industry.

NFIP was set up to be a self-sustaining program, borrowing funds from the U.S. Treasury only when needed. However, with the rising costs, occurrences, and consequences of flood events, NFIP's fund was losing more money than it was acquiring. Therefore, a reform to the program was created to address these Emerging Issues: the Biggert-Waters Flood Insurance Reform Act of 2012 was passed by Congress and signed by President Obama. The Act extended the NFIP for five years (through September 30, 2017) and created premium rate structure reforms, such as phasing out subsidies for second homes, business properties, severe repetitive loss properties, or substantially improved/damaged properties by increasing rates for these properties by 25% until premiums meet the full actuarial cost. Often criticized for its increases in flood insurance premiums, two years later and post Superstorm Sandy, sections of the Biggert-Waters Act were repealed and modified by the Homeowner and Flood Insurance Affordability Act (HFIAA) of 2014. The HFIAA created supplementary program changes not covered by Biggert-Waters, restored grandfathering (the exemption based on previously existing circumstances), lowered the recent rate increases on certain policies, prevented some future rate increases, and implemented a surcharge on all policyholders. The Act also repealed certain rate increases that have already gone into effect and provides refunds to those policyholders (FEMA, 2014). Despite modifications

made by the HFIAA, as flood events continue to become the new normal, the cost of living in floodprone areas is rising due to the cost building to development standards to withstand future storms (e.g. elevated structures) and the cost of flood insurance.

12.3.3 Pending Changes to [Flood Insurance Rate Maps \(FIRMs\)](#): Before Sandy hit, the FEMA Region II office had initiated a study to update the coastal storm surge elevations within the states of NY and NJ including the Atlantic Ocean, Barnegat Bay, Raritan Bay, Jamaica Bay, Long Island Sound, and their tributaries. The study replaces outdated coastal analyses as well as previously published storm surge stillwater elevations for all Flood Insurance Studies (FIS) in the study area, including Monmouth County, and serves as the basis for updated FIRMs (FEMA, 2015). FEMA along with state, local, and tribal officials collect current and historic flood-related data on an ongoing basis including hydrology, infrastructure, hydraulics, land use, and existing floodplain, base, and flood maps. As factors change, such as population growth and development, changes in climate, and new or revised scientific/technical data becomes available, FEMA modifies the FIRMs. FEMA had not released the Preliminary Work Maps when Sandy hit in 2012. As an interim measure, FEMA released Advisory Base Flood Elevation (ABFE) maps for the NJ/NY coastal region following Superstorm Sandy because in some cases, the effective FIRMs were more than 25 years old and did not accurately reflect coastal flood hazards in the area. There was confusion for property owners trying to rebuild post-Sandy as property owners were not clear on which floodplain development regulation to follow for reconstruction. In January 2013, Governor Christie announced that the state was adopting FEMA's updated advisory flood maps to provide communities with clearer guidance for rebuilding and to expedite reconstruction. Preliminary Work Maps were later released in 2013 and Preliminary FIRMs were released in 2014.

As part of the FIRM update, Monmouth County went through the open house and 90-day appeal and comment period in early 2015. After the



90-day time period and all of the appeals are resolved, FEMA will issue a Letter of Final Determination to Monmouth County communities that initiates the six month adoption period before the maps become effective. Once effective, the new FIRMs will determine flood insurance rates for properties and the locations where floodplain development regulations apply, helping communities plan for future storms and reducing the risk of future loss of property and life. As of spring of 2016, FEMA is addressing appeals from the 90-day comment period.

12.3.4 Confusion Over Flood Insurance Coverage: Prior to Sandy, there was a common misconception that homeowners insurance covered flooding damage. According to a 2007 National Association of Insurance Commissioners survey, more than 30% of U.S. heads of households who have homeowners insurance mistakenly believed flood damage is covered by standard homeowners' policy. That is incorrect; residents *must* purchase flood insurance if they want flood damage to be covered by insurance. NFIP will cover most flood damage above the basement, whereas coverage under homeowners and renters insurance depends on an individual's policy.

12.3.5 Keeping Community Character and Historic Fabric: Superstorm Sandy brought flooding and severe damage to several historic areas along the east coast. While many structures have the option to elevate above the [Base Flood Elevation \(BFE\)](#), historic buildings often cannot elevate due to aging physical condition, proximity to other buildings, building type, and intensity of development. Another challenge to elevating historic structures is that it changes the overall historic urban fabric; raising historic buildings or floodproofing them so that the first

floor is vacant can hurt the cultural and historic streetscape of urban neighborhoods. The New Jersey Institute of Technology's (NJIT) Center for Resilient Design hosted a conference on floodproofing historic cities where dry and wet floodproofing were discussed as popular alternatives to elevating the entire structure, in addition to elevating mechanical and electrical equipment above the BFE. These alternatives are discussed in more detail in 12.3.2 Best Management Practices in Resiliency.



Elevation of a historic residence in Mandeville, Louisiana

Source: NFIP

12.3.6 Aging Infrastructure: The East Coast is older and denser than a majority of the coastal U.S. While there has been talk to increase the gas tax to repair the state's aging transportation infrastructure, other NJ politicians have discussed developing a master plan aimed at improving the state's infrastructure. In 2015, Rutgers University's Alan M. Voorhees Transportation Policy Center (VTC) was enlisted to help develop a plan to go beyond the immediate crisis and plan for the long-term future. According to [Infrastructure Report Card](#), NJ has 218 high hazard dams (Association of State Dam Safety Officials, 2012), 624 of its 6,566 bridges are structurally deficient (U.S.DOT, 2013), over \$7.9 billion is needed over the next 20 years for drinking water infrastructure (U.S. EPA, 2013), and 35% of the state's roads are in poor condition (TRIP, 2014). Although infrastructure throughout America faces similar statistics, the infrastructure in NJ is extremely vulnerable due to its age, daily usage, and location in [Special Flood Hazard Areas \(SFHAs\)](#). Monmouth County municipalities are encouraged to conduct routine inspections of infrastructure and when applicable, replace it with reinforced



infrastructure that absorbs storm surge and controls stormwater runoff to better withstand future storm events.

12.3.7 Loss of Property Tax Revenue (Short-Term): An emerging post-Sandy theme for NJ municipalities is a loss of property tax revenue. Many residents with houses and businesses completely destroyed by Sandy appealed their tax assessments, abandoned, or demolished their structure resulting in a loss to the local tax base. The loss of tax revenue was a wide-spread concern for municipalities along the Jersey Shore.

12.3.8 Increased Property Tax Revenue (Long-Term): Although Sandy caused abandoned or demolished structures along shore communities, in the long-term, the replacement housing stock along the shore might be at a higher value than that before Sandy hit. While historic bungalows and houses with slab or on grade foundations once populated the shore, new floodplain development regulations are requiring structures in SFHAs to meet stronger building codes, such as raised utilities and structures, breakaway panels, and floodproofed lower levels. In many instances, the replacement buildings are often larger, more expensive, and of better quality than the prior structure. These higher building standards reduce property damage from future storm events and attribute to the building's higher assessed property values, resulting in additional property tax revenue.

12.3.9 Cost of Housing and Displaced Homeowners: With the recent reforms to flood insurance acts and updated FIRMs, insurance rates across the country are significantly increasing and so is the number of people now located in a SFHA. Combined with the associated costs of rebuilding after Sandy, complying with FEMA's new floodplain regulations, and making structures more resilient, an Emerging Issue and Long Range Challenge for Monmouth County is housing affordability along the shore. Many residents that once could afford to live along the shore now cannot afford the higher flood insurance rates and/or the costs to comply with new regulations. Therefore, many

houses remain in foreclosure. The rising cost to live on the Shore has the potential to create an enclave of wealthy residents.

12.3.10 Preparing for Sea Level Rise: Sea level rise is not a factor in the designation of flood zones on the NFIP's FIRMs. Although helpful in predicting future flood events, the FIRMs may give a false sense of safety by not considering the effects of the rising ocean in their flood risk analysis. There are sea level rise viewers available that can be helpful as a tool for enhancing preparedness and land use planning decisions including [NJ Flood Mapper](#), an interactive mapping website for NJ communities.

