



FLOODPLAIN MANAGEMENT PLAN

Township of Ocean
Ocean County, New Jersey

FLOODPLAIN MANAGEMENT PLAN

APRIL 2015

Prepared for:
Township of Ocean
Ocean County, New Jersey

Prepared by:



11 Tindall Road
Middletown, NJ 07748

Martin P. Truscott, PP, AICP, LEED- GA
NJ Professional Planner No.: 2443

Patrick Jeffery, PE, PP, CME
NJ Professional Planner No.: 33LI00621900

*The original of this document was signed
and sealed in accordance with New Jersey Law*

Acknowledgements

Mayor and Committee

Christina Wetter, Mayor
Dennis F. Tredy, Deputy Mayor
Joseph Lachawiec, Committeeman
Diane Ambrosio, Township Clerk

Planning Board

William Sneddon, Chairman
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Ralph Avellino
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Aaron Shapiro
Ben Loparo
Dennis F. Tredy
Christina Wetter
John Petrosilli, Alternate #1
Donald Lippincott, Jr., Alternate #2

Stephen E. Yost, Esq., Planning Board Attorney
James Oris, PE, CME, Planning Board Engineer
Scott D. Taylor, PP, AICP, LLA, LEED-AP, Planning Board Landscape Architect
Laurie Clune, Planning Board Secretary
Sandra Pirozzi, Alternate Secretary

David Breeden, Township Administrator
Diane Ambrosio, Township Clerk
Gregory McGuckin, Township Attorney

T&M Project Team

Martin P. Truscott, PP, AICP, LEED-GA
Patrick Jeffery, PP, PE, CME
Christine Bell, PP, AICP, CFM

Executive Summary

This plan is intended to identify and assess flood hazards within Ocean Township, establish goals and objectives for floodplain management, and to present a series of actions designed to minimize flooding and mitigate the impacts from flooding in the future. This Floodplain Management Plan was funded using Phase II- Post Sandy Planning Assistance Grant Funding from the New Jersey Department of Community Affairs and will be incorporated as an element of the Township's Master Plan.

This plan has been organized according to the guidelines of the 2013 National Flood Insurance Program Community Rating System Coordinator's Manual to maximize the amount of points available for credit in the Community Rating System Program and follows the 10-step planning process outlined in the manual. The planning process was conducted through a committee consisting of public members as well as Township employees and officials. The committee met frequently throughout the planning process to discuss each step of the plan and provide input on suggested activities and actions.

To assess the problems and flood hazards impacting Ocean Township, a review was done of all relevant planning studies, documents, and relevant zoning ordinances. Outside stakeholder agencies were contacted to see if they had any input on the planning process. Historical flooding events, repetitive loss properties and known flood hazards were reviewed to determine problem areas within the Township.

Possible activities to mitigate the impacts of flooding in the community were discussed. The committee determined a list of goals for the Ocean Township Floodplain Management Plan and determined a prioritized list of action items from the list of possible activities, using the goals as guidance.

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I. INTRODUCTION

PURPOSE AND SCOPE

This plan has been prepared as Ocean Township's Floodplain Management Plan (FMP) and will be incorporated as an element of the Township's Master Plan. The FMP identifies and assesses flood hazards within the Township, establish the goals and objectives for floodplain management in Ocean Township, and presents a series of actions designed to minimize flooding and mitigate the impacts from flooding in the future. The FMP also evaluates the need and potential options for wetland restoration and maintenance and/or other engineering control measures to mitigate potential storm surge in those areas of the Township that may be vulnerable. The FMP also includes recommendations for the Township's current Floodplain Development Protection Ordinance.

This Floodplain Management Plan is designed to maximize points available under the Community Rating System Program.

FLOODPLAIN MANAGEMENT PLANNING

Floodplain management is defined by FEMA as the operation of a community program of preventive and corrective measures to reduce the risk of current and future flooding, resulting in a more resilient community. While FEMA has minimum floodplain management standards for communities participating in the National Flood Insurance Program (NFIP), adopting higher standards will lead to safer, stronger, more resilient communities.

COMMUNITY RATING SYSTEM

The Community Rating System (CRS) is a voluntary incentive program of the National Flood Insurance Program (NFIP) that provides participating communities with discounted flood insurance premium rates for undertaking community floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premium rates are discounted in increments of 5%, reflecting the reduced flood risk resulting from community actions in four categories: public information, mapping and regulations, flood damage reduction, and flood preparedness. The three goals of the Community Rating System Program are:

1. Reduce flood damage to insurable property;
2. Strengthen and support the insurance aspects of the NFIP; and
3. Encourage a comprehensive approach to floodplain management.

ORGANIZATION OF THE PLAN

This plan has been organized according to the guidelines of the 2013 National Flood Insurance Program Community Rating System Coordinator’s Manual to maximize the amount of points available for credit in the Community Rating System Program. This Floodplain Management Plan follows the 10- step planning process outlined in the manual:

- Step 1: Organize
- Step 2: Involve the public
- Step 3: Coordinate
- Step 4: Assess the hazard
- Step 5: Assess the problem
- Step 6: Set goals
- Step 7: Review possible activities
- Step 8: Draft an action plan
- Step 9: Adopt the plan
- Step 10: Implement, evaluate, revise



II. OCEAN TOWNSHIP PROFILE

Ocean Township is located in central Ocean County along the western shore of the Barnegat Bay. It is approximately 21 square miles and is bordered to the north by Lacey Township, to the south and west by Barnegat Township and to the east by Barnegat Bay. The southern portion of Island Beach State Park and the Township of Barnegat Light are located across the bay from Ocean Township and are separated by the Barnegat Inlet. Ocean Township is a predominately rural-suburban residential community.

The Garden State Parkway runs north and south through Ocean Township, dividing the Township. Land to the west of the Parkway falls within the Pinelands, and land to the east of the Parkway is regulated by CAFRA. US Highway Route 9 is located east of the Garden State Parkway and also runs north and south through the Township. Most of Ocean Township's commercial and residential development has occurred along the Route 9 corridor, with land to the west of the Garden State Parkway in the Pinelands region having minimal development.

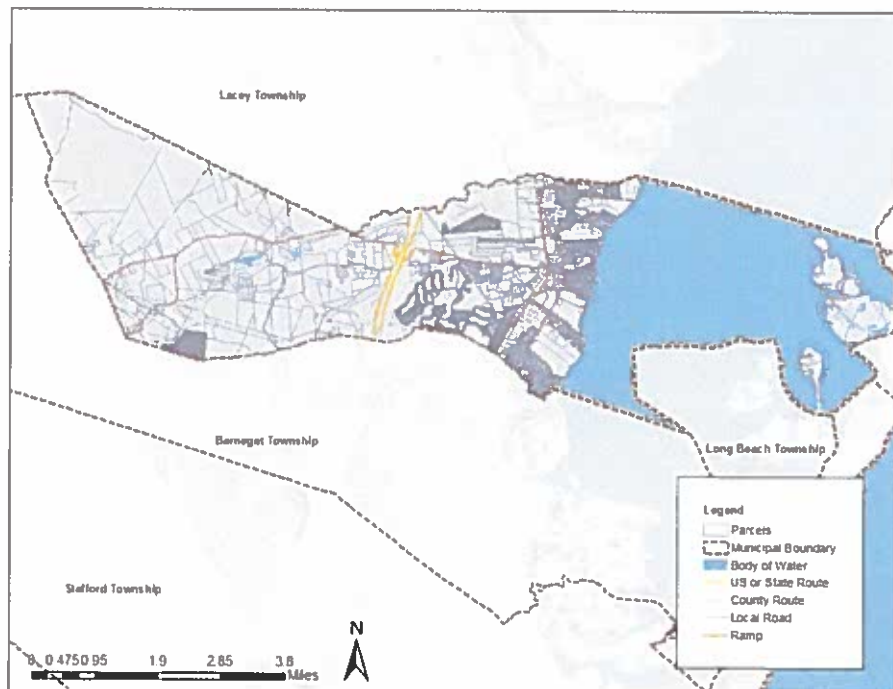


Figure 1. Township Map

The Township is located in the Outer Coastal Plain on unconsolidated sediments laid down since the Cretaceous period and extending to the continental shelf. There are a number of streams running through the Township; including Oyster Creek on the

northern Township border, Waretown Creek cutting through the middle of Ocean Township, and Lochiel Creek on the southern border of the Township. All three of these streams are generally tidally influenced in the developed portions of Ocean Township.

POPULATION TRENDS

The population of Ocean Township has continued to grow at a tremendous pace since 1930, with an average rate of 30% each decade. The period of largest population growth for Ocean Township was between 1950 and 1980. This is most likely due to the construction of the Garden State Parkway, which allowed travelers faster, more direct access to Ocean Township from New York City and Northern New Jersey. According to the U.S. Census Bureau's American Community Survey, the 2013 population estimate for Ocean Township was 8,444. At the 2010 census the median age in Ocean Township was 49.6. There were 3,483 total households, averaging 2.39 people each.

III. PROJECT ORGANIZATION & PUBLIC MEETINGS

T & M Associates assisted the Township of Ocean in preparing this Floodplain Management Plan. The planning process was conducted under the supervision of a New Jersey licensed professional planner.

The planning process was conducted through a Steering Committee consisting of both Township staff and representatives of the public. The Committee was formed by Township Committee Resolution 2015-91 and met on a bi-weekly basis from March to April 2015 to discuss the existing hazards and problems related to flooding in the Township, review potential goals and hazard mitigation activities, and make recommendations to revise existing Township Ordinances. Outlines of all steering committee meetings can be found in Appendix A. The following are members of the Committee:

- Louis Fisher- Construction Official
- Diane B. Ambrosio- Municipal Clerk
- Laurie Cune- Planning/ Zoning
- Renee Dronebarger- Code Enforcement
- Lt. George Thomas or designee- Police/ OEM
- Adele Shaw or designee- Historical Society
- William Sneddon- Planning Board
- John Petroselli- Zoning Board
- Kevin Harnett- Resident
- Chris West- Resident
- Matt Ambrosio- DPW/Parks & Recreation
- Patrick Jeffery- T&M Associates

In addition to the Steering Committee meetings, a separate public information meeting was held during the initial stages of planning on March 23, 2015. This meeting was publicly advertised and open to all members of the public. The public was informed of the proposed Floodplain Management Plan and was given the opportunity to provide input and recommendations.

A second open public meeting was held on April 20, 2015. The proposed Floodplain Management Plan was presented to the Board and the public was encouraged to provide input on the recommended plan.

Additional information on these meetings can be found in Appendix B.

IV. FLOOD HAZARD ASSESSMENT

EXISTING DOCUMENTS

It is important to coordinate floodplain management goals with other planning and community development goals in Ocean Township. As part of the planning process, the following documents were reviewed:

- 1982 Master Plan
- 1999 Master Plan Update
- 2005 Master Plan
- 2005 Waretown Town Center Goals and Objectives
- 2006 Land Use Plan Element Amendment- Environmental Conservation and Bayfront Conservation Areas
- 2010 Emergency Operating Plan
- 2012 Floodplain Management Plan
- 2014 Strategic Recovery Planning Report

Information from the following documents was identified as important to the floodplain management planning process:

1982 Master Plan

The following goals of the 1982 Master Plan are relevant to this Floodplain Management Plan:

- Provide for cluster subdivision design to conserve open space and natural amenities in residential areas and to reduce road and utility cost.
- Develop a system of secondary streets in built-up and urbanizing areas which improve access to individual areas and reduce use of Route 9 for internal trips.
- Improve local streets and drainage where poor conditions and problems exist.
- Provide for the expansion of public sewer and water systems to serve all built-up areas and future development generally east of Route 9.
- Restrict unsewered development in all areas with less than five (5) foot depth to seasonal high water table.
- Establish a system of conservation areas which are designed to limit or restrict development in wetlands, along streams, and in undeveloped bay front locations; promote appropriate recreational uses in these conservation areas.

1999 Master Plan Update

The following goals of the 1999 Master Plan Update are relevant to this Floodplain Management Plan:

- Encourage the use of best management policies for all development to ensure the least negative impact on the overall quality of residential life and the environment in the Township.
- Review and continually update, as needed, the various codes and development standards and maintain an aggressive code enforcement policy to ensure the highest quality of life within the Township.
- Review and continually update the permitted uses within each zone to ensure that only those uses compatible with the land capacity to support them are permitted.
- Ensure that any conversion of seasonal residential units to year-round residential uses is accomplished in a manner consistent with all applicable codes and standards.
- Encourage development of new residential housing units in areas that are served with adequate infrastructure including water, sewer, stormwater management, and streets, so as to minimize any negative environmental impacts.
- Maximize the economic benefit of resource-based development with the lowest possible negative environmental impact.

2005 Master Plan Recommendations

The following goals of the 2005 Master Plan Reexamination Report are relevant to this Floodplain Management Plan:

- Reduce residential development that has a negative financial impact on the Township.
- Encourage, through land development standards, the protection of open space.
- Continue to balance all forms of development through the use of smart growth principles and sustainability planning.