12.3.11 Long Range Challenges: During the Community Resiliency Working Groups in the summer of 2014, the Division of Planning facilitated a discussion with county stakeholders and residents on the strengths, weaknesses, opportunities, and threats (SWOT) of community resiliency specific to Monmouth County. Through the SWOT analysis, it became clear which ongoing challenges the county will continue to face beyond the 10-year *Master Plan* horizon. These Long Range Challenges provided a context to Working Group discussions which the *Master Plan* Recommendations attempt to address along with other Emerging Issues.

- There are typically three types of adaptation strategies used by communities to address the increasing likelihood of flooding: retreat, accommodate, or protect. Each jurisdiction must determine the most appropriate and effective response(s) for their own community ([Borough of Atlantic Highlands Getting to Resiliency Recommendations Report, 2015](#)).
- Reverting residential and commercial properties back to their natural state is perceived as a long-term conflict with expanding a community's tax base.



- Sea level rise combined with land subsidence will result in the intrusion of floodwater into areas that are not currently identified as susceptible or located within a SFHA.
- Continue to work with Naval Weapons Station Earle on local and regional flood hazards mitigation projects that support their continual operation in Monmouth County.
- Address the impacts of saltwater intrusion on fresh water supplies and its corrosive effects on public infrastructure.
- Replace older infrastructure with equipment designed to better withstand future storm events.
- Any significant level of sea level rise could make the current SLOSH (Sea, Lake, and Overland Surges from Hurricane) model outdated and less accurate at modeling storm surge events.
- There is a lack of understanding of what resiliency means, what resilience actions are, and how they are implemented to better prepare a community for future natural and manmade hazards.

12.4 Community Resiliency Stakeholder Actions and Efforts

12.4.1 Monmouth County Efforts

[Multi-Jurisdictional Natural Hazard Mitigation Plan \(HMP\) for Monmouth County \(2015\)](#): The Division of Planning assisted the Monmouth County Office of Emergency Management (OEM) with *HMP* for Monmouth County in 2015. The last *HMP* for Monmouth County was created in 2009 and the update started in 2012 but was postponed due to Sandy. The plan evaluates community susceptibility to natural hazards and the extent to which these events will occur. It identifies municipal vulnerability to the effects of natural hazards and defines the goals, objectives, and actions required to minimize future loss. The plan provides mitigation strategies which if implemented, gradually lessening the impacts from hazard events.

Municipalities that participated in the creation of the most recent *HMP* for Monmouth County (2015) became eligible to apply to FEMA for

hazard mitigation project funding, including monies that became available after Hurricane Irene and Superstorm Sandy. For this update, all 53 municipalities in Monmouth County opted to participate which included attending meetings, providing feedback, reaching out to its residents and community stakeholders, and developing an updated mitigation strategy. *Master Plan* Recommendation 12.1 calls for Monmouth County Planning Board adoption of the *HMP* for Monmouth County as an Element of the *Monmouth County Master Plan*.

Additionally, the OEM also adopted three plans in 2013 to help with storm recovery: *Shore Re-Entry Plan*, *Debris Management Plan*, and *Short-Term Recovery Plan*. There are also several plans housed in the OEM to assist in emergency response operations. Those plans include: the *County Continuity of Operations/Continuity of Government Plan (COOP/COG)*, *County Emergency Operations Plan (2013)*, *County Hazmat Response Plan*, *County Medical Needs Sheltering Plan* (in coordination with Monmouth County Health Department), and the statewide emergency medical service (EMS) plans *Staging Area Management Plan*, *Ferry Terminals Plan*, *Hospital Evacuation Plan*, *Tropical Storm/Hurricane Plan*, and the *Passenger Rail Response Plan*.

[Know Your Zone](#): In the fall of 2016, a new public education campaign was unveiled. The campaign is focused on educating the public as to which coastal evacuation zone they live, work, or vacation within. The zones A, B, C, and D were created using various hypothetical storm models and represent the worst case scenario from each of these models. This public outreach campaign was designed to support a new tiered coastal evacuation plan that has been developed to target evacuation orders to those areas that are at the



greatest risk of being impacted by storm surge from tropical cyclones, extratropical storm events, or nor'easters based upon threat, strength, direction, and forecasted storm surge from. The plan with this public outreach campaign along with some additional activities has the potential of providing municipalities with extra points within the Community Rating System program, which in turn could provide lower flood insurance premiums.

NJ Register Ready: The Monmouth County OEM is a strong supporter of the statewide Register Ready program. The Register Ready program is designed to assist first responders and emergency management officials in identifying residents that may need assistance in evacuating during an emergency. The registry also provides these same public safety partners with relevant information needed to develop emergency plans. The OEM's efforts to insure that residents with Access and Functional Needs have completed the registry are supported by the Monmouth County Office on Aging and the Monmouth County Health Department.



Monmouth County Community Rating System (CRS) Assistance Program: The National Flood Insurance Program (NFIP) administers CRS which scores and classifies towns on their effectiveness in dealing with the mitigation of flood hazard events. In participating towns, earning CRS points lowers flood insurance premiums for homeowners and businesses located in Special Flood Hazard Areas (SFHAs). SFHAs are areas where NFIP's floodplain management regulations must be enforced and the area where the purchase of flood insurance is

mandatory (FEMA, 2015). On March 13, 2014, the Monmouth County Board of Chosen Freeholders passed a resolution with Municipal Program Guidelines for the county to serve as a CRS planning and support system. Specifically, the resolution initiated quarterly Monmouth County CRS Users Group meetings. Facilitated by the Division of Planning and the OEM, the Users Group meetings provide a peer learning forum for municipalities to learn about the CRS program, exchange strategies for program advancement, and the opportunity to ask the county for professional assistance, with no cost accrued to the municipality. The Monmouth County CRS Assistance Program is aimed at municipalities that may not have the technical, financial, or administrative capacity to successfully participate in the CRS program. The Monmouth County CRS Assistance Program is the first regional assistance program in Region II.

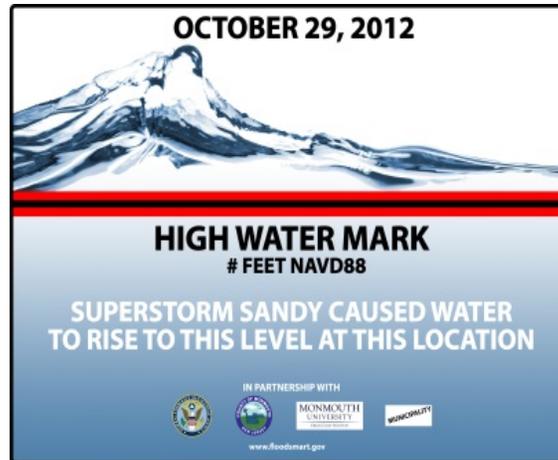
The CRS classification is on a range from CRS Class 1, the best score and therefore highest discounts on flood insurance premiums, to a CRS Class 9. A classification of 10 means a town is not yet eligible for the CRS program. Each class improvement produces a 5% greater discount on flood insurance premiums for properties in the SFHA. Most communities enter the program at a CRS Class 9, with a 5% discount on premiums, or as a CRS Class 8, with a 10% discount (FEMA, 2014). The benefit to NJ municipalities participating in the CRS program is that all towns are already eligible for advanced points due to New Jersey's strict building requirements. NFIP's CRS program has three goals: reduce and avoid flood damage to insurable property, strengthen and support the insurance aspects of the NFIP, and encourage comprehensive floodplain management (FEMA, 2014). Creditable activities within the CRS program include stormwater management techniques, flood data maintenance, open space preservation, low density zoning, and flood protection information and outreach, to name a few. Municipal participation in the CRS program is voluntary, however the municipality is entirely accountable for their role in the management and



implementation of credited activities to keep their CRS classification status.

In 2015, Monmouth County launched a [High Water Mark \(HWM\)](#) Initiative, in conjunction with FEMA’s High Water Mark Initiative and Monmouth University’s Urban Coast Institute (UCI), as a way for participating towns in the CRS program to gain points when they install high water mark signs in their community. These HWM signs show flood heights from severe storm events (such as Sandy), which raises flood risk awareness in the local community. Through this initiative, FEMA funded the cost of the signs, the county formed a committee to design a uniform countywide sign, and UCI surveyed the location of the HWM, with no cost incurred to the municipality. The Monmouth County HWM Initiative is available to any municipality; however the town must adopt a resolution to be a partner in the initiative (the Monmouth County HWM Committee created a sample resolution for municipalities to use). In this partnership, the municipalities are responsible for outreach and project completion. On June 27, 2016, Monmouth County hosted an event at the Belford Ferry Terminal in Middletown to launch the Monmouth County HWM Initiative, and the first of the county HWM signs were installed at the ferry docks. The Monmouth County HWM Initiative is the first in Region II to partner with FEMA.

The county is receiving national and state recognition for its regional resiliency planning



Monmouth County HWM Sign designed by the Monmouth County Division of Planning



First HWM Sign Installation at the Belford Ferry Terminal in Middletown

Source: Monmouth County Department of Public Information and Tourism

efforts. Monmouth County was one of eleven participants awarded the 2014 Walter B. Jones Memorial Awards for Excellence in Coastal Resource Management, an award given to individuals and organizations by NOAA’s Office for Coastal Management. The award is for exemplary leadership and commitment to balancing the human use of coastal and ocean resources with the needs of the environment. Due to county coordination between the OEM and the Division of Planning, the county provided leadership and direction for its municipalities interested in becoming part of the CRS program. Monmouth County was also among three counties mentioned as a case study in the National Association of Counties (NACo) November 2014 [Severe Weather Adaption, Coastal Resiliency County Case Studies, Volume 2](#) issue, which explored approaches to reduce vulnerability and exposure through planning, technology, and collaboration tools. In 2014, the Division of Planning spoke about its involvement with CRS at a panel discussion with ISO Community Hazard Mitigation, New Jersey Department of Environmental Protection (NJDEP), and New Jersey Association of Floodplain Management at the American Planning Association’s New Jersey Chapter (APA-NJ) annual planning conference in New Brunswick, NJ. The Monmouth County OEM and Division of Planning also presented at the 99th New Jersey State League of Municipalities Conference in Atlantic City in October 2014. Most recently, NACo awarded Monmouth County a 2016 Achievement Award for the Monmouth County CRS Assistance



Program. Monmouth County received the honor of Best of Category in the “County Resiliency: Infrastructure, Energy and Sustainability” category.

Master Plan Recommendations 12.2 and 12.3 speak directly to county efforts in advancing the CRS program in Monmouth County and supporting regional resiliency by expanding CRS influence throughout the state’s vulnerable coastal communities. For more information on Monmouth County municipal CRS participation, see Section 12.4.3, Municipal Partner Efforts.

Maintain Flood Insurance Rate Maps (FIRMs) and Historic Flood Information:

The FIRMs, historic flood information, and flood studies promote countywide resiliency by informing municipalities of past flood events and current FEMA standards, which should influence decisions on where to locate future development to reduce loss of life and property. *Master Plan* Recommendation 12.5 calls for the county to maintain a collection of FIRMs and historic flood information for use in countywide resiliency and municipal CRS program advancement; however, a municipality *would continue to request a FIRM through NJDEP*. Municipalities that maintain their own map collections and historic flood information can further their placement in NFIP’s CRS program, as points are awarded specific to FIRM maintenance and historical/repetitive flood information. The FIRMs and historic flood maps will inform municipalities on appropriate locations

for future infrastructure, transportation routes, redevelopment, and utility services that supports vibrant and sustainable communities.

Monmouth County Mutual Aid and Assistance Agreements (MAAs):

In 2015, the Monmouth County OEM coordinated an intra-county MAAs for municipalities. In the case of a federally declared emergency, municipalities that have formally adopted the agreement are allowed to share department services (e.g. fire, police, emergency medical services, building construction, and public works) with other participating municipalities and are eligible for reimbursement for those services by FEMA. The MAA, while particularly important during federally declared disaster, also works for daily emergencies as well. The network of shared emergency response services allows for a quicker recovery, therefore enabling a community to adapt physically and economically to long-term environmental changes, emergencies, and natural hazards. The Division of Planning will assist OEM with implementation and program outreach (See *Master Plan* Recommendation 12.4).

Monmouth-Ocean County Building Officials Association (MOCBOA)

The MOCBOA, a nationally recognized Code Official Association, is included in Monmouth County’s intra-county MAA. The MAA agreement is free for municipalities to participate and the MOCBOA will train and certify municipal construction employees in unified safety evaluation teams. The agreement assisted Union Beach when a house under construction collapsed in June 2015. When the incident occurred, the Borough Construction Code Official was out-of-state and thus requested assistance through the Monmouth County MAA, granting full authority to the Safety Evaluation Team (S.E.T.) coordinator. Within two hours of the incident, a formal S.E.T. response was made, detailed evaluations performed, consultation with municipal leaders was conducted, and written UCC orders were carried out with established S.E.T. Standard Operating Guidelines. If the mutual assistance agreement did not exist, the house would have remained a danger to the community until the Borough Construction Code Official was able to return.

Public Works and Engineering:

The Monmouth County Highway Division in the Department of Public Works and Engineering assisted Naval Weapon Station Earle by mowing Phragmites in the Ware Creek Salt Marsh to control invasive species, improve habitat, and increase stormwater capacity.



12.4.2 State and Federal Partnership Efforts

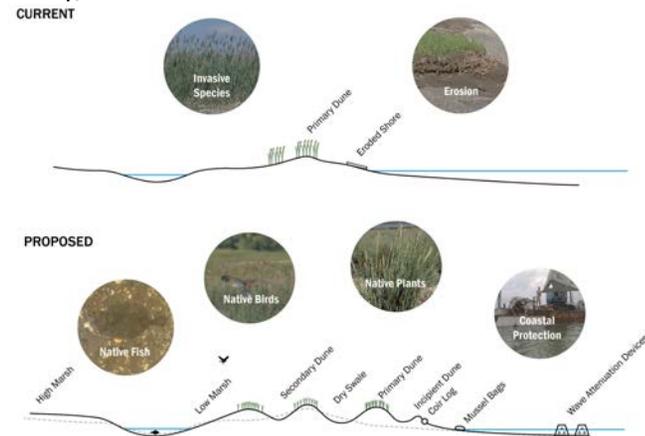
The Federal Government and State of New Jersey have varying stakes in community resiliency. The Disaster Mitigation Act of 2000 that “amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act by repealing the previous mitigation planning provisions and replacing them with a new set of requirements that emphasize the need for state, local, and Indian Tribal entities to closely coordinate mitigation planning and implementation efforts” (FEMA, 2015). It is important to note that the U.S. Army Corps of Engineers (USACE) has authority over navigable waterways which affects where infrastructure is built. NJ has delegated “police power” to local governments and usually requires zoning to be based on a comprehensive master plan.

Federal Emergency Management Agency (FEMA): FEMA coordinates the Federal Government’s role in the preparation, prevention, and mitigation of all domestic, natural, manmade, and terror disasters (FEMA, 2014). As mentioned earlier, NJ is in FEMA Region II. FEMA’s website provides additional resources to encourage community resiliency including information on programs such as Community Emergency Response Teams (CERTs), which educates people about disaster preparedness for hazards that may impact their community and trains them in disaster response skills. There are training webinars with topics including Social Media in Emergency Management, Fundamentals of Emergency Management, Emergency Planning, and Multi-Hazard Emergency Planning for Schools. FEMA also provides information for properties located in federally declared disaster areas along with links to the U.S. Department of Homeland Security’s Financial Assistance and U.S. Fire Administration grants and funding.