2005 Waretown Town Center Goals and Objectives

The goal of the 2005 Master Plan Reexamination was to provide the planning framework and foundation for the implementation of the Township's proposed Waretown Town Center, which was included in the Township's application for Plan Endorsement from the New Jersey State Planning Commission. The following goals specific to the Waretown Town Center were added to the master plan with the 2005

Master Plan Reexamination Report and are relevant to this Floodplain Management Plan:

- Protect environmentally sensitive lands and direct growth towards areas of Township with existing infrastructure.

2006 Land Use Plan Element Amendment- Environmental Conservation and Bayfront Conservation Areas

This amendment created an Environmental Conservation (EC) district and expanded an existing Bayfront Conservation (BC) district in an effort to focus development from environmentally sensitive areas east of the Garden State Parkway within Ocean Township into the Town Center, which is more appropriate for development. Other benefits include the preservation of the environmental and open space amenities for all residents in the Center and surrounding areas and to create a green belt around the Center to delineate its boundaries.

2010 Emergency Operating Plan

This Plan, approved in 2010, sets forth the general policies and procedures to be carried out by municipal and volunteer entities (such as the Fire Department and EMS) in order to provide the citizens of the Township with an effective integrated emergency response plan designed to minimize the loss of life and property during an emergency. The manual is comprised of the Basic Plan and the following list of annexes providing response plans for such emergency situations as: alerting, warning, and communications; damage assessment; emergency operating centers; emergency public information; evacuation; fire and rescue; hazardous materials; law enforcement; public health; public works; radiological protection; resource management; shelter, reception, and care; social services; and terrorism and weapons of mass destruction.

The purpose of the Emergency Operating Plan is to protect life and property in emergencies by coordinating response activities of municipal and volunteer entities to ensure their optimum use. It provides for actions to be taken to mitigate, prepare for, respond to, and recover from the effects of an emergency. The plan is an "all-hazards" approach to emergency management and covers natural disasters, technological disasters, and national security crises.

2012 Floodplain Management Plan

In 2011 the Township adopted ordinances authorizing the preparation of a Floodplain Management Plan and the creation of a Floodplain Management Plan Committee, consisting of officials responsible for implementing the plan, a local resident for the bayfront hazard area and a professional planner. Plan drafting began in 2012, and it was adopted in April 2012. The Plan's goals include:

- Reducing loss from flood damage through codes and standards.
- Educating decision makers and the public about stormwater and floodplain management.
- Coordinating and prioritizing maintenance of the stormwater management system.

The plan also seeks to:

- Ensure that a comprehensive review of possible activities and mitigation measures is conducted so that the most appropriate solutions are used to address the hazard.
- Ensure that the recommended activities meet the goals and objectives of the Township.
- Educate residents about the hazards, loss-reduction measures, and the natural and beneficial functions of floodplains.
- Build public and political support for projects that prevent new problems, reduce losses, and protect the natural and beneficial functions of floodplains.

This existing floodplain management plan will help to guide the floodplain management plan update.

Strategic Recovery Planning Report

As a response to Hurricane Sandy, Ocean Township adopted a Strategic Recovery Planning Report in 2014. The purpose of the Strategic Recovery Planning Report is to outline a recommended set of actions to guide the township in promoting recovery from the impacts of Hurricane Sandy and resiliency to future storms. The SRPR identified the community vulnerabilities exacerbated by Sandy and opportunities created by Sandy.

Vulnerabilities identified included the vulnerability of homeowners and business owners located in low-lying areas in close proximity to the flooded waterways that border and run through Ocean Township. The loss of power exposed residents to the

dangers of cold fall nights. Furthermore, the damage to the pump stations threatened the health of residents by failing to prevent the backflow of raw sewage into flooded Township streets. Additionally, the land to the east of Route 9 is mostly built out, and the Township faced limited options for relocating debris. In the event of another storm, the Township would have minimal land to dump debris; the building that houses the zoning and construction departments has no generator; the Township Hall's generator is 30 years old; and the Township's community center has no generator and is in a flood zone. Furthermore, the storm has also exacerbated the Township's vulnerability to Barnegat Bay. These identified vulnerabilities will be important to take into consideration during the floodplain management planning process.

2014 Ocean County Multi-Jurisdictional Natural Hazard Mitigation Plan

The 2014 Multi-Jurisdictional All Hazard Mitigation Plan is intended to provide a blueprint for saving lives and reducing property damage from the effects of natural and man-made disasters in Ocean County, as well as to improve community resiliency following disastrous events. The Multi-Jurisdictional All Hazard Mitigation Plan is also intended to fulfill state and federal legislative requirements related to local hazard mitigation planning, and facilitate access to pre- and post-disaster grant funding.

The Multi-Jurisdictional All Hazard Mitigation Plan is comprehensive in scope, and outlines a mitigation strategy that is centered on the following countywide goals and objectives:

- Encourage sustainable development to protect people, property, community resource and the environment from natural and human-made disasters.
 - Meet and exceed minimum standards of the National Flood Insurance Program.
 - Manage building code, land use code, ordinance and other planning mechanisms to prevent and mitigate the impact of disasters on people and property.
 - Improve information available for mitigation planning.
 - Coordinate and increase applications for federal and state grant programs.
 - Integrate and leverage other planning mechanisms from: neighboring jurisdictions; local, county and regional organizations; and, state partnerships to implement the plan.
 - Improve shelter management.
- Build and rebuild structures and infrastructure to protect people, and to reduce impacts of future disasters.

- Increase the number of residential properties protected from hazards.
- Increase the number of community resources and amount of infrastructure protected from hazards.
- Improve the ability of critical facilities and infrastructure to safely operate during storms and utility interruptions.
- Improve evacuation capability.
- Protect and restore the natural environment to support disaster resiliency.
 - Improve the health of natural systems to safely and naturally accommodate flooding and wildfire.
 - Improve the health of natural systems used to protect residential properties and other community resources.
 - Plan for increased open space in the most vulnerable areas.
 - Promote appropriate urban-wild land interface for wildfire mitigation.
- Promote education, awareness and outreach before, during and after disaster.
 - Improve and expand information and opportunities for input available by television, radio, websites, social media, newsletters, and meetings.
 - Increase participation in mitigation programs, including the Community Rating System, StormReady, and FireWise programs.
 - Tailor timely messages for audiences, including children, parents, community groups, universities, seniors and other groups.
 - Improve alert and warning systems.

To support the implementation of the 2014 Multi-Jurisdictional All Hazard Mitigation Plan in Ocean Township, the plan recommends that the Township use it (i.e., the 2014 Multi-Jurisdictional All Hazard Mitigation Plan) to implement the mitigation strategies and actions as outlined in the Plan.

COORDINATION WITH OUTSIDE AGENCIES

Notices were sent to the following groups, commissions, municipalities, and agencies soliciting data or information related to flooding, as well as any specific actions the agency or organization has undertaken that may affect flooding. Agencies and organizations who were contacted are as follows:

- The Township of Barnegat
- The Township of Lacey
- Barnegat Light
- Island Beach State Park

- Ocean County Department of Parks and Recreation
- Ocean County Sheriff Department Office of Emergency Management
- Ocean County Planning Department
- Township of Ocean Police Department
- Waretown First Aid Squad
- Waretown Volunteer Fire Co #1
- Township of Ocean Environmental Commission
- Ocean County Soil Conservation District
- North Jersey Transportation Planning Authority
- Natural Resources Conservation Service
- NJ Coastal Management Program
- US Army Corp of Engineers
- American Red Cross
- Jacques Cousteau National Estuarine Research Reserve
- Shore Builders Association of Central Jersey
- Comcast Cable
- New Jersey American Water
- New Jersey Department of Environmental Protection, State Floodplain Manager
- Barnegat Bay Partnership
- Save Barnegat Bay
- Atlantic City Electric
- New Jersey Natural Gas

A spreadsheet of all agencies contacted along with their response and a sample of the letter sent to each can be found in Appendix C. Many agencies responded and discussed information that could be beneficial to the Township's Plan. An example of this work is the various mapping provided by the Jacques Cousteau Reserve and the Rutgers University Center for Remote Sensing and Spatial Analysis (CRSSA).

FLOODING HISTORY

Description of Known Flood Hazards

The Flood Insurance Rate Map (FIRM) for the Township of Ocean is currently in the process of being updated. The Effective FIRM maps dated September 25, 2009 can be found in Appendix D. The Advisory Base Flood Maps, which were adopted shortly after Superstorm Sandy, can be found in Appendix E. The new Preliminary FIRM maps issued on January 31, 2014 indicates that the entire coastline along the Barnegat Bay as

well as the portion of the Township located along Oyster Creek is located within the Special Flood Hazard Area. None of Ocean Township’s critical facilities are located within a floodplain on the Preliminary FIRM. The Preliminary FIRM map for the Township is identified in Figure 2 below and in Appendix F.

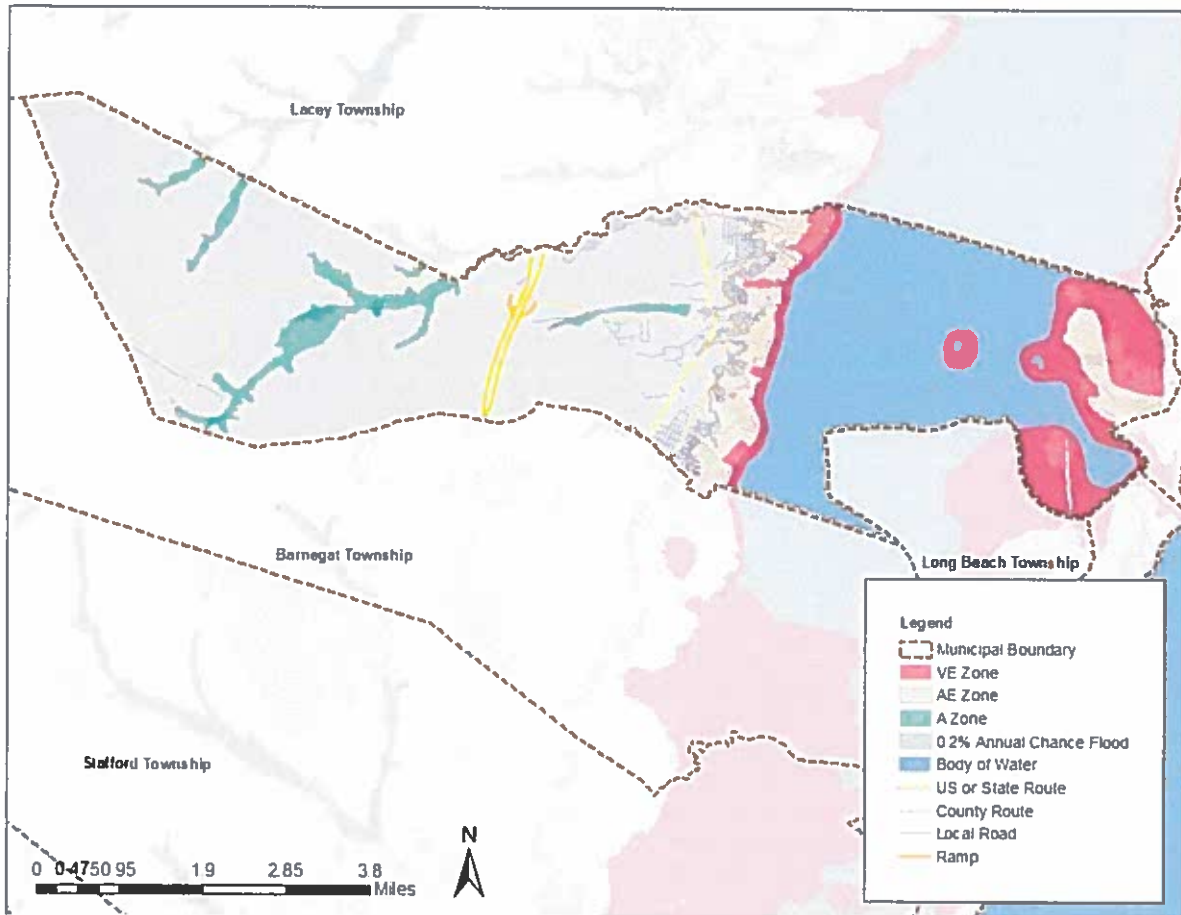


Figure 2. Preliminary FIRM

Flooding in Ocean Township generally takes place east of the Garden State Parkway, along the Barnegat Bay and Oyster Creek, with impacts most felt in the densely populated Bayfront neighborhoods. Land along the Barnegat Bay is vulnerable to erosion, which is often exacerbated by storm events.

Superstorm Sandy made landfall along the coast of New Jersey on October 29, 2012, causing major flooding and destruction. This event has become the storm of record (the highest flood recorded) for much of New Jersey and New York. Sandy surge elevations

were recorded by FEMA. Where available, Superstorm Sandy Surge Elevations were mapped throughout Ocean Township and surrounding communities. These maps can be found in Appendix G. In many parts of the Township, Sandy surge elevations are slightly lower than the Preliminary FIRM area in which they are located. If residents build to their required BFE, they should prevent some future flood occurrences.