As part of its Community Resilience Toolkit initiative, FEMA interviewed Belmar and Manasquan in early 2016 to identify current resiliency projects occurring in their community, the barriers each face in implementing resiliency at the local level, and which of FEMA’s tools could assist Belmar and Manasquan in becoming more resilient. The

Oyster Restoration at Naval Weapons Station Earle

Although oysters once thrived in the Raritan Bay and New York Harbor, by the 20th century the reefs were in decline and currently no oyster reefs exist. The U.S. Navy working with [NY/NJ Baykeeper](#), an environmental nonprofit organization, to reintroduce oyster reefs at [Naval Weapons Station Earle’s](#) 2.2-mile pier in Middletown. At this location over five years of research has proved that the water quality is good enough for oysters to flourish. In the summer of 2015, the Baykeeper began seeding oyster castles, which are interlocking concrete blocks, inside five hundred gallon setting tanks. Once the oyster larvae attach to the oyster castles and begin to grow, the oysters can be placed on the bottom on the Raritan Bay. If the oysters prove to prosper in the Bay, the next phase in 2016 will be to place around a thousand oyster castles to the west of the Navy piers. The oysters and oyster reefs contribute to community resiliency in many ways. For example, an adult oyster can filter up to fifty gallons of seawater per day, which considerably improves water quality. The offshore reef provides habitat for marine life, reduces maximum wave height by dissipating wave energy before hitting the shore, and encourages sediment deposit to rebuild the beach, which according to the U.S. Navy, has receded 250 to 300 feet since the 1940s.



Source: [Rutgers Center for Urban Environmental Sustainability \(CUES\) and Biohabitats Inc.](#)
**Oyster reefs are the wave attenuation devices.*



toolkit includes programs and strategies that have been proven beneficial in building community resilience.

U.S. Navy and Department of Defense (DoD): The DoD is currently taking action to increase resiliency at the federal level. The DoD released its [2014 Climate Change Adaptation Roadmap](#) in October 2014 which focuses on planning actions the department is taking to increase its resilience to the impacts of climate change, because “climate change will affect the Department of Defense’s ability to defend the Nation and poses immediate risks to U.S. national security.” As part of their first phase of planning, the U.S. Navy completed a detailed study in Norfolk, Virginia of all coastal naval facilities. The Navy’s guidance as of June 2014 is to plan for 1.5 to 7.5 feet of relative sea level rise by 2100.

According to the Navy, the rate of sea level rise is accelerating and a rise up to 1.5 feet is anticipated if the rate becomes stable, which is unlikely. The Navy is projecting it will lose critical infrastructure (e.g. piers and wastewater stations) between 1.5 feet to 3 feet of sea level rise, which may occur as soon as 2045 to 2055, assuming a worst case scenario. The Navy aims to replace 2% of the aging infrastructure each year with new infrastructure that has an approximate 68-year lifespan. As of mid-2015, the Navy is onto their next phase of planning which includes studying all naval bases, including Naval Weapons Station Earle, and convening a 125-member Navy Climate Change Working Group.

In 2014, the Monmouth County Board of Chosen Freeholders passed a resolution supporting a Superstorm Sandy Coastal Resiliency Competitive Grant Application by Middletown. Naval Weapons Station Earle approached Monmouth County and Middletown with a concept project for the 200-acre salt marsh site along the Raritan Bay between Belford Ferry Terminal and the Naval Weapons Station pier. The project would restore the salt marsh, improve stormwater capacity, increase storm surge resistance, restore the natural ecosystem, and lessen localized flooding around Ware Creek. Although the project was not

funded, elements of the salt marsh restoration project have been implemented and the Monmouth County Board of Chosen Freeholders resolved in December 2014 to enter into a partnership with the Navy to preserve land for the purpose of natural resiliency.

U.S. Department of Housing and Urban Development (HUD): In 2013, The [Hurricane Sandy Rebuilding Task Force](#) and HUD initiated a design competition, known as [Rebuild by Design](#) to connect researchers and designers with local businesses, policymakers, and community groups in Sandy-affected areas along the East Coast. The goal of the initiative was to redevelop communities that are environmentally and economically healthier and better prepared for future storm events. Monmouth County’s Asbury Park and Bayshore Region were selected as case studies for two finalist design teams.

REBUILD BY DESIGN

Full Reports: [Sasaki/Rutgers/Arup Proposal \(Asbury Park and the Bayshore\)](#) and [HR&A Advisors and Cooper, Robertson & Partners Proposal \(Asbury Park\)](#)

Although the Rebuild by Design proposals are specific to Asbury Park and the Bayshore Region, several Monmouth County seaside communities with boardwalks and coastal lakes can incorporate resilient design ideas, concepts, and strategies proposed from the two design teams. The [American Littoral Society](#) designed a project as part of its “Creating Nature-based Infrastructure to Promote Community Resiliency and Awareness in Monmouth County” initiative. The forest provides protection to local residents, decreases the amount of runoff by increasing groundwater infiltration, provides a habitat, increases biodiversity, provides a natural vegetated buffer strip along the shoreline by the flume which improves water quality of the nearby lake, and creates a space for environmental education and interaction. [Surfrider Foundation](#) has also hosted several dune grass planting events for Monmouth County communities which was an activity during the Rebuild One City Parade and Party Event.



Rebuild One City Parade and Party Event in Asbury Park, 2014

Source: Rebuild by Design



New Jersey Department of Environmental Protection (NJDEP): A network of NJDEP programs, facilitated by their Office of Coastal Management, plans and coordinates coastal resiliency through community planning, identifying and expanding management tools, developing new approaches to resiliency, and informing effective policies, regulations, and planning. The NJDEP created the NJ Resilient Coastal Communities Initiative (RCCI) to advance community resiliency efforts. The RCCI is part of the [Coastal Resilience Networks Grant Program](#). The project duration is from June 1, 2014 to May 30, 2016 and partners with Jacques Cousteau National Estuarine Research Reserve (JC NERR), Rutgers University's Bloustein School, Sustainable Jersey, New Jersey Future, and Monmouth University's Urban Coast Institute. RCCI's objectives are to provide assistance to communities either affected by Sandy and/or vulnerable to future storms, implement strategies that reduce risk and vulnerability to coastal hazards, provide tools, guidance, and technical assistance to coastal resilience planning, and advance government policy and actions that support community-based recovery and resiliency efforts. The four tasks of the RCCI are coastal hazards

vulnerability assessment, coastal hazard response through tool development, resiliency planning through expanding existing efforts and capacity, and the design and implementation of the Resilient Coastal Communities Program.

12.4.3 Municipal Partner Efforts

Strategic Recovery Planning Reports (SRPRs) Municipal Highlights: The NJ Department of Consumer Affairs (DCA) awarded the Monmouth County municipalities of Belmar, Deal, [Highlands](#), Keansburg, Keyport, Monmouth Beach, Neptune Township, Ocean Township, Oceanport, Rumson, [Sea Bright](#), and [Union Beach](#) with Phase I funding to complete SRPRs. Some towns, such as Rumson, were also awarded Phase II funding to implement the SRPR. While each municipality experienced different types of storm damage and therefore faces different rebuilding strategies, a trend of municipal action steps began to form. The common action steps recommended in Monmouth County municipal SRPRs are:

- Participate (or continue to participate) in NFIP's CRS program
- Write master plans or master plan reexamination reports that address post-Sandy strategies and policies related to hazard mitigation and resiliency
- Update municipal maps to include FEMA's FIRM maps, critical community facilities, open space/natural features, etc.
- Locate municipal services (e.g. borough halls, fire stations, and public works) out of floodprone areas/SFHA
- Prepare a redevelopment plan and Capital Improvement Plan;
- Install emergency generators
- Replace sewage pump stations
- Conduct dune restoration and hardening
- Investigate problems with storm drain systems
- Improve streets vulnerable to flooding through elevation, new grades, curbs, and street repairs
- Repair sea walls



Aberdeen Township: In 2013, DCA awarded Aberdeen \$20,000 to complete a SRPR. Aberdeen was also among one of the first municipalities to receive Phase II funding; \$50,000 in 2014. The recommended municipal actions for Aberdeen that emerged from the SRPR included reconstruction of the sanitary sewer pumps, the elevation of the Route 35 bridge and roadways, complete dune restoration along Raritan Bay, Cliffwood Beach seawall repair, a master plan reexamination report to address hazard mitigation and resiliency measures, and continued participation in the CRS program. The SRPR encouraged Aberdeen to use its Phase II funding to write their municipal *2015 Master Plan Reexamination Report and Master Plan Amendments*, an Upstream Development Impact Study, and a Flood Control Assessment.

As a result, Aberdeen recently reexamined its master plan and created an executive summary to its reexamination explaining the impacts of Superstorm Sandy and the damage the Aberdeen sustained. The summary included local and regional action the municipality is taking in response to Sandy, such as their SRPR and involvement with the *HMP* for Monmouth County. The summary concludes with specific changes recommended for the master plan and development regulations to promote resiliency to future storms.

Highlands Borough: In 2014, DCA awarded Highlands \$20,000 to complete a SRPR. The report explained the highest priority projects for Highlands which included improving stormwater management through the construction of a direct stormwater pipe to Route 36, mitigation to address steep slope stability issues, the creation of a municipal facilities plan with a multi-purpose municipal building, and sanitary system improvements. The SRPR encouraged Highlands to apply for the Phase II grant to fund increases in property maintenance and code compliance, participate in the CRS program, perform an economic viability study of the existing clamming industry and a redevelopment study, and develop an ordinance update to adopt the latest version of FEMA's flood maps.

Rumson Borough: Rumson was awarded both Phase I and Phase II of the Post Sandy Planning Assistance Grant. Phase II granted \$255,000 to Rumson to implement its SRPR which recommended the creation of these resiliency plans and programs: a capital improvement plan, [2015 Master Plan Reexamination Report & Amendments](#), an update to their emergency operations plan, the [Rumson 2015 Floodplain Management Plan](#), community resiliency geographic information system (GIS) development, a hazard mitigation plan, and improvements to their permit application process. Due to its persistence in creating and implementing resiliency plans and programs, Rumson was the recipient of the 2015 Monmouth County Planning Merit Award.

Master Plans and Reexamination Reports: The New Jersey Municipal Land Use Law (MLUL) requires that each municipality in New Jersey undertake a periodic review of its local master plan every ten years by evaluating its master plan and development regulations to determine the need for updates due to local and regional changes that might affect the municipality. The Monmouth County Division of Planning strongly recommends that municipalities incorporate information on the impacts from Superstorm Sandy along with recent resilience and hazard mitigation measures into their master plans and reexamination reports, as Aberdeen, Rumson, and Union Beach did in their 2015 reexamination reports.

Recovery and Redevelopment Plans: As a recommendation from the Strategic Recovery Planning Reports (SDRPs), many municipalities have adopted redevelopment plans with a focus on resilient development. The **Borough of Union Beach** adopted the [Commercial Corridor Resiliency Plan: Route 36 and Union Avenue \(2015\)](#) a redevelopment plan for the Route 36 Corridor because that area flooded during Sandy and many buildings were subsequently demolished. Union Beach's redevelopment plan combines flood protection and commercial revitalization in the Borough to "provide a stronger response to the next major storm event" both physically and economically." FEMA's Long-



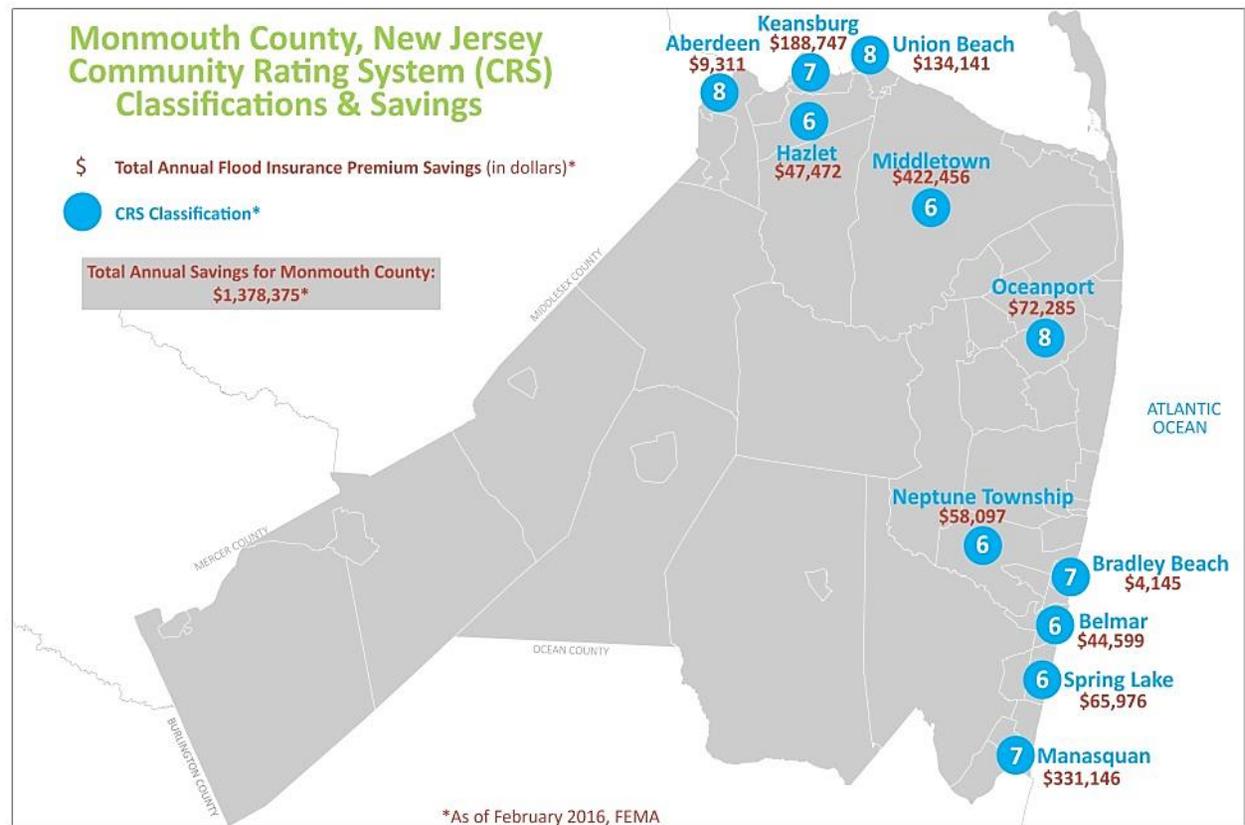
Term Community Recovery Team assisted the **Borough of Highlands** in the creation and adoption of a recovery plan in 2013 that highlighted key recovery issues, summarizes recovery projects to address those issues, and outlines the community’s strategy for moving forward post-Sandy.

Other Resiliency Projects: In addition to the creation of recovery and resiliency plans, Monmouth County municipalities are implementing their own local projects to lessen storm damage. One example includes Belmar which shortly after Superstorm Sandy installed a new drainage system in Silver Lake, which was the cause for massive flooding during Sandy. Belmar also used federal funds to install a new outfall pipe in Lake Como to mitigate flooding and is reviewing its ordinances to make it easier for residents to elevate their homes when they surpass the maximum building height, as mandated by borough code. Manasquan has strengthened its approach to resiliency by increasing communication with residents in the wake of an emergency. Manasquan installed automated flood alerts, flashing sign systems connected to broadcasts, and emergency siren in addition to increasing their use of social media to relay emergency information to residents.