Historical Flooding Events

Ocean Township is susceptible to flooding from the Barnegat Bay and has flooded repeatedly throughout time. Some of the major storm events that have affected the Township and the greater Ocean County area, causing flooding and damage in the Township of Ocean are:

- September 14 – 15, 1944: A category 2 hurricane passed within 47 miles of the coast of New Jersey in September 1944, producing wind velocities over 100 mph and a maximum tidal elevation of 7.4 feet at the gage in Sandy Hook.
- Hurricane Donna: On September 12, 1960 Hurricane Donna was classified as a Category 2 hurricane when it reached Ocean County. Wind speeds of up to 110 mph were recorded as was a maximum tidal elevation of 8.6 feet at Sandy Hook.
- The Ash Wednesday Storm: A nor'easter struck the coast of New Jersey lasting 3 days and 5 tidal cycles from March 6- 8, 1962 and causing massive amounts of destruction including 10 deaths in the state of New Jersey.
- Hurricane Belle: On August 9, 1976, Hurricane Belle impacted New Jersey as a Category 1 hurricane with wind speeds of up to 90 mph. In Asbury Park, 2.56 inches of rain was recorded as having fallen in a 24-hour period.
- March 1984: This nor'easter coincided with astronomically high tides and caused flooding, erosion, and damage to roads and boardwalks.
- Hurricane Gloria: On September 27, 1985, Hurricane Gloria came onshore in Long Island, NY as a Category 2 hurricane. The storm caused extensive power outages through New Jersey and forced people to be evacuated from their homes. However, coastal flooding was minimized as the peak storm surge arrived during low tide.
- The Perfect Storm: The Perfect Storm, also known as the Halloween Storm, was a nor'easter that caused coastal flooding on October 31, 1991.
- The Storm that Stole Christmas: A nor'easter struck the coast of New Jersey on December 11, 1992 and continued to impact the area through eleven (11) tidal cycles, causing extensive beach erosion and 3 to 5 ft. storm surge.

- Tropical Storm Floyd: Tropical Storm Floyd impacted New Jersey on July 16, 1999. Heavy rains coincided with high tide to exacerbate flooding. However, the greatest impacts were felt away from coastal areas in Bergen and Somerset Counties.
- Tropical Storm Irene: Tropical Storm Irene produced heavy rains from August 27-28, 2011, causing tidal flooding and beach erosion, making it the costliest storm in New Jersey after Hurricane Floyd prior to Superstorm Sandy.
- Superstorm Sandy: Superstorm Sandy made landfall in Brigantine on October 29, 2012, becoming the costliest natural disaster in the State of New Jersey and second only to Hurricane Katrina nationwide. The coastal areas of Monmouth and Ocean Counties were among the hardest hit with record breaking high tides and wave action. Many homes throughout the coastal communities were destroyed or impacted by severe flooding. All communities within Ocean County faced power outages, some lasting up to two (2) weeks.

Storms with Repetitive Loss

Using repetitive loss data provided by FEMA, seven areas in throughout Ocean Township were identified as being particularly prone to flood events. A repetitive loss property is classified as one which has experienced two or more claims of more than \$1,000 that have been paid by the National Flood Insurance Program (NFIP) within any 10 year period since 1978. To protect the privacy of homeowners, individual repetitive loss properties were not mapped, but rather a 200 foot buffer was created around each repetitive loss property and any parcel falling in that buffer was categorized as in an area generally affected by flooding. The Repetitive Loss Areas map can be found in Appendix H. The general areas are as follows:

- 1) The western edge of the Sands Point neighborhood along Oyster Creek;
- 2) The eastern edge of the Sands Point neighborhood along Oyster Creek;
- 3) The Holiday Harbor neighborhood along the Barnegat Bay;
- 4) The eastern edge point Hornblower Drive, along the Barnegat Bay;
- 5) The Bay Haven and Bryant Beach neighborhoods;
- 6) The Barnegat Beach neighborhood; and
- 7) The western portion of the Pebble Beach neighborhood.

The highest concentration of repetitive loss properties are located in the Sands Point neighborhood, Bay Haven and Bryant Beach neighborhood, and the Barnegat Beach neighborhood of the Township, which consists of many lagoons along the Barnegat

Bay. Numerous homes in this area were substantially damaged during Superstorm Sandy.

The average number of losses per repetitive loss property in Ocean Township is three (3). The average pay-out per loss for a repetitive loss property in the Township is \$30,119.69, with an average total pay-out per property of \$73,503.73 for all losses. The two storms prior to Superstorm Sandy which produced the majority of repetitive losses in Ocean Township were The Perfect Storm, or Halloween Storm, of October 31, 1991 and the winter storm of December 11, 1992. Both of these storms were nor'easters lasting through multiple tidal cycles. Flood events that have resulted in repetitive losses since 1978 include:

- Nor'easter: A nor'easter on March 29, 1984 caused over \$3 million in damage throughout the state. In Ocean Township, one (1) repetitive loss property filed a claim for this event.
- November 4, 1985: One (1) repetitive loss property in Ocean Township filed a claim for this flood event.
- July 13, 1991: One (1) repetitive loss property in Ocean Township filed a claim for this flood event.
- The Perfect Storm (The Halloween Storm): The Perfect Storm, also known as the Halloween Nor'easter, was a nor'easter that caused extensive damage along the east coast from North Carolina to Maine. It began on October 28th and lasted until November 1, 1991. On October 30, 1991, four (4) flood claims for repetitive loss properties were made in Ocean Township and nine (9) were made on October 31, 1991; totaling thirteen (13) claims for this event.
- "The Storm that Stole Christmas": The nor'easter of December 1992 caused massive coastal flooding and erosion. Hurricane force winds, a lunar eclipse, a full moon, and four inches of rain in 24 hours all contributed to the flooding. The strongest portion of the storm remained over New Jersey for several days, resulting in elevated surge levels through a number of tidal cycles. In Ocean Township, sixteen (16) flood insurance claims were made on repetitive loss properties on December 11, 1992, second only in number to Superstorm Sandy in 2012.
- Blizzard: A federal emergency declaration was declared for a blizzard from March 13, 1993 to March 17, 1993 in the State of New Jersey. Ocean Township had one (1) flood insurance claim for a repetitive loss property due to this event on March 13, 1993.
- On each of the following dates, one (1) flood insurance claim was made for a repetitive loss property in Ocean Township:

- July 23, 1993
- March 13, 1994
- May 10, 1998
- February 22, 2003
- June 30, 2005
- October 14, 2005
- October 21- 25, 2005: A total of four (4) flood insurance claims from repetitive loss properties were made over the course of these four (4) days in Ocean Township. One (1) claim was filed on October 21st, one (1) claim on October 23rd, and two (2) claims on October 25, 2005.
- September 2006: Due to a number of tropical storms and hurricanes forming in the Atlantic Ocean, one (1) flood insurance claim from a repetitive loss property was made in Ocean Township on September 2, 2006 and three (3) flood insurance claims from repetitive loss properties were made on September 15, 2006.
- May 12, 2008: One (1) flood insurance claim from a repetitive loss property was made for this event.
- Nor'easter: A nor'easter in mid- March caused severe storms and flooding in New Jersey. On March 13, 2010, five (5) flood insurance claims for repetitive loss properties were filed in Ocean Township, followed by one (1) on March 14, 2010; for a total of six (6) claims over two days in the Township.
- Tropical Storm Irene: Tropical Storm Irene caused flooding throughout the state of New Jersey. In the Ocean Township, a total of four (4) flood insurance claims were submitted for repetitive loss properties on August 28, 2011.
- Superstorm Sandy: Superstorm Sandy is the costliest storm to hit the state of New Jersey. It caused extensive damage and severe flooding throughout the state. Coastal Ocean County was one of the areas hardest hit by the storm with power outages in some areas lasting up to two weeks. A total of twenty-six (26) flood insurance claims were filed on repetitive loss properties during Superstorm Sandy in Ocean Township. On October 29, 2012, twenty-five (25) claims were filed, followed by one (1) claim on October 30th.
- August 13, 2013: One (1) repetitive loss property in Ocean Township filed a claim for this flood event.
- August 12, 2014: One (1) repetitive loss property in Ocean Township filed a claim for this flood event.

DESCRIPTION OF FUTURE EVENTS FOR OTHER HAZARDS

In addition to flooding, Ocean Township is susceptible to a number of other hazards. While the intent of this plan is to focus on flood hazards, it is important to identify and

recognize other hazards that impact the Township. Information on other hazards was taken from the 2014 Ocean County Multi-Jurisdictional All-Hazards Mitigation Plan.

Coastal Erosion

Coastal erosion occurs when more sediment is lost than is gained at a particular location. Coastal erosion can result from natural or man-made causes, including sea level rise, flooding, strong wave action or large storms, some types of shore protection structures, some land uses, and other alterations to the natural environment. Coastal erosion can occur gradually, as shorelines recede over a period of time or can be caused by a rapid recession of shoreline due to another hazard event. Erosion increases the vulnerability of near-shore structures to damage from storms and flooding events.

Ocean Township is susceptible to erosion along the Barnegat Bay. The impacts of coastal erosion can be lessened by implementing living shoreline techniques and undertaking a variety of shoreline protection measures.

Climate Change

Ocean Township will be affected by increasing sea levels along the Barnegat Bay. The effects of sea level rise will be more pronounced in low-lying, marshy areas of the Township and will exacerbate problems with flooding. Additionally, severe storm events are predicted to become more frequent as the climate warms. The impacts of climate change in the future will depend on the rate which sea level rises and human actions and response to the threats caused by climate change.

Drought

A drought is a period of low or no precipitation in a given area. The severity of the drought depends on the length of time, geographic reach, regional water supply demands, and the impact of other hazards, such as extreme heat. There is a low probability of severe drought conditions occurring in Ocean, due to Township's relatively low elevation and abundant groundwater supply; although short term, less severe droughts may be more likely. If extended drought conditions do occur in Ocean Township, the Township may be subject to restricted water usage and other regulations. Recent periods of drought in New Jersey include:

- October 1997
- 1998- 1999
- October 2001- 2002
- August- September 2008
- August to October 2010

Earthquake

The probability of a significant, damaging earthquake in Ocean Township is low. While low magnitude earthquakes do occur throughout New Jersey on a fairly regular basis, most earthquakes impacting Ocean Township will have only minor effects. The greatest probability of an earthquake occurrence in New Jersey exists in the northern portion of the State near the Ramapo Fault.

Extreme Temperature

Ocean Township is highly susceptible to both extreme heat and extreme cold events. The Ocean County Multi-Jurisdictional All-Hazards Mitigation Plan defines extreme heats as occurring when temperatures hover 10 degrees or more above the average high temperature for a region for several weeks. The plan defines extreme cold temperatures as well below the average level for an area during the winter and often coinciding with winter storm events. Long periods of extreme temperatures can overstress power supply systems, resulting in brown-outs or black outs and leaving residents without heat or air conditioning. Generally, the impact on humans of extreme temperature events is minimal, with the exception of the very young and elderly populations, who are more susceptible to the health impacts of extreme temperatures. If the population of Ocean Township continues to age, the vulnerability to extreme temperature events will increase. Improved weather forecasting, community warnings, and community preparedness can help to reduce the risks of extreme temperature events, as well as other hazard events such as flooding, to vulnerable populations.

Extreme Cold

Extreme cold events often accompany a winter storm or occur soon after. Prolonged exposure to the cold can cause frostbite or hypothermia. Recent periods of extreme cold in Ocean Township include:

- Jan 14- 29, 2003
- Jan 9-11, 2004
- Jan 16- 18, 2009
- Jan 23, 2014
- Jan 4, 7, & 22, 2014

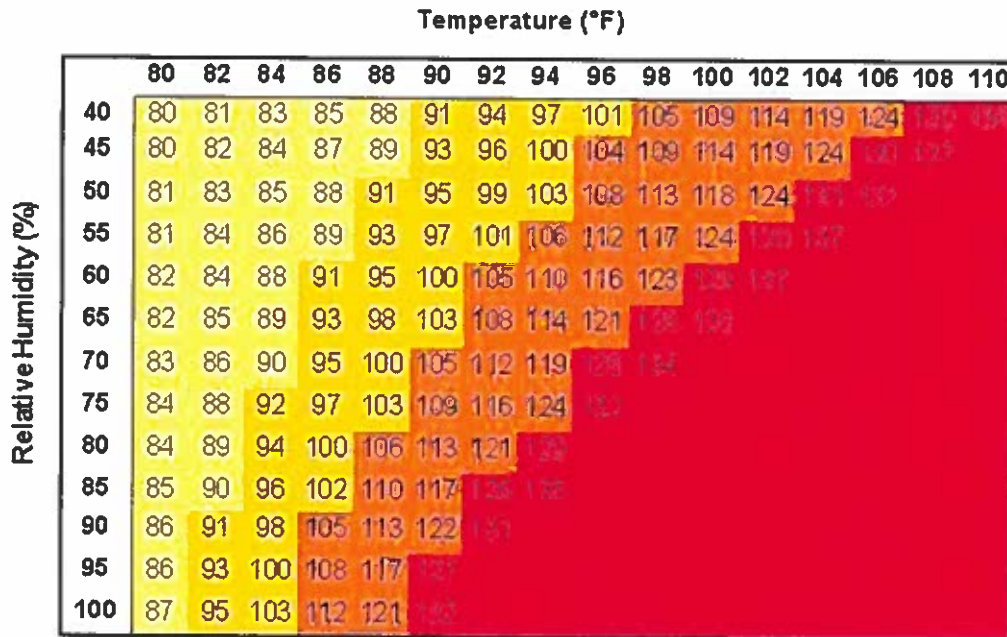
Extreme Heat

Ocean Township is more likely to experience extreme heat than extreme cold events. Extreme heat events occur during the summertime when the weather in Ocean is

substantially hotter and/or more humid than the Township average for that time of year. Recent periods of extreme heat include:

- July 4- 11, 1999
- August 1-3, 2006
- June 7-10, 2008
- July 5-7, 2010
- July 21- 24, 2011
- July 17- 18, 2012
- July 18-19, 2013

The extent of extremely hot temperatures are typically measured through the Heat Index, which calculates the temperature that is felt when the effects of relative humidity are added to the base air temperature, highlighting dangerous extreme heat conditions.



Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

- Caution
- Extreme Caution
- Danger
- Extreme Danger

Figure 3. NOAA National Weather Service Heat Index

Extreme Wind

Extreme wind can occur alone or with other natural hazards, often occurring during thunderstorms. The impacts of extreme winds can be critical and can include flying debris and downed trees and power lines. The probability of future extreme wind events is high, with an average of 5- 10 extreme wind events occurring each year in the Central New Jersey region. Recent extreme wind events near Ocean County, New Jersey include:

- Thunderstorm on September 9, 1998
- Thunderstorm on August 7, 2000
- Thunderstorm on August 2, 2002
- Thunderstorm on July 22, 2003
- January 18, 2006
- Thunderstorm on August 17, 2007
- February 13, 2008
- March 5, 2008
- March 13, 2010
- Hurricane Irene, August 27- 28, 2011
- Superstorm Sandy, October 29, 2012

Hurricanes, Tropical Storms, & Nor'easters

Hurricanes, tropical storms, and nor'easters are events consisting of a number of damaging hazards including heavy precipitation, high winds, wave action, storm surge, coastal flooding, and coastal erosion. All of New Jersey, including the Township of Ocean Township, falls within the Hurricane Susceptible Region, and there is a 24- 36% chance of experiencing a tropical storm or hurricane event between June and November of any given year in Ocean County. Ocean County lies within a design Zone II, meaning that shelters and critical facilities should be designed to withstand a 3 second wind gust of up to 160 mph. Nor'easters generally occur during the winter months and are named after the wind direction of the storm. They tend to last for more than one tidal cycle, often generating flooding events. Severe storms that have impacted the Township of Rumson with flood damages were discussed in the Historical Flooding Events section of this document.

Lightning

Ocean Township is susceptible to lightning events, but not as much as other areas of the United States, particularly the Southeast. The probability of future lightning events in

Ocean Township is certain, however, lightning often occurs with other natural hazards, such as thunderstorms.

Storm Surge

All coastal areas are at high risk for storm surge. The severity of storm surge is generally related to the severity of the storm making landfall, as well as the tidal and lunar cycles.

Tornado

The probability of a tornado in Ocean Township is low. If a tornado is to occur, it is mostly likely to do so between March and August, forming in the late afternoon or early evening at the trailing edge of a thunderstorm.

Wave Action

All immediate coastal and shoreline areas along the Atlantic Ocean and Barnegat Bay are at risk from wave action. Waves are generally caused by wind and storm events, even those which remain offshore, and generally the more severe the storm, the more destructive waves become. Future occurrences of wave action will affect the areas of Ocean Township located along the Barnegat Bay in the coastal flood hazard zone.

Wildfire

Wildfires typically occur in unoccupied, rural, or forested areas and happen during the fall and spring when it is hot and dry. In New Jersey, 99% of wildfires are caused by human activity. The probability of wildfires occurring in the Pinelands is extremely high, as the Pinelands are categorized as Fuel Model B, which indicates a high hazard fuel. Ocean Township contains 8,501 acres of land within the Pinelands, or 64.4% of the Township's total land area. Therefore, the probability of wildfires occurring in the western portion of Ocean Township is high. Wildfires have occurred in the Pinelands of Ocean County on the following:

- Sept. 7-10, 1938
- April 15, 1977
- April 30, 2001
- May 1, 2001
- March 10, 2002
- February 19, 2011

Winter Storms

Although Ocean Township is located south of the typical boundary between freezing and non-freezing precipitation during the wintertime, there is a high probability of occurrence of winter storms in Ocean Township, with Coastal Ocean County averaging approximately 15 inches of snowfall annually. Winter storms generally occur from November through mid- April, with the peak season being December through March. Winter storms can consist of blizzards, heavy snow, sleet, and/or ice storms.

Winter storms can result in downed trees, damaged vegetation, transportation accidents, road closings, stranded travelers, power outages, and a depletion of heating supplies. They can cause major disruptions to transportation, commerce, and electrical power. Recent winter storm events that have impacted Ocean Township include:

- January 6-8, 1996
- February 16-17, 2003
- January 22, 2005
- February 17, 2007
- December 26, 2010
- November 7-8, 2012

SPECIAL FLOOD RELATED HAZARDS

There are many special localized situations in which flooding or flood-related problems do not fit the national norm for riverine and coastal floodplain management. These special flood-related hazards include:

Uncertain Flow Paths

Alluvial fans, moveable bed streams, channel migration, and other floodplains where the channel shifts during a flood are classified as uncertain flow paths. This hazards is not an issue in Ocean Township

Closed Basin Lakes

Lakes that have a small or no outlet that may stay above flood stage for weeks, months, or years are called closed basin lakes. This hazard is not relevant to Ocean Township.

Ice Jams

Ice jams, also known as ice dams, typically occur in late winter or early spring when a frozen river begins to thaw. Blocks of ice break free and can accumulate at bends in the

river, mouths of tributaries, or near structures such as bridge piers. The ice can restrict the flow of a river and cause flooding upstream. A flash flood type event can also occur downstream if the ice jam suddenly breaks free. Although the Barnegat Bay has been known to freeze in winter months, the threat of flooding from ice jams in the Ocean Township is low due to the width, depth and tidal nature of the rivers. However, there is a high likelihood of damage to structures such as bulkheads, docks and piles from floating ice.

Land Subsidence

Along the East Coast, land is sinking towards sea-level in a process known as subsidence. This will accelerate the impacts of sea level rise, causing actual water levels to be much higher than some predicted estimates.

Mudflow hazards

Mudflow hazards are identified as a river, flow, or inundation of liquid mud down a hillside, usually as a result of a dual condition of loss of brush over and the subsequent accumulation of water on the ground, preceded by a period of unusually heavy or sustained rain. This is not considered to be a threat in Ocean Township.

Coastal Erosion

This hazard was discussed in the previous section. It has a large impact on Ocean Township.

Tsunamis

Tsunamis are large ocean waves typically caused by an earthquake, landslide, or underwater volcano. Although Tsunamis are far more likely on the west coast, there are three DART (Deep-ocean Assessment and Reporting of Tsunamis) monitoring stations off the coast of New Jersey, near the Hudson Canyon.

V. PROBLEM ASSESSMENT

FEMA is currently in the process of updating the Flood Insurance Rate Map (FIRM) for Ocean Township. The Preliminary FIRM indicates that the perimeter of the Township along the Barnegat Bay and Oyster Creek is located within the Special Flood Hazard Area. There are no critical facilities located within the Special Flood Hazard Area in Ocean Township. A total of 1,537 residential properties and 40 commercial properties are located within the SFHA. Table 1 below indicates the total structures, properties and land area located within both the 100-year and 500-year floodplains. The table also shows the percentage of each category that is located within the 100-year floodplain to get a better understanding of how much of the Township is vulnerable to flooding.

Table 1. Floodplain Property Data

Item	Township Total	100-Year Floodplain	500-Year Floodplain ¹	100-Year + 500-Year Floodplain	Percent Located within the 100-Year Floodplain
Properties	10,197	2328	329	2657	22.83%
Land Area (acres) ²	12,975.44	2,404.24	258.53	2,662.77	18.53%

1. This does not include the area within the 100-year floodplain.

2. Land area only includes land parcel areas. Waterways and roads are not included in this area.

Flooding generally occurs in Ocean Township as coastal flooding due to the Township's location on the Barnegat Bay and along the Township's borders, including Oyster Creek, Waretown Creek, Warrens Creek, and Lochiel Creek. Coastal flooding generally occurs along the Bayfront and in the backwater, intertidal areas along the creeks. Flooding can also be caused by the stormwater management system being overwhelmed by excessive rainfall, being undersized, or clogged. While none of Ocean Township's critical facilities are located within the floodplain, it is important to be aware of their location in regards to flood hazard areas. A map showing the Township's critical facilities and the Special Flood Hazard Areas can be found in Appendix I. The map also indicates which roads have potential for flooding during a 100-year flood event.

HAZARD IMPACT

Township residents and first responders are particularly vulnerable to the impacts of flooding in Ocean Township. Residents who live within the SFHA should be encouraged to take all necessary precautions to ensure their homes are safe from flood

hazards. Additionally, those residents who do not live within the SFHA, but live in areas which are known to flood should take similar precautions as their neighbors living within the SFHA. In addition to the possible damage to buildings and other infrastructure, there is the possibility of injury or even death to residents or responders who could get trapped in a flooded building or swept away in fast moving floodwaters. The Township and its residents must also be aware of the potential impacts to public health from flooding. Mold will quickly develop in many structures and cause respiratory issues for those attempting to rebuild. Debris from damaged and demolished structures could also contain hazardous materials such as mold, lead or asbestos. Early warning and evacuation, as well as making the necessary preparations to protect facilities from flooding, can protect the health and safety of residents and emergency workers and facilitate a rapid response and recovery from future flood events.

Many of the hazards to which Ocean Township is vulnerable generally occur concurrently with flooding. Areas that are susceptible to flooding will only increase in their vulnerability as impacts due to sea level rise become greater in the future. Homes which are not raised above the base flood elevation are particularly vulnerable to flood related hazards, as are areas prone to flooding but not located within the SFHA. Ocean Township should work with FEMA to ensure that all flood maps illustrate an accurate portrayal of flood risk within the community.

Repetitive Loss Areas were mapped throughout Ocean Township, as illustrated in Appendix H, with repetitive loss properties averaging three (3) losses per property. The highest concentration of repetitive loss properties are within the lagoon communities along the Barnegat Bay. A number of homes in these areas were substantially damaged during Superstorm Sandy.

Category 1, 2, & 3 SLOSH models for Ocean Township were run by the Jacques Cousteau National Estuarine Research Reserve (JCNERR) to estimate storm surge heights and wind resulting from historical, hypothetical, or predicted hurricanes. SLOSH is a computer model developed by the National Weather Service (NWS) and stands for Sea, Lake, and Overland Surge from Hurricanes. It is important to note that the SLOSH model does not include rainfall amounts, river flow, or wind-driven waves and accuracy is generally within 20% (NOAA).