Participation in NFIP’s Community Rating System (CRS) Program: Although voluntary, Monmouth County strongly encourages and assists municipal participation and advancement in the [CRS program](#). Since the

Monmouth County CRS Assistance Program began in 2013, four additional municipalities have joined the program and two have improved their CRS Classification. [Figure 12.5: Monmouth County CRS Classification and Savings](#) displays the 11 municipalities within the county that are currently participating in the program, their CRS Classification, and their annual savings on flood insurance premiums, as of February 2016. The total annual savings for Monmouth County is \$1,378,375, as of February 2016. Avon applied to enter the program in

Figure 12.5: Monmouth County CRS Classifications and Savings



2016 and is currently being evaluated. Their savings is not included in the county total.

12.4.4 Partnership Efforts

Jacques Cousteau National Estuarine Research Reserve (JC NERR):

Administered through Rutgers University, the JC NERR is one of the national estuarine reserves created to promote the responsible use and management of the nation's estuaries through a program combining scientific research, education, and stewardship. JC NERR offers [Coastal Training Programs](#) that Division of Planning staff and municipalities regularly attend. JC NERR also offers training on NJ Flood Mapper, an interactive mapping website offering a user-friendly visualization tool to assist local officials with the data to make decisions concerning flooding hazards and sea level rise. JC NERR attends the Monmouth County CRS Users Group meetings to give information on their resources and use their experience working with other municipalities in NJ to answer resiliency questions.



In addition to training opportunities, JC NERR offers [Getting to Resilience \(GTR\)](#), a nonregulatory tool to assist local decision makers in the identification of opportunities to reduce vulnerability to coastal storms and sea level rise. GTR has become a useful tool for seven Monmouth County municipalities, with interest from several other municipalities. The first step in the GTR process is for a diverse group of municipal decision makers (planners, floodplain managers, emergency managers, administrators, etc.) to use the online mapping tool to evaluate their risks and vulnerabilities to natural disasters. Then the local group must complete an online assessment of municipal preparedness, planning, and public outreach activities around flood hazards. Based on current risk, vulnerabilities, and municipal activities,

the JC NERR staff then creates municipal-specific recommendations that encourage community resiliency. The staff reviews those recommendations with the decision makers and prioritizes the next steps. Participation in GTR can generate points for the Sustainable Jersey certification and can identify where activity points are being earned in the CRS program.

Monmouth County Community Organizations Active in Disaster

(MONCOAD): MONCOAD is the county counterpart to the state New Jersey Voluntary Organizations Active in Disaster (NJVOAD). Through facilitating training and educational opportunities, the MONCOAD is a consortium of county, state, and national organizations active in disaster assistance. By developing and fostering partnerships, the MONCOAD coordinates numerous community organizations' disaster response planning efforts.

Monmouth County Long-Term Recovery Group (MCLTRG):

The MCLTRG was founded following Superstorm Sandy to help expedite recovery in the county. The MCLTRG creates partnerships with organizations in the area to work together and pool resources to help residents still struggling to recover from Sandy. MCLTRG provides recovery services to both Monmouth County property owners and renters that suffered damage or loss to residential property as a result of any natural disaster. Those recovery services include access to case managers and information on long-term recovery topics such as grants, mental health and wellness programs, food, clothing, and temporary housing.

Monmouth University Urban Coast Institute (UCI):

Monmouth University's UCI is working with Monmouth County and FEMA to provide free land surveying for county municipalities interested in participating in the Monmouth County High Water Mark (HWM)

MONMOUTH
UNIVERSITY
URBAN COAST INSTITUTE



Initiative. See 12.4.1 Monmouth County Efforts for additional information.

New Jersey Future: New Jersey Future is currently involved in [three significant recovery initiatives](#): local recovery planning management, the development of a national model for state recovery, and community vulnerability assessments. In 2015, there were local recovery planning managers in two Monmouth County communities, the Highlands and Sea Bright. The managers help municipalities work towards creating and adopting a Strategic Recovery Planning Report (SRPR), establishing a recovery planning and implementation steering committee, adding a community vulnerability assessment to municipal master plans, establishing a community engagement program, aiding with the application of Sandy recovery grants, and establishing or improving participation in the CRS program. New Jersey Future encourages municipalities to integrate all their plans and departments (subdivision regulations, zoning, master plans, budgets, stormwater regulations, etc.) to plan for community resiliency.

12.5 Additional Resources and Funding Opportunities

Federal

- [Community Rating System \(CRS\) Official Website](#)
- Federal Emergency Management Agency (FEMA)
 - [Community Emergency Response Teams \(CERT\)](#)
 - [Community Rating System \(CRS\) Coordinator's Manual \(2014\)](#)
 - [Grants](#)
 - [Hazard Mitigation Assistance \(HMA\)](#)
 - [Pre-Disaster Mitigation \(PDM\)](#)
 - [Flood Mitigation Assistance \(FMA\)](#)
 - [Repetitive Flood Claim](#)
 - [Severe Repetitive Loss](#)
 - [Hazard Mitigation Grant Program \(HMGP\)](#)
 - [Homeowner Flood Insurance Affordability Act of 2014](#)

- [Increased Cost of Compliance Coverage \(ICCC\)](#)
- Information on [Mitigation](#)
- [Integrating Hazard Mitigation Into Local Planning \(March 2013\)](#)
- [The President's Climate Action Plan](#)
- National Association of Counties (NACO)
 - [Digital Coast: Tools to Promote County Resilience, October 2013](#)
- National Oceanic and Atmospheric Administration (NOAA)
 - [Coastal and Estuarine Land Conservation Program](#)
 - [Coastal Inundation Mapping and Training on GIS](#)
 - [Coastal Resilience](#)
 - [Competitive Federal Funding Opportunities \(FFOs\)](#)
 - [High Water Mark Information Toolbox](#)
 - [National Sea Grant Resilience Toolkit](#)
 - [Natural and Structural Measures for Shoreline Stabilization](#)
 - [Regional Coastal Resilience Grants](#)
 - [Storm Ready, National Weather Service](#)
- National Wildlife Federation (NWF)
 - [Natural Defenses to Hurricanes and Floods](#)
- U.S. Department of Housing and Urban Development (HUD)
 - [Economic Resilience](#)
 - [Hurricane Sandy Rebuilding Task Force](#)
- U.S. Department of the Interior
 - [Hurricane Sandy Coastal Resiliency Competition Grant Program](#)
- U.S. Environmental Protection Agency (EPA)
 - [Climate Ready Estuaries Program](#)
 - [Climate Resilience Evaluation and Awareness Tool \(CREAT\)](#)
 - [Combined Heat and Power Partnership \(CHP\)](#)
- U.S. Small Business Administration (SBA)
 - [Business Physical Disaster Loans](#)
 - [Home and Personal Property Loans](#)

State

- [Database of State Incentives for Renewables & Efficiency \(DSIRE\)](#)
- [New Jersey Coastal Management Program](#)



- New Jersey Department of Community Affairs (DCA)
 - [Post-Sandy Planning Assistance Grant Program](#)
- New Jersey Department of Environmental Protection (NJDEP)
 - [Blue Acres Program](#)
 - [Disaster Debris Management Planning Tool Kit for New Jersey Municipalities](#)
 - [Shoreline Protection](#)
- [New Jersey Energy Resilience Bank \(ERB\)](#)
- [New Jersey Environmental Infrastructure Trust \(NJEIT\)](#)
- [New Jersey Governor's Office of Recovery and Rebuilding](#)
- [New Jersey Office of Emergency Management \(NJOEM\)](#)
 - [Alert Systems](#)
- [NJ Sea Grant Consortium](#)

County and Local

- [Monmouth County Community Rating System \(CRS\) Assistance Program](#)
- [Monmouth County Hazard Mitigation Planning](#)

Nonprofits, Research Centers, and Other Stakeholders

- [Affordable Housing Alliance](#)
- [Center for Coastal Resiliency and Urban eXcellence \(CRUX\), Stevens Institute of Technology](#)
- [Center for Disaster Philanthropy](#)
- [Center for Resilient Design, New Jersey Institute of Technology](#)
- [Center for Resilient Landscapes, Rutgers University](#)
- [Clean Ocean Action](#)
- [Climate Reality Project](#)
- [Consortium for Climate Risk in the Urban Northeast](#)
- [Georgetown Climate Center](#)
- [Hearts & Hands Disaster Recovery](#)
- [International Conference on Amphibious Architecture, Design, and Engineering \(ICAADE 2015\)](#)
- [Jersey Shore Partnership](#)

- [New Jersey Future](#)
- [Operation Hope](#)
- [Resilient by Design by Joseph Fiksel](#)
- [Sustainable Jersey \(SJ\)](#)

Visualization and Analysis Tools

- [Climate Resilience Evaluation and Awareness Tool \(CREAT\)](#)
- [Coastal Hazard Profiler](#)
- [FEMA Region II \(Monmouth County\) Mapping](#)
- [HURREVAC](#)
- [Hurricane Sandy Storm Tide Mapper](#)
- [NJ Flood Mapper](#)
- [NJADAPT](#)
- [SLOSH Models](#)
- [U.S. Climate Resilience Toolkit](#)

12.6 Master Plan Recommendations and Stakeholder Strategies

Five *Master Plan* Recommendations and numerous Stakeholder Strategies emerged from meetings and conversations with residents and community stakeholders.