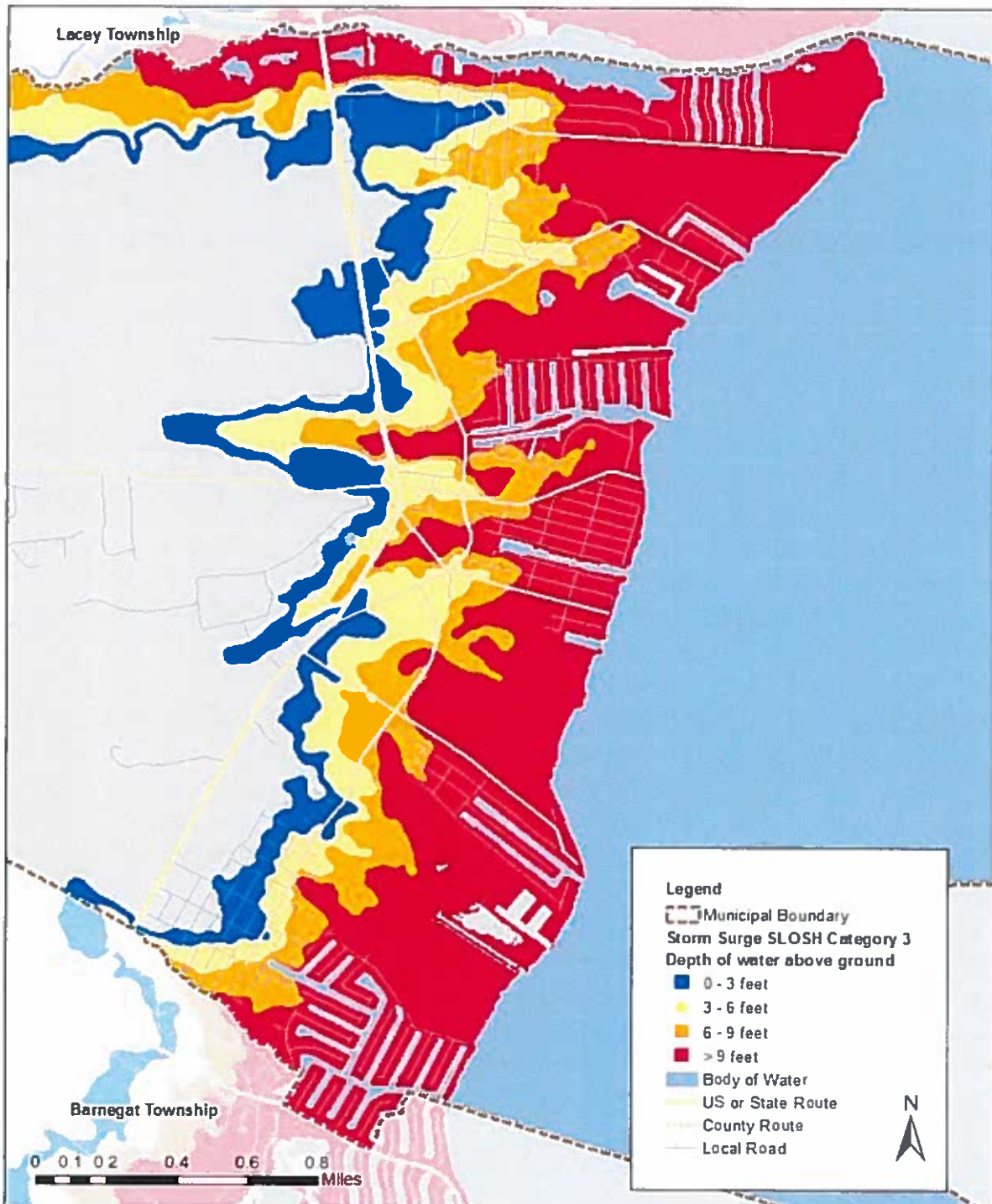


Figure 4. Category 3 SLOSH Model Map

As depicted in the maps found in Appendix J, during a Category 1 storm event storm surge would be above ground level along the Barnegat Bay and into the lagoon communities. During a Category 2 storm event, storm surge would further inundate the Township along the banks of the Barnegat Bay, with storm surge reaching over 9 feet in some waterfront areas. As shown above in Figure 4, a category 3 storm event would produce storm surge along all of the Township's shoreline, with inundation reaching Route 9 in most of the Township. Additionally, the entirety of the Bayfront and most of the lagoon neighborhoods would have surge levels over 9 feet in height.

The impacts of Sea Level Rise on Ocean Township were also analyzed by JCNERR. With a one foot increase in sea level rise, some small areas within the Bayfront lagoons would be underwater. Much of the tidal marsh will remain, however in these areas there would be slight uninhibited marsh retreat, as well as the loss of some land area from the sedge islands located off Island Beach State Park within the Township's boundaries. With two feet of sea level rise, water will further encroach on lagoons bordering the Barnegat Bay. Much of the tidal marsh will remain however there will be some areas of uninhibited marsh retreat in the more upland areas of the lagoon communities. Additionally, in a small portion of the sedge islands located off Island Beach State Park within the Township's boundaries, marsh will convert to open water. Three feet of sea level rise will further encroach on the land area bordering the Barnegat Bay. The impacts of sea level rise on the Barnegat Bayshore will be more severe neighboring municipalities than in Ocean Township. Much of the tidal marsh will continue to remain; however areas of uninhibited marsh retreat in the more upland areas of the lagoon communities will continue to expand westward. Additionally, in large portions of the sedge islands will convert from marshland to open water. Maps indicating Sea Level Rise and Marsh Retreat can be found in Appendix K & L respectively.

Ocean is a predominately residential community, and as such, much of the areas that will be affected by storm surge and/or sea level rise are residential areas. The eastern portion of the Township, near the Bayfront, contains some of the highest densities of single family homes throughout the community. This is also the area that is and will continue to be most impacted by storm and flooding events.

Due to the high build-out in the eastern portion of the Township and the Pinelands regulations in the west, there are not many viable options for major changes to zoning and development regulations. However, the Township should consider adopting stricter regulations to limit the impacts of flooding and protect those residents building in flood zones.

HISTORICAL DAMAGE

Superstorm Sandy caused the most damage of any storm in recent history. During Superstorm Sandy, Ocean Township experienced major impacts from wind, storm surge, and flooding. Entire neighborhoods along the bayfront were flooded. The storm exposed many of the Township's vulnerabilities, including that the land to the east of Route 9 is largely built-out and is the most flood prone area of the Township.

One census tract in Ocean Township contained homes which sustained severe or major damage as a result of Superstorm Sandy, with 10% of the homes in that tract sustaining severe or major damage. A total of 87 properties within the Township sustained substantial damage during the storm. A structure is considered substantially damaged when the total costs of restoring the structure to its before damaged condition would equal or exceed 50% of the structure market value. Most of these properties were located to the east of Route 9 along the Bayfront.

Residents of Ocean Township faced power outages for 14 days due to downed trees following Superstorm Sandy. The JCP&L electric substation on Route 9 by St. Stephen's Church went offline. In addition, many residents lost cell phone power, and Township personnel relied on radios for communication for three days following the storm. Entire neighborhoods in the Bayfront area faced damage from flooding, and the Township building and community center sustained roof damage due to heavy winds.

Superstorm Sandy also affected the Township's sewage pump stations, causing five pump stations to go offline due to damage from Superstorm Sandy. The pump stations that went offline were located at: the intersection of Bay Parkway and Dock Avenue, the intersection of Lighthouse Drive at Anchor Drive, the intersection of Marine Road and Lagoon View Road, 262 Bayshore Drive, and 225 Seneca Boulevard.

ECONOMIC IMPACTS

Due to the residential character of the Township, the majority of flood damage within Ocean has been, and will continue to be, to single family homes. The cost of flood damage to residential property is generally covered by insurance pay-outs and owner out of pocket expenses. The average flood insurance pay-out for a repetitive loss property within Ocean Township is \$30,119.69. If property owners can no longer pay their taxes or decide to abandon their property, there could be a potential impact on the tax base of the Township due to flooding events.

Impacts of flooding on businesses within Ocean Township would be realized mostly in the form of lost profits for times when they are not able to operate. Most of the businesses within the Township that are located within the flood zone are marinas and other marine related businesses. They may experience flood damage in addition to lost revenue. During Sandy many of these businesses were flooded. However, most have reopened their doors since.

The largest economic impact of flooding to the Township is the cost of debris removal, municipal facility repair, and personnel costs during the event. The impact of costs to the community would depend on the severity and longevity of the event as well as reductions in the tax base due to property loss or migration.

NATURAL FEATURES

Ocean Township is located entirely within the Pinelands and CAFRA regulatory areas, with lands to the west of the Parkway located in the Pinelands and lands to the east located in CAFRA. Much of the land to the west of the Parkway in the Pinelands region has been preserved and strict development regulations limit development in areas that have not been officially preserved. The Forked River Mountains are also located in the western portion of the Township. There are a number of County Natural Lands Trust Fund owned preserved lands throughout Ocean Township, with the largest holdings in the western portion of the Township. Wells Mills County Park is a 910 acres park located within the Township as well. The map below, and found in Appendix M, shows areas of natural features throughout the Township.

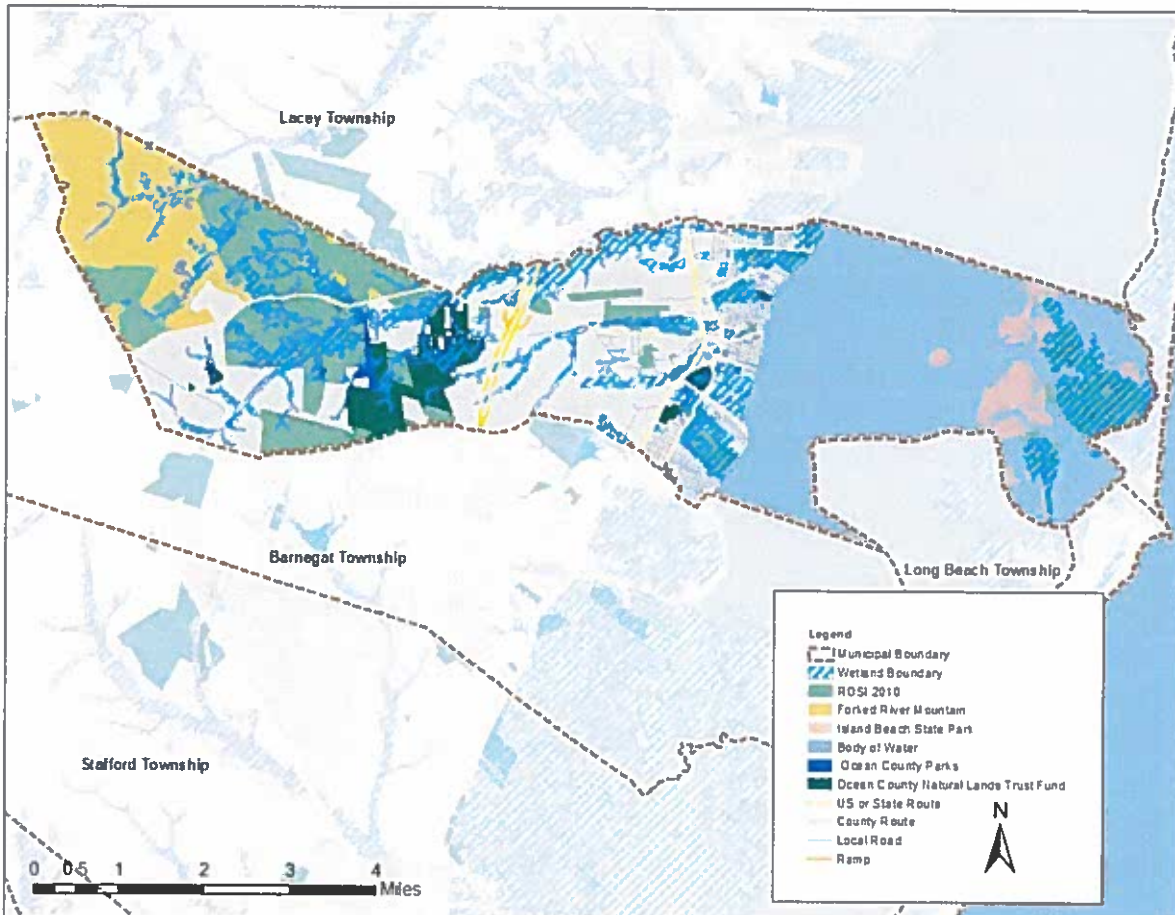


Figure 5. Natural Features

Much of the development within Ocean Township is located on the eastern side of the Parkway, along the Barnegat Bayfront. However, there are significant areas of natural space in the Bayfront Conservation districts. Additionally, Island Beach State Park is across the Barnegat Bay and acts like a natural buffer, protecting Ocean Township from storm surge and reducing the direct impacts of storm events.

Within the Bayfront Conservation Areas and along the bayside of Island Beach State Park there are many areas of natural wetlands, located in Ocean Township. These wetlands can help to help to store water and reduce the impacts of flooding on the surrounding areas.

FUTURE FLOODING IMPACTS

As previously indicated, there is little future development potential in Ocean Township due to the Pinelands regulations to the west and the built out nature of many of the

eastern lagoon communities. The Township should continue to enforce existing development standards, making changes where necessary to allow residents to rebuild to higher resiliency standards. The Township should continue to maintain and pursue open space acquisitions and encourage the use of living shoreline and green infrastructure techniques. This is critical to maintaining permeable surfaces and limiting stormwater runoff.

However, as sea level rises and marshes retreat, Ocean Township will become more vulnerable to impacts from flooding. The overall impacts of flooding on the community will be contingent on how effectively the Township mitigates current vulnerabilities and plans for future conditions. It is imperative that the Township utilize this Floodplain Management Plan as a valuable tool to plan for the future.

VI. GOALS

Over the course of the various Floodplain Management Plan Steering Committee meetings, the Committee discussed the goals that the Township would like to achieve with the Floodplain Management Plan to increase resiliency and mitigate future storm events. The following is a list of the goals agreed upon by the Committee:

1. Reduce loss from flood damage through codes and standards;
2. Educate decision makers and the public about stormwater management and floodplain management;
3. Coordinate and prioritize maintenance of the stormwater management system;
4. Protect existing properties by encouraging property owners to build higher than the base flood elevation;
5. Protect health and safety;
6. Improve the quality of life in Ocean Township;
7. Ensure that public funds are used in the most efficient manner.

VII. POSSIBLE FLOODPLAIN MANAGEMENT ACTIVITIES

As part of the planning process, all existing and potential floodplain management activities and measures to mitigate property damage and impacts to community infrastructure were reviewed. The benefits, costs and general feasibility of each action were considered prior to making a recommendation to proceed with the action. Many of the proposed activities coincide with actions recommended in the 2014 Ocean County Multi-Jurisdictional All Hazards Mitigation Plan and 2015 Master Plan Reexamination Report. All activities and measures have been grouped into the following six mitigation strategies: Preventative Measures, Property Protection, Natural Resource Protection, Emergency Services, Structural Projects and Public Information. The findings are as follows.

PREVENTATIVE MEASURES

Planning and Zoning

The Township of Ocean Township can develop Geographic Information Systems (GIS) to increase the community's resiliency and enable them to better prepare for, respond to and recover from disasters. The components of the GIS should support facilities and public works infrastructure, land information, and floodplain management-related data layers and applications. This will be done as part of Round 2 Post-Sandy Planning Assistance Grant program.

Open Space Preservation

There are significant open space holdings within the SFHA, including holdings owned by the U.S. Government as part of the Barnegat National Wildlife Refuge. There are other large tracts owned by the New Jersey Department of Environmental Protection and the Ocean County Natural Land Trust for natural land preservation. The Township should continue to support acquisitions made by the State, County, and land trusts for open space preservation. Residents looking to pursue buyouts through the Blue Acres or NRCS programs should be encouraged to do so.

Floodplain Regulations

A Stormwater Management Ordinance is in place in accordance with the Stormwater permit requirements and Pinelands requirements. Additionally, state regulation for coastal areas (CAFRA) freshwater wetlands, coastal wetlands, waterfront development

and dam safety as well as Flood Hazard regulations (formerly Stream Encroachment) are all in place. Ocean Township has a Stormwater Management Plan as required by the Township's general discharge permit.

Ocean Township will adopt a Floodplain Management Ordinance as an outcome of this plan. Additionally, zoning regulations affecting the residential districts within the Special Flood Hazard Area will be looked at as part of the Phase 2 Post-Sandy Planning Assistance Grant. The 2014 Ocean County Multi-Jurisdictional All Hazards Mitigation plan recommends that Ocean Township accept the FEMA Advisory BFE floodplain maps to support pro-active floodplain management to assist property owners in rebuilding at or above regulatory standards when the new floodplain maps become effective. Ocean Township has adopted the Advisory BFEs.

Erosion Setbacks

The Township of Ocean Township could adopt an erosion setback ordinance based on erosion rates along the Barnegat Bay. An erosion setback ordinance would reduce the need for erosion control structures along the shoreline, minimize property damage due to erosion, and maintain the natural shoreline dynamics. In order to maintain effective setback requirements, good scientific data must be used. Additionally, erosion rates change over time and would require a periodic reevaluation of the setback lines along the riverfronts.

Planning and Zoning

Most of the Township area within the SFHA is built out or zoned for conservation. Zoning amendments have been suggested as part of the Phase 2- Post Sandy Planning Grants to allow for rebuilding to the new BFEs in the older, built out, waterfront communities without the need for variances. Additionally, waivers for permits were extended to October 30, 2013 post- Sandy. The 2014 Ocean County Multi-Jurisdictional All Hazards Mitigation plan recommends that Ocean Township continue participation in the CRS program and consider upgrading to the next class level.

Stormwater Management

Ocean Township could adopt a recharge requirement for other than major developments.

Drainage System Maintenance

The public works department maintains the Townships storm sewers, ditches and outfalls in accordance with the stormwater pollution prevention plan.

Building Codes

Ocean Township has a Flood Damage Prevention Ordinance in place in accordance with the FEMA requirements. The 2014 Ocean County Multi-Jurisdictional All Hazards Mitigation plan recommends Ocean Township continue to enforce building codes to require building, renovations, and re-building meets or exceeds the Uniform Construction Code thus protecting homes from risk related to hazards including flooding, fire, wind, earthquake, and winter storm.

PROPERTY PROTECTION

Acquisition

Within Ocean Township, the main areas of flooding concern and therefore potential for acquisition are along the Bayfront. However, wholesale acquisition of properties within flood prone areas is not practical. Residents looking to pursue buyouts through the Blue Acres or NRCS programs should be encouraged to do so. If homes are to be acquired for floodplain protection, they should be done strategically, as selectively removing or relocating houses located throughout the Bayfront areas may isolate the remaining properties and would not reduce the need for municipal services. The 2014 Ocean County Multi-Jurisdictional All Hazards Mitigation plan recommends that one repetitive loss Bayfront home on Bryant Road be acquired and then the structures on the property removed from the floodplain permanently.

Relocation

The 2014 Ocean County Multi-Jurisdictional All Hazards Mitigation plan recommends relocating a streetlight at Bryant Road that is located near the bayfront on a repetitive loss property to maintain light for responders during flood related hazards.

Building Elevation

The Township of Ocean Township should require that newly constructed or substantial damaged buildings in SFHAs must comply with the most up-to-date base flood elevations.

The 2014 Ocean County Multi-Jurisdictional All Hazards Mitigation plan actions for Ocean Township include elevation projects for 203 homes to elevate and build to higher

standards that will mitigate impact of flood related hazards while maintaining residents in the community.

Retrofitting

The Township should make information available about different floodproofing techniques in the construction office and encourage the floodproofing of non-residential buildings within the floodzone that do not meet the new BFEs. Dry floodproofing is most applicable to commercial structures which already have a substantial structural design. Most flood prone houses within Ocean Township are of a frame design with open crawl space making flood proofing a difficult operation. Wet flood proofing is currently recommended where a non-residential building is below the base flood elevation.

The Township should also make sure elevation certificates are accurate and complete for all structures within the SFHA area as well as require elevation certifications prior to starting construction and after completion of work.

Flood Insurance

Ocean Township participates in the National Flood Insurance Program. Homeowners are encouraged to maintain flood insurance to protect against loss of structure and contents in case of flooding. The Township of Ocean Township can reduce the flood insurance rates for property owners by increasing their participating in the Community Rating System program. This plan is intended to gain points towards that program.

NATURAL RESOURCE PROTECTION

Wetlands Protection

There are many areas throughout the Township that contain wetlands. The wetlands are classified as deciduous wetlands, disturbed wetlands, herbaceous wetlands, managed wetlands, phragmites dominant wetlands and salt marshes. These wetlands provide the Township a vital asset during storms and floods. Not only do wetlands provide a natural buffer between buildings and the rivers, but they also slow the speed of surging floodwaters and provide an area for retention and recharge. State regulations through the NJDEP freshwater and coastal wetland permit programs are currently in place to limit development in these areas. The Township should continue to support and enforce these programs. The Township should also consider further

investigation of living shorelines to augment these areas and provide additional shoreline stabilization.

Erosion and Sediment Control

The Standards for Soil Erosion and Sediment Control in New Jersey are regulated by the New Jersey Department of Agriculture and locally enforced through the Ocean County Soil Conservation District. The Township should continue to support and enforce these standards for all applicable development.

Natural Area Preservation

Much of the land in Ocean Township along the bay is publically owned for conservation.

Natural Area Restoration

The Township could also implement living shoreline or other restoration projects for specific areas within the floodplain as needed.

Coastal Barrier Protection

There are a couple of small public and private bay beaches along the bayfront. There are no dunes associated with those beaches and most are less than 30 feet wide. Ocean Township extends to the mouth of Barnegat Bay and there are some islands that have small beach heads associated with them. These are uninhabited and controlled by the state of New Jersey as open space within the Island Beach State Park system.

Best Management Practices

Best Management Practices are techniques that have been developed to address the adverse impacts that result from unmanaged land development. These methods serve to control not only the storm water quantity but also the quality and groundwater recharge in order to mitigate the adverse effects on the hydraulic system and to replicate the natural run off patterns. Best management practices are mandated through the Township's Stormwater management Ordinance. These are in place.

EMERGENCY SERVICES

Hazards Warning

Ocean Township already alerts its residents to hazards through a Reverse 911 calling system. The Police and Fire Departments notify residents of emergencies via loudspeakers and an Emergency Broadcast System is utilized in Ocean County.

Hazards Response Operations

The 2014 Ocean County Multi-Jurisdictional All Hazards Mitigation plan recommends that Ocean Township undertake the following actions in regards to hazards response operations:

- Develop and implement Shelter Management Plans to mitigate the impact of hazards that require evacuation on residents.
- Continue CERT to improve outreach and community member capability for disaster mitigation, preparedness, response and recovery
- Continue "We Care" Program to look out for residents with special needs during emergencies. This program assists in getting the right information and assistance to community members who need additional assistance during a disaster and may not receive information effectively from other outlets.

Critical Facilities Protection

The municipal building, police department, fire and first aid and both Township schools are located outside of the 100 year floodplain.

Health and Safety Maintenance

The Police Department is primarily responsible, after flooding events, to patrol evacuated areas to prevent looting. Clearing streets and removing debris is performed through the Township Department of Public Works. Vaccinating of the residents would be handled by the Ocean County Health Department.

STRUCTURAL PROJECTS

Levees/ floodwalls

Levees and floodwalls are not considered a feasible method of protection because of the many inlets, lagoons, and backbay areas of the bay front. The 2014 Ocean County Multi-Jurisdictional All Hazards Mitigation plan recommends installing riprap along the shoreline to protect from erosion and flood related hazards.

Storm Drain Improvements

The Ocean Township Department of Public Works should be encouraged to be more proactive in cleaning, repairing, and upgrading storm sewer and other conveyance types such as ditches, as well as identify areas of ponding and other problem areas. Storm water structures should be upgraded if necessary and when possible.

PUBLIC INFORMATION

Map Information

Flood insurance rate maps are available for review in the Construction Office for residents who want to determine whether their property is in a flood zone. A log is kept of information provided to residents who come in to view maps or who call with questions. Mapping can be obtained from the FEMA website by inputting the address of the property of interest.

Outreach Projects

The Floodplain Management Plan Committee can set up a booth at local events. Additionally, information on flood hazards can be mailed out annually with tax bills. Depending on the information included on the pamphlets, this activity could be eligible for CRS credit. The 2014 Ocean County Multi-Jurisdictional All Hazards Mitigation plan recommends the following outreach actions for Ocean Township:

- Continue police outreach programs in schools to include children in outreach and improve families capability for disaster mitigation, preparedness, response, and recovery

- Continue Junior Police Academy Program to include youth in hazard related education and to support them in conducting effective, relevant outreach to community
- Continue “We Care” Program to look out for residents with special needs during emergencies. This program assists in getting the right information and assistance to community members who need additional assistance during a disaster and may not receive information effectively from other outlets.
- Maintain, improve, and expand education and awareness programs to provide effective and relevant information to community members

Real Estate Disclosure

Form is provided to local realtors approximately twice per year

Library

The Ocean County Library System should keep current FEMA publications on flooding. The Township should check the Waretown Branch to ensure all FEMA publications are up to date.

Technical Assistance

The construction office has several pamphlets and booklets concerning flood preparedness and the National Flood Insurance Program, flood venting, etc. It was discussed as a way to improve the dissemination of information that an additional information rack be placed at the Committee Room so the public would have enhanced access to the information available.

Environmental Education

To increase environmental awareness and knowledge of flood risks, the Township should coordinate with the Environmental Commission to raise awareness about environmental and flooding within the community.

VIII. ACTION PLAN

The previous chapter presented a wide range of possible floodplain management activities to address the goals established by the Floodplain Management Plan Steering Committee. This chapter presents an Action Plan that describes which activities should be implemented, who is responsible for implementing the activity, the deadline for completing the activity, the proposed budget and the funding source. The Committee realizes that there are many proposed activities, and that not all activities can be completed immediately based on available funds. The Township should initially focus on those projects that are economically feasible and will aid in the recovery and resiliency of the Township. The following priority levels were therefore established:

- High Priority – Activities in this category are critical to protecting the Township’s critical facilities and creating a more resilient community. The benefits of these activities far outweigh the costs. Funding for these projects is currently in place or there is the high likelihood for grant funds to be secured in the near future. It is recommended that the majority of these projects be completed prior to the next hurricane season.
- Medium Priority – Activities in this category are necessary to increase the Township’s resiliency and provide flood protection. Benefits outweigh the costs; however, funding has not yet been secured for those activities with physical improvements. The Township should continue to seek grants and other funding sources for these activities. It is recommended that these projects be completed in the next three years as funding becomes available.
- Low Priority – Activities in this category will mitigate hazard risks for the Township and are cost-effective. However, it is understood that these projects are not as critical as those identified as high or medium priority and that funding may be difficult to obtain for some of the larger construction projects.
- Ongoing – Activities in this category are required on a continuous or regular basis to be effective. These activities do not require special funds outside of the Township’s standard budget.