Master Plan Recommendations

Recommendation 12.1: Incorporate the approved Multi-Jurisdictional Natural Hazard Mitigation Plan (HMP) for Monmouth County (2015) update into the Monmouth County Master Plan by reference; recognizing that the HMP is the broadest approach to implementing community resiliency activities at both the local and county level. Hazard mitigation is the only phase of emergency management that is specifically dedicated to breaking the cycle of damage, reconstruction, and repeated damage. Recommendation 12.1 advocates the continued integration of hazard mitigation and planning by having the Division of Planning and the Monmouth County Office of Emergency Management (OEM), the manager of hazard mitigation planning for the county, work together in the development and implementation of the *Multi-*



Jurisdictional Natural Hazard Mitigation Plan for Monmouth County (2015).

Recommendation 12.2: In partnership with the Monmouth County Office of Emergency Management (OEM), continue to encourage and advance municipal participation in the National Flood Insurance Program's (NFIP) Community Ratings System (CRS) program. The NFIP administers the CRS program which scores (and classifies) communities on their effectiveness in dealing with the mitigation of flood hazard events. In participating towns, earning CRS points may lower flood insurance premiums for homeowners and businesses located in Special Flood Hazard Areas (SFHAs). Together, the OEM and Division of Planning encourage municipal participation in the program through the creation of the Monmouth County CRS Users Group, a quarterly meeting that serves as a peer learning forum for municipalities to gain knowledge about the program and exchange strategies for program advancement. The Division of Planning offers professional assistance with CRS, such as generating the required geographic information system (GIS) maps and guidance on the overall program.

Recommendation 12.3: Partner with jurisdictions outside of Monmouth County to expand participation in the county's CRS Users Group, eventually resulting in a more influential regional forum. The Division of Planning and Monmouth County Office of Emergency Management (OEM) intend to build upon the existing CRS Users Group as the foundation for an expanded regional forum for CRS since community resiliency often requires a regional approach. Surrounding counties, especially Ocean and Middlesex Counties, share Monmouth County's Emerging Issues and Long Range Challenges. Additionally, development in those counties directly impact Monmouth County. Regional cooperation with other counties will only further advance local resiliency efforts.

Recommendation 12.4: Support the Monmouth County Office of Emergency Management (OEM) in providing a network of shared emergency response services across the county. The recent Monmouth County Mutual Aid Agreement (MAA) for municipalities provides additional aid and assistance in protecting persons or property against loss, damage, or destruction caused by fire, civil unrest, hazardous material, major criminal or emergency events, and natural or manmade disasters. The network of shared emergency response services promotes resiliency as it allows for a quicker recovery, therefore enabling a community to adapt physically and economically to emergencies, and natural hazards.

Recommendation 12.5: Maintain a collection of Flood Insurance Rate Maps (FIRMs) and historic flood information for use in countywide resiliency and municipal CRS program advancement. The FIRMs, historic flood information, and flood studies promote countywide resiliency by informing municipalities of past flood events and current Federal Emergency Management Agency (FEMA) standards, which should influence decisions on where to locate future development in order to reduce loss of life and property. Municipalities that maintain their map collection and historic flood information can further their placement in NFIP's CRS program, as points are awarded specific to FIRM maintenance and historical/repetitive flood information. The FIRMs and historic flood maps will inform municipalities on appropriate locations for future infrastructure, transportation routes, redevelopment, and utility service that supports vibrant and sustainable communities.



Stakeholder Strategies

General

- Establish a subcommittee of Bayshore and coastal municipalities to address regional shoreline issues.
- Incorporate more resiliency language, conversations, and recommendations into municipal master plans and land development ordinances.
- Consider adding resilient building and infrastructure expertise (engineer, architect, code enforcement officer) to the development review boards if your community has development located in Special Flood Hazard Areas (SFHAs).
- Explore architectural and/or an engineering designs that highlight different construction methods intended to work with reoccurring flooding events rather than resisting floodwater impacts.
- Encourage municipalities to incorporate building codes that exceed the minimum requirements for SFHAs and to expand these codes outside of SFHAs for potential floodprone areas in anticipation of the effects caused by eventual sea level rise.
- Encourage municipal environmental commissions to work with local and county planning departments, OEM departments, construction and code enforcement officials, and engineering departments, in the floodplain management process.
- Partner with institutions and organizations such as the New Jersey Association of Floodplain Managers, Jacques Cousteau National Estuarine Research Reserve, Rutgers University, Urban Coast Institute of Monmouth University, and New Jersey Institute of Technology (NJIT), to assist towns in identifying ways to improve resiliency to future storm events.
- Provide technical and professional support to towns in the creation of detailed flood mitigation plans for areas that experience repetitive loss from storm damage (*Borough of Atlantic Highlands Getting to Resiliency Recommendations Report, 2015*). 

- Encourage municipalities to pursue designation as a StormReady Community by the National Weather Service, which assists towns as they develop plans for a wide variety of storm events (*Borough of Atlantic Highlands Getting to Resiliency Recommendations Report, 2015*). 
- Municipalities should prepare a Continuity of Operations Plan that ensures that essential functions are coordinated before, during, and after a wide range of emergency scenarios, different than and nonconflicting to Emergency Operations or Response Plan (*Borough of Atlantic Highlands Getting to Resiliency Recommendations Report, 2015*).
- Support local jurisdictions in their advancement of dune restoration and beach replenishment projects.

Sustainable Places

- Continue to support the Monmouth County Board of Chosen Freeholder’s ongoing efforts in establishing sustainable state funding for the preservation and stewardship of open space, waterways, parks, farmland, and historic sites throughout NJ.
- Long-term sustainability becomes more dependent upon a community’s ability to withstand, respond, and quickly recover from such events; this is best done through planning for and implementing hazard mitigation strategies.
- Work with our stakeholder partners including municipalities, the Jacques Cousteau National Estuarine Research Reserve, Sustainable Jersey, and Clean Ocean Action in identifying action steps for resiliency in the Sustainable Jersey certification program; building upon efforts already begun under Sustainable Jersey’s Climate Mitigation and Adaptation Task Force and Clean Ocean Action’s Blue Star Program.
- Preserve undeveloped properties in floodplains and SFHAs to prevent further development in high-risk locations and to help improve municipal CRS ratings; encouraging towns to work together



in securing and leveraging funds to acquire open space in shared locations that impact their communities.