The following is the recommended Action Plan for the Township of Ocean:

PREVENTATIVE MEASURES

Action Item	Priority	Responsible Party	Target Deadline	Budget	Funding Source
Prepare a 5-year Capital Improvement Plan	High	Township Staff and T&M Associates	July 2015	\$30,000	NJDCA Grant (secured)
Create an automated and expedited system for zoning and construction permit administration	High	Township Staff and T&M Associates	July 2015	\$25,000	NJDCA Grant (secured)
Develop a Geographic Information System (GIS) Program	High	Township Staff and T&M Associates	July 2015	\$50,000	NJDCA Grant (secured)
Update Zoning Ordinances in the waterfront development districts as they relate to resiliency	High	Township Staff and T&M Associates	August 2015	\$12,500	Township General Funds
Continue to support open space preservation throughout the Township	Low	County, State, Federal, and nonprofit partners	Ongoing	Township Staff Time	TBD
Increase participation in the Community Rating System (CRS) Program	Medium	Township Staff	October 2015	Township Staff Time	Township General Funds
Enforce the Township Stormwater Management Plan & Ordinance	Ongoing	Planning, Zoning, Code Enforcement & Construction Departments	Ongoing	Township Staff Time	Township General Funds

PROPERTY PROTECTION

Action Item	Priority	Responsible Party	Target Deadline	Budget	Funding Source
Update the Township's Flood Damage Prevention Ordinance	High	Township Staff	August 2015	Township Staff Time	Township General Funds
Relocate a streetlight/utility pole at Bryant Road	High	Township Staff	December 2015	Township Staff Time	HMGP/Capital Funds
Acquire one repetitive loss bayfront home on Bryant Road and remove structures from the floodplain permanently.	High	Township staff	Ongoing	Township Staff Time	HMGP
Elevate 203 homes and build to higher standards	High	Township Staff	Ongoing	Township Staff Time	HMGP

NATURAL RESOURCE PROTECTION

Action Item	Priority	Responsible Party	Target Deadline	Budget	Funding Source
Continue to enforce NJDEP and soil erosion and sediment control standards for all development	Ongoing	Planning, Zoning, Code Enforcement & Construction Departments	Ongoing	Township Staff Time	Township General Funds

EMERGENCY SERVICES

Action Item	Priority	Responsible Party	Target Deadline	Budget	Funding Source
Develop and implement Shelter Management Plans to mitigate the impacts of hazards that require evacuation of residents	Medium	Township Staff	Ongoing	Township Staff Time	General Funds/Grant Opportunities
Continue CERT to improve outreach and community member capability for disaster mitigation, preparedness, response, and recovery	Medium	Township Staff	Ongoing	Township Staff Time	General Funds/Grant Opportunities
Continue "we care" program to look out for residents with special needs during emergencies. This program assists in getting the right information and assistance to community members who need additional assistance during a disaster and may not receive information effectively from other outlets.	Medium	Township Staff	Ongoing	Township Staff Time	General Funds/Grant Opportunities
Install emergency backup generators at Town Hall, The Department of Public Works, Construction and Zoning Office, and First-Aid	High	Township Staff/Contractor	December 2015	\$50,000	HMGP Grant
Install a SCADA system	High	Township Staff/Contractor	December 2016	TBD	Capital Budget/HMGP Grant
Allocate a place for debris removal	Medium	Township Staff/Contractor	December 2015	Township Staff Time	Township General Funds
Provide more radios for emergency communication	Medium	Township Staff/Contractor	Ongoing	TBD	Township General Funds/Grants Opportunities

STRUCTURAL PROJECTS

Action Item	Priority	Responsible Party	Target Deadline	Budget	Funding Source
Install riprap along the shoreline to protect from erosion and flood related hazards	Medium	Township Staff/Contractor	December 2017	\$250,000	Possible HMGP Grant
Storm drain and channel maintenance	Ongoing	Township Staff	Ongoing	Township Staff Time	Township General Funds

PUBLIC INFORMATION

Action Item	Priority	Responsible Party	Target Deadline	Budget	Funding Source
Implement the GIS program and make available to the public	High	Township Staff and T&M Associates	July 2015	Township Staff Time	Township General Funds
Continue police outreach programs in schools to include children in outreach and improve families capability for disaster mitigation, preparedness, response, and recovery	Low	Township Staff	Ongoing	Township Staff Time	Township General Funds
Continue Junior Police Academy Program to include youth in hazard related education and to support them in conducting effective, relevant outreach to community	Low	Township Staff	Ongoing	Township Staff Time	Township General Funds
Continue "We Care" Program to look out for residents with special needs during emergencies. This program assists in getting the right information and assistance to community members who need additional assistance during a disaster and may not receive information effectively from other outlets.	Low	Township Staff	Ongoing	Township Staff Time	Township General Funds
Maintain, improve, and expand education and awareness to provide effective and relevant information to community members	Low	Township Staff	Ongoing	Township Staff Time	Township General Funds

IX. PLAN IMPLEMENTATION & MAINTENANCE

This floodplain management plan is intended to be a dynamic document, adapting to changes in flood hazards and the needs of the Township of Ocean. The recommendations and actions identified in this plan should be implemented by the designated lead for each action item as funding and resources become available. Changes in future conditions and funding availability may determine the timeline for when some actions get implemented. As the plan is evaluated each year and updated every five, the goals and objectives of this plan should also be evaluated and revised as necessary.

The Township's CRS Coordinator will be responsible for monitoring the plan and ensuring that the floodplain management plan committee will meet at least once per year to aid with the yearly plan evaluation. The original members of the committee will remain, unless they wish to be replaced. Then a like representative will replace them. The committee will review the plan on annual basis to evaluate changes to hazard conditions, goals and objectives, and progress made towards objectives. The committee will identify any necessary changes or revision to the plan. The annual review will include:

- A review of the original plan;
- Identification of any flood, hurricane, or other disaster that has impacted Ocean since the last review;
- Review of action items from the original plan, including what has been accomplished;
- Discussion on why actions have not been completed;
- Where vulnerabilities have increased, identify why and what additional measures can be taken to decrease the vulnerability of that area to flood hazards;
- Recommendations for new projects or revised action items; and
- Survey of available resources to address action items.

This Floodplain Management Plan will be updated every five years and reviewed for CRS credit according to the CRS Coordinator's Manual in effect at the time. The 5-year update must include the following steps to retain CRS credit:

- The update must be conducted by a committee;
- A public meeting must be conducted to review and receive comments on the draft update;
- Review of new studies, reports, and technical information of the Township's needs, goals, and plans for the area;

- New floodplain or hazard mapping;
- Identification of additional repetitive loss properties or completed mitigation projects;
- Discuss any major flood or other disasters that have occurred since the plan was adopted;
- Any other changes in flooding conditions or development exposed to flooding or other hazards;
- Goals must be evaluated to determine if they are still appropriate;
- The action plan will be revised to account for projects that have been completed, dropped, or changed, and for changes in the hazard and problem assessments; and
- The update will be adopted by the Township's governing body.

Appendix A: Steering Committee Meeting Outlines

**Minutes – 4th Committee Meeting
Township of Ocean
Floodplain Management Plan Committee
Friday, April 10, 2015 (10:00 AM)
Municipal Complex Court Room**

Call to Order at 10:00 AM

Roll Call and Introductions

Diane Ambrosio
Renee Dronebarger
Adele Shaw
William Sneddon
John Petroselli
Patrick Jeffery
Christine Bell
Matt Ambrosio
Louis Fisher
George Thomas
Kevin Harnett

Discussion Items:

- Review of Draft FMP

The committee reviewed the draft FMP assembled by T&M Associates. Overall the plan was determined to be comprehensive and inclusive of the items discussed at the prior committee meetings and public meeting. The committee members were provided with a copy of the plan for review.

Committee Comments

The committee determined that they would independently review the FMP document and pending public comments at the second public meeting determine if a 5th committee meeting was required to implement the comments.

Adjourn

Meeting was adjourned at 10:35 AM

MINUTES PREPARED BY: Patrick Jeffery on April 13, 2015.

**Minutes – 3rd Committee Meeting
Township of Ocean
Floodplain Management Plan Committee
Friday, March 27, 2015 (10:00 AM)
Municipal Complex Court Room**

Call to Order at 10:05 AM

Roll Call and Introductions

Diane Ambrosio
Renee Dronebarger
Adele Shaw
William Sneddon
John Petroselli
Laurie Clune
Patrick Jeffery
Christine Bell
Matt Ambrosio
Louis Fisher
George Thomas
Kevin Harnett

Discussion Items:

- Discussion of Phase III Item(s)
 - Step 6: Set Goals
 - Goals should set the context for the subsequent review of floodplain management activities and drafting the action plan. They should incorporate or be consistent with other community goals for the affected areas. A multi-hazard mitigation plan should have goals that address all the major hazards that face the community.

The committee reviewed the goals established in the prior FMP, draft goals prepared by T&M Associates and sample goals provided in the CRS coordinators manual. The following goals were discussed:

- 1. Reduce losses from flood damage through codes and standards*
- 2. Coordinate and prioritize maintenance of the stormwater management system*
- 3. Educate decision makers and the public about stormwater management and floodplain management*
- 4. Protect health and safety of the public*
- 5. Protect existing properties by encouraging property owners to build higher than the base flood elevation.*
- 6. Improve the quality of life in Waretown*

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7. Ensure that public funds are used in the most efficient manner possible.

- The points for this step are provided if the plan includes a statement of the goals of the community's floodplain management or hazard mitigation program. The goals must address all flood-related problems identified in Step 5.

The committee discussed the inclusion of the goals into the floodplain management plan.

○ Step 7: Review Possible Activities

- At this step, the plan reviews different activities that could prevent or reduce the severity of the problems described in Step 5. This is a systematic review of a wide range of activities to ensure that all possible measures are explored, not just the traditional approaches of flood control, acquisition, and regulation of land use. The review, including the pros and cons of each activity, must be included in the plan document. Figure 510-4 lists some of the types of activities that could be reviewed under each of the six credited categories.

The committee reviewed the activities listed in the prior FMP as well as draft activities prepared by T&M Associates. The following were discussed:

Preventative Measures

Planning and Zoning

Open Space Preservation

Floodplain Regulations

Erosion Setbacks

Stormwater Management

Drainage System maintenance

Building Codes

Property Protection

Acquisition

Relocation

Building Elevation

Retrofitting

Flood Insurance

Natural Resource Protection

Wetlands

Natural Area Preservation

Coastal Barrier Protection

Emergency Services

Hazard Warnings

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*Hazard Response Operations
Critical Facilities Protection
Health and Safety Maintenance*

Public Information

*Mapping
Outreach
Real estate Disclosure
Technical Assistance
Environmental Education*

- The range of activities should be evaluated for each area affected. While some of them may be quickly eliminated as inappropriate, most deserve careful consideration, especially to ensure full understanding of their costs and benefits.

The committee discussed the range of activities as well as their level of importance, cost and method of implementation. The notes were compiled on the draft activities document compiled by T&M Associates.

- **Step 8: Draft an Action Plan**

After the review of alternatives during Step 7, an action plan is drafted (Step 8) that selects and specifies those activities appropriate to the community's resources, hazards, and vulnerable properties. The community should strive for a balanced program, selecting measures from more than one category of floodplain management activity. In every case, the community should implement preventive activities both to keep its flood problems from getting worse and also to protect new construction from the effects of natural hazards. There is no requirement that a floodplain management plan identify expensive or massive structural flood control projects. The plan must include activities that the community can be assured will be implemented through its own resources. If outside funding support is needed for some projects, the funding sources should be identified and researched to ensure that the projects are eligible and the community has a chance of receiving the funds. Many of the activities could receive CRS credit once they are implemented. Note that 50% of the maximum credit for this planning step is a prerequisite for Class 4 or better communities.

The committee reviewed the action plan items prepared by T&M Associates assigning a priority level, determining a responsible party, a target implementation date, budget and funding source for each activity.

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Township of Ocean
Floodplain Management Plan Committee
Friday, March 27, 2015 (10:00 AM)
Municipal Complex Court Room**

Overview of next committee meeting

Review Draft FMP (scheduled for April 10, 2015 at 10:00 AM)

Committee Comments

The committee discussed the 1st Public Meeting, noting that the meeting had strong attendance. Many of the public comments pertained to flood insurance rates and building codes. The comments reinforced the need for public education and outreach as discussed by the committee and as recommended in the draft FMP.

Adjourn

Meeting was adjourned at 10:50 AM

MINUTES PREPARED BY: Patrick Jeffery on March 30, 2015.

**Minutes – 2nd Committee Meeting
Township of Ocean
Floodplain Management Plan Committee
Friday, March 13, 2015 (10:00 AM)
Municipal Complex Court Room**

Call to Order at 10:00 AM

Roll Call and Introductions

Diane Ambrosio
Renee Dronebarger
Adele Shaw
William Sneddon
John Petroselli
Laurie Clune
Patrick Jeffery
Christine Bell
Matt Ambrosio
Louis Fisher
George Thomas
Kevin Harnett

Discussion Items:

- Discussion of Phase II Item(s)
 - Step 5: Assess the Problem
 - Overall Summary of Vulnerability to Hazards identified under Step 4 (Assess the Hazard), see meeting minutes (Meeting 1).
The committee reviewed and discussed hazards including Coastal Erosion, Drought, Climate Change, Earthquake, Hurricane, Extreme Temperature hot/cold, Wind, Tropical Storms, Nor'easters, Storm Surge, Tornado, Wildfires and Snow.
 - Description of the Impacts Identified in Step 4 (Assess the Hazard) have on the following:
 - Life safety and the need for warning and evacuating residents and visitors.
The committee discussed each of the events, any known occurrences in the past and how the community responded, including events requiring evacuation. Information was compiled for inclusion into the report. Wildfire and Hurricanes/Tropical Storms were discussed for their ability to affect evacuation routes.
 - Public health, including health hazards to individuals from flood waters and mold.
The committee discussed how hazard events affect public safety before and after a hazard event. It was discussed how education

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of the public was paramount in minimizing the effects of these hazards.

- **Critical facilities and infrastructure**
The committee reviewed the critical facilities map. There are no major critical facilities within a flood hazard area.
- **Community economy and major employers**
The committee discussed the effects of a hazard, mainly a flooding event on the local community economy. The committee reviewed how Sandy affected local marinas and industry along the Bayfront including restaurants and industries which support the marinas.