- Leverage funds through the New Jersey Department of Environmental Protection's (NJDEP) Blue Acres Program for those communities seeking to purchase property in repetitive loss locations and NJDEP's Green Acres Program funding for the procurement of open space in floodplains.
- Transfer personal knowledge, documents, and other records of coastal storms and flooding events into digital formats with redundant, remote off-site storage (*Borough of Atlantic Highlands Getting to Resiliency Recommendations Report, 2015*). 
- Promote comprehensive floodplain management in communities with guidance from Certified Floodplain Managers, the NJDEP, Monmouth County OEM, construction code officials, and the NFIP.
- Foster social sustainability through neighborhood emergency preparedness, awareness campaigns, and cultural events such as concerts and festivals.
- Encourage the expansion of recycling programs and single stream approaches to recycling to simplify the participation process.
- Municipalities should consider implementing land use ordinances that provide for onsite residential groundwater recharge systems rather than curb to gutter flows. These ordinances would provide for better aquifer recharge for drinking water supplies as well as sustain groundwater pressure to prevent the encroachment of saltwater intrusion and land subsidence along the coast.
- Encourage projects like the SU+RE HOUSE in Seaside Park, NJ that partner with colleges to build energy efficient, solar-powered, net-zero, storm-ready structures that serve as an emergency management and coastal resilience center ([SU+RE House](#)).

Community Development & Housing

- Prioritize Community Development Block Grant (CDBG) funding of public infrastructure projects that promote resiliency to future storm events.

- Prioritize CDBG funding for maintenance and upkeep of drainage facilities along emergency evacuation routes.
- Incorporate a review of "Best Practices for Hazard Resiliency" including conformance to enhanced building code requirements as part of the environmental review for Office of CD projects located in a SFHA.
- Discourage CDBG project funding in high-risk flood areas and those locations that do not provide for effective onsite hazard mitigation. However, deference should be given to projects that will permanently preserve and/or create easements on project owned land in the SFHA.
- Discourage zoning that allows the placement of residential facilities that are difficult to evacuate in a SFHA (e.g. nursing homes, group homes, special needs facilities, schools, day care facilities, senior centers, etc.).

Healthy Communities

- Ensure that new emergency response facilities are not located in hazard vulnerable areas, whereas preexisting facilities should receive enhanced flood hazard mitigation and protection in accordance with NFIP guidelines.
- Protect sources of drinking water from contamination caused by flooding.
- Help maintain the Monmouth County Long-Term Recovery Group (MCLTRG) support services after disaster recovery funds expire.
- Whenever possible, keep septic systems, fuel tanks, utilities, backup generators, and the storage of onsite hazardous materials either outside the SFHA or above the Base Flood Elevation (BFE).
- Organize outreach projects and neighborhood events that foster a sense of community cohesiveness and build upon our social networks which are often our first defense in the face of adversity.
- Culturally-based community recovery programs provide individuals and communities with a positive and productive means to cope with the stress, grief, and emotional strain in the aftermath of a disaster.



- Continually encourage individual households to be action ready in the face of an emergency; advising them on the importance of creating a family emergency plan and keeping emergency supplies at home.

Natural Resources

- Protect and restore natural features, such as riverbanks, wetlands, dunes, rain gardens, maritime gardens and forests, vegetative buffers and tree roots which provide natural mitigation relief.
- Create living shoreline protections around coastal lakes in the county; coastal lake revitalization provides flood protection for nearby properties, restores recreational access, improves local ecology, and mitigates water quality issues ([HR&A Advisors and Cooper, Robertson & Partners Proposal \(Asbury Park\)](#)).
- Utilize beachfront properties to incorporate resilient design such as combined boardwalk dune systems that protect beachfront communities and support local habitats ([Sasaki/Rutgers/Arup Proposal \(Asbury Park and the Bayshore\)](#)).

Open Space

- Preserve undeveloped properties in SFHAs as open space to retain natural floodplain functions of the property, helping to alleviate flooding and serving as a natural buffer to nearby built environments.
- Encourage the use of open space for community programming and resilient landscaping. In times of recovery, these open spaces often serve as a gathering place for residents and business owners to receive information and assistance ([HR&A Advisors and Cooper, Robertson & Partners Proposal \(Asbury Park\)](#)).

Farmland Preservation

- Preserving farms proximate to floodplains reduces the built environment’s impact on riverine systems and downstream impacts.
- Incentivize farmland preservation in SFHAs.

- Provide education and public awareness about the benefits and significance of preserving farmland within the floodplain.

Arts, Historic, & Cultural Resources

- Monmouth Arts is recognized as the county’s primary Art Responder to help connect the arts community to information, resources, and emergency funding in the aftermath of a disaster.
- People and organizations entrusted with the stewardship of important community cultural and historic artifacts, archives, and exhibits should develop specialized hazard mitigation and disaster response plans to protect collections from damage.
- Art organizations collaboratively develop contingency programming for conflict resolution and avoidance implementation in the wake of disaster.
- Identify and implement appropriate hazard mitigation protection strategies that protect historic resources without diminishing the historical integrity of buildings or structures.
- Work with local artists and art organizations to incorporate public art and art spaces into resiliency infrastructure such as sea walls and barriers.
- Use local historic commission resources and knowledge to help determine the extent of prior flood events in the community (Jacques Cousteau feedback). 

Utilities

- Encourage municipalities to work with utility companies and authorities to conduct regular maintenance, repair, cleaning, and inspections for integrated utility systems to ensure proper function before and during storm events.
- Consider increasing the overall capacity of storm drainage systems and onsite retention basins for drainage systems.
- Install elevated backup generators for emergency facilities and public administration.



- Replace old and failing utilities with more efficient, higher capacity systems to better withstand climate and weather conditions.
- Encourage private owners to recapture rainwater onsite to reduce the amount of rainwater in storm drains and the need to supply water to private homes.
- In accordance with NFIP guidelines and Best Management Practices (BMPs), flood proof those facilities that cannot be relocated out of floodprone areas (e.g. water treatment plants, sewerage treatment plants, transformers, transfer stations, etc.).
- As a cost-savings measure, encourage municipalities, boards of education, and local and regional utility authorities to utilize public finance options offered through the Monmouth County Improvement Authority to maintain and improve their utilities.
- Protect potable water supplies by having a standby source, anchor and protect pipes, and protect openings to water sources (wellhead) to prevent contamination.

Planning Services, Outreach, & Coordination

- Utilize municipal websites to publish information to property owners about flood mitigation techniques, flood maps, purchasing flood insurance, and flood risk and safety.
- Coordinate with local nonprofits, such as Clean Ocean Action, to provide public education on community sustainability and resiliency.
- Develop a pre-flood plan for public information projects that will be implemented during and after a flood (Jacques Cousteau feedback). 
- Encourage libraries to maintain an onsite collection of flood insurance brochures and reference information.
- Organize and support New Jersey Clean Communities activities, such as stream clean ups to help alleviate flooding caused by the buildup of debris in floodways.

Transportation & Mobility

- Coordinate county improvements along emergency evacuation routes with other local and state agencies.
- Clearly mark and maintain coastal evacuation routes through communities within a regional context, giving priority to the maintenance and upkeep of drainage facilities along these routes.
- Provide for real-time emergency information through electronic messaging, social media, and crowdsourcing applications.
- Elevate future bridges and roads above the BFE.
- Upgrade streets and sidewalks in SFHAs to better absorb storm surge and control stormwater runoff.
- Improve east-west travel bottleneck points in the roadway network to provide more efficient movement of people, goods, and supplies during and after emergency events.

Agricultural & Economic Development

- Improve means and methods of communicating information between responders, government, and businesses during emergency and storm events.
- Reduce the number of flood-impacted agriculture and commercial structures by improving inadequate drainage facilities and increased structural floodproofing.
- Encourage farms and small businesses to develop debris clean up and removal plans that prevent their timely reopening after storm events.
- Find program funding that provides small business training in resiliency planning, methods, and practices.
- Refer to “Additional Guidance on Building Requirements to Mitigate Agricultural Structures’ Damage in High-Risk Areas Is Needed” ([GAO-14-583, 20144](#)) for recommendations on how to better protect agricultural property in high-risk flood hazard areas.



- Refer to [Homestead and Farm Resiliency, Principles and Practice, NOFA 2013](#) (Ben Falk) as a case study in small farming and gardening methods for resiliency and sustainability.
- Involve local Chambers of Commerce in working with their business constituents in resiliency planning, particularly in downtown commercial business districts.
- Plan for livestock accommodations prior to severe storm events and possible relocation to safer areas.