- **Number and types of affected buildings (Community Owned) within FHA, including status of insurance on each building. (see attached discussion summary for additional details).**
The committee reviewed the data showing that there were approximately 10,197 properties within the Township of which 2,328 were within a FHA. There are 2,657 properties within the 100 year and 500 year floodplain. The floodplain manager for the Township was working on obtaining the NFIP claims data.
- **Areas within the floodplain that provide natural functions (i.e. wetlands, riparian areas, sensitive areas, habitat for rare or endangered species).**
The committee reviewed and discussed the natural functions mapping.
- **Description of development, redevelopment and population trends.**
The committee discussed the effects of increases in impervious coverage and the desire for people to live on or near the water. The Committee felt that Waretown was mostly developed, however; it was important to redevelop and grow utilizing stormwater management regulations that would not increase the severity of localized flooding events.
- **Description of the impact of the future flooding conditions on people, property and natural floodplain functions.**
The committee reviewed the various flood maps, including the SLOSH models prepared and compared them to the known flood limits from Sandy. The committee noted that implementation of best management practices regarding floodplain management was important to minimize future losses from potential larger/more intense future storm events.

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Overview of next committee meeting

- Phase III – Mitigation Strategy: Step 6: Set Goals and Step:7 Review Possible Activities (scheduled for March 27, 2015 at 10:00 AM)

Committee Comments

Lt. Thomas indicated he would provided a listing of all business along the waterfront.

Adjourn

Meeting was adjourned at 10:55 AM

MINUTES PREPARED BY: Patrick Jeffery on March 16, 2015.

**Minutes - 1st Committee Meeting
Township of Ocean
Floodplain Management Plan Committee
Friday, February 27, 2015 (1:00 PM)
Municipal Complex Court Room**

Call to Order at 1:00 PM

Roll Call and Introductions

Diane Ambrosio
Renee Dronebarger
Adele Shaw
William Sneddon
John Petroselli
Laurie Clune
Patrick Jeffery
Christine Bell

Discussion Items:

- **Flood Plain Management Plan/Community Rating System Overview**
The committee reviewed the provided overview of the FPMP and CRS systems. The Committee reviewed the role of the CRS and how the FPMP impacts the community's rating and the benefits for a community to achieving the best possible rating. Benefits include a comprehensive FPMP which improves health, safety and the economic stability of the community as well as providing for reduced flood insurance premiums for residents.

- **Review of Phase I Items:**
 - **Step 1: Organize**
 - **Review Committee Selection**
The committee reviewed the listing of committee members as appointed by a Resolution Municipal Governing Body. The listing of members includes Township staff including representation from the Building Department, Public Works, Code Enforcement, Land Use/Planning, Emergency Management, Environmental Protection, Parks and Recreation, Administration, appointed professionals (Engineering and Planning), business owners, residents and other local stakeholders.
 - **Select a Committee Chairperson**
The committee determined that meetings will be chaired by Patrick Jeffery.
 - **Step 2: Involve the Public**
 - **Review Committee Meeting Schedule**
The schedule, as provided in the Meeting 1 handouts was approved.
 - **Schedule 1st Public Meeting in an affected area**

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The first public meeting will be on March 23, 2015 at the Waretown Community Center at 5:00 PM. The Township clerk will provide public notice of the meeting.

- **Schedule 2nd Public Meeting to obtain public input on Plan**
The committee will determine a second public meeting date as the draft of the plan is assembled.
- **Step 3: Coordinate**
 - **Review existing FPMP**
A copy of the current FPMP was provided to all committee members. A general overview was provided and committee members were instructed to review the plan and provide any comments at the next meeting.
 - **Review existing Flood Control Ordinance**
A copy of the current Flood Control Ordinance was provided to all committee members. A general overview was provided and committee members were instructed to review the ordinance and provide any comments at the next meeting.
 - **Review existing and preliminary FIRM maps**
The committee reviewed the most recent preliminary FIRM maps, discussing changes between the previous maps and currently proposed maps.
 - **Discuss other sources of information/existing studies/reports**
The committee reviewed the SLOSH mapping prepared by Rachael Sacatelli from the Rutgers University.
 - **Discuss the community's needs, goals and plans for the area**
The committee reviewed the current FPMP and discussed the ability to update the master plan as well as the FPMP based upon current land use practices as well as lessons learned from recent flooding events, such as Hurricane Sandy.
 - **Review correspondence/coordination with agencies and organizations outside the community's governmental structure**
The committee reviewed the listing of letters which were sent out to agencies and organizations outside the community's governmental structure. The committee made a suggestion that an additional letter be sent to JCP&L. A listing of letters sent out is provided in the Meeting 1 packet.
- **Discussion of Phase II Item(s)**
 - **Step 4: Assess the Hazard**
 - **Assess the Flood Hazard**
 - **Review of Special Flood Hazard Area (SFHA) shown on the FIRM**

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The committee reviewed the most recent preliminary FIRM Maps as well as GIS mapping showing the SFHA's with overlays such as the location of community structures/buildings and evacuation routes. Copies of the mapping are contained within the Meeting 1 packet.

- Review repetitive loss areas and data

The committee reviewed the repetitive loss data which was compiled into a mapping showing areas which had repetitive loss claims. The committee was asked to review the mapping and provide any comments which pertaining to the repetitive loss areas such as the age of the homes or other environmental factors which should have contributed to the repetitive claims.

- Discuss areas not mapped on the FIRM which have flooded in the past.

The committee reviewed the FIRM and determined that it was inclusive of areas known to flood.

- Identification of other flood studies

The committee reviewed the SLOSH mapping prepared by Rachael Sacatelli from the Rutgers University.

- Assessment of less-frequent flood hazards

- Inventory of levees that could result in flooding if they were to fail
No levees were believed to be located within the Municipality.

- Inventory of dams that could result in flooding if they were to fail
The committee noted two dams within Town. One located at Waretown Lake and the second located within the Wells Mills Preserve.

- Identify flood hazards in Section 401 of the CRS Coordinators Manual as follows:

1. Uncertain flow paths: alluvial fans, moveable bed streams, channel migration, and other floodplains where the channel shifts during a flood.

The committee reviewed flooding events and determined that there were no notable channel shifts during flood events. The community is impacted mostly by storm surges and tidal flooding. Many of the communities waterways are lagoons which are bulkheaded or contain other means of structural protection minimizing the ability for these structures to shift the footprint of a waterway during a flood. It was noted that bulkheads do overtop, however; this is typically a result of a surge resulting in a still water elevation encompassing a large area within the Municipality and did not result in a shift a natural stream channel.

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2. Closed basin lakes: lakes that have a small or no outlet that may stay above flood stage for weeks, months, or years.
None identified by committee members. Technical staff will review mapping to determine if any exist to be included in the FPMP.
 3. Ice jams: flooding caused when warm weather and rain break up a frozen river. The broken ice floats down river until it is blocked by an obstruction, such as a bridge or shallow area, creating a dam.
This was reviewed and noted to a rare occurrence, with no known knowledge of an event in recent history.
 4. Land subsidence: lowering of the land surface caused by withdrawal of subsurface water or minerals or by compaction of organic soils.
No known sources.
 5. Mudflow hazards: a river, flow, or inundation of liquid mud down a hillside, usually as a result of a dual condition of loss of brush cover and the subsequent accumulation of water on the ground, preceded by a period of unusually heavy or sustained rain.
The community has not experienced mudflow hazards to the best understanding of the committee members.
 6. Coastal erosion: areas subject to the wearing away of land masses caused primarily by waves on the oceans, Gulf of Mexico, and the Great Lakes.
The community contains a large number of areas which are subject to coastal erosion. These areas include bay frontage and lagoon frontages as well as flooding along the Oyster Creek, Lochiel Creek, Waretown Creek, Warrens Creek and sever other smaller unnamed waterways and marsh areas.
 7. Tsunamis: large ocean waves typically caused by an earthquake, landslide, or underwater volcano.
Although the community has not direct knowledge of tsunamis affecting the community, because of its location along the coast the community is susceptible to a Tsunamis although storm surges are a more common and recorded source for flooding.
- Identify the coastal A zone (wave heights of 1.5 to 3 feet during the 100-year storm)
The Coastal A Zone has been mapped and the committee reviewed the FIRM Maps and GIS Maps prepared by T&M Associates as provided in the Meeting 1 packet.
 - Map the areas affected
The areas discussed were mapped by the T&M Associates, copies of the mapping were provided in the Meeting 1 packet and reviewed by Committee members.

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- Summarize the Hazards in lay terms
The community discussed the hazards which include coastal flooding due to the Township's location on the Barnegat Bay as well as flooding from the noted creeks, streams and marsh areas within and surrounding the Municipality. The committee will review the Flood Plain Management Plan draft document to ensure it contains a lay description of the Hazards.
- Identify areas likely to be flooded and flood problems that are likely to worsen as a result of the following:
 - Changes to the floodplain development and demographics
The committee reviewed the SLOSH maps as well as the maps showing 1, 2 and 3 feet of sea level rise. As the Community becomes more developed the committee noted that more infrastructure and a larger percentage of the population will be located within a SFHA.
 - Development in the watershed
The committee discussed development within the watershed, including increasing impervious coverage. The committee noted that development was a cause of localized flooding and while it should be monitored, the sources of flooding causing the most hazard to the Township were from the Barneget Bay/Atlantic Ocean and local tidal streams, marshes and waterways which were tributary thereto.
 - Climate change or sea level rise
The committee reviewed the mapping showing the effects of sea level rise which would likely result in the loss of lands and placement of a larger percentage of the population and local infrastructure within a SFHA.
- Describe the magnitude, severity, history and probability of future events for other natural hazards including the following:
 - Earthquakes
The committee discussed the relatively low probability of earthquakes which pose a hazard to the township.
 - Wildfires
The committee noted that the Township, a large percentage of which is located in the Pinelands, has a high annual probability and susceptibility to wild fires. The committee noted recent fires within the past few years.
 - Tornados

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The community has a high annual probability, however potential for losses are generally limited with exception for extreme events.

In addition to the listed hazards the committee discussed Coastal Flooding, Tsunamis, Hurricanes and Tropical Storms, Winter Storms, High Wind Events and drought all of which were noted to be included in the Flood Plain Management Plan draft document.

Overview of next committee meeting

- o Phase II – Step 5: Assess the Problem (scheduled for March 13, 2015 at 10:00 AM)

Committee Comments

No comments provided

Adjourn

Meeting was adjourned at 2:15 PM

MINUTES PREPARED BY: Patrick Jeffery on March 6, 2015.

Appendix B: Public Meetings Information



**Township of Ocean
Floodplain Management Plan
2nd Public Meeting– April 20, 2015
Waretown Fire House
5:30 PM**

Floodplain Management Plan



Floodplain Management Plan Project Background



- Ocean Township was awarded a grant to update their Floodplain Management Plan (FMP) through the NJ Department of Community Affairs (DCA).
- The main objective of the FMP is to provide an overall strategy of programs, projects and measures that will reduce the impacts of hazards on the community and promote resiliency within flood hazard areas.
- The FMP provides the community with credits under the Community Rating System (CRS) which can lower flood insurance premiums within the community.
- One of the main goals of the FMP committee is to increase collaboration during the planning process to obtain input and comment from as many sources as possible.



Floodplain Management Plan Executive Summary



The Floodplain Management Plan is intended to:

- Identify and assess flood hazards within Ocean Township
- Establish goals and objectives for floodplain management
- To present a series of actions designed to minimize flooding and mitigate the impacts from flooding in the future.

Planning Process

Phase 1 – Planning Process

- Organize
- Involve the Public
- Coordinate

Phase 2 – Risk Assessment

- Assess the Hazard
- Assess the Problem

Phase 3 – Mitigation Strategy

- Set Goals
- Review Possible Activities
- Draft an Action Plan

Phase 4 – Plan Maintenance

- Adopt the Plan (scheduled May 2015)
- Implement, evaluate, revise



Phase 1 - Organize Task 1 - Organize



Waretown's Floodplain Management Committee was formed by Township Committee Resolution 2015-91 and consists of the following members:

Construction Official – Louis Fischer (*staff*)
Municipal Clerk – Diane B. Ambrosio (*staff/resident*)
Planning/Zoning – Laurie Clune (*staff/resident*)
Code Enforcement – Renee Dronebarger (*staff*)
Police/OEM – Lt. George Thomas or designee (*Staff*)
Historical Society – Adele Shaw or designee (*Stakeholder*)
Planning Board – William Sneddon (*Stakeholder/Resident*)
Planning Board – Dan Collamer (*Stakeholder/Resident*)
Zoning Board – John Petroselli (*Stakeholder/Resident*)
Resident – Kevin Harnett (*Resident*)
Resident – Chris West (*Resident*)
DPW/Parks/Recreation – Matt Ambrosio (*Staff/Resident*)



Phase 1 - Organize Task 2 – Involve the Public



- Committee contains both public and private stakeholders representing a range of interests and perspectives.
- Two public information meetings are scheduled (including this meeting)
 - March 23, 2015 (5:30 PM) Waretown Community Center
 - April 20th, 2015 (5:30 PM) Waretown Fire House
- FMP will be up for public comment and review at the before the Planning Board Meeting.
- Draft copy of the plan is posted on website. Update draft will be posted this week.
- Numerous outside agencies, groups, commissions, and adjacent municipalities were notified of the FMP and requested to provide input.

Phase 1 - Organize Task 3 – Coordinate



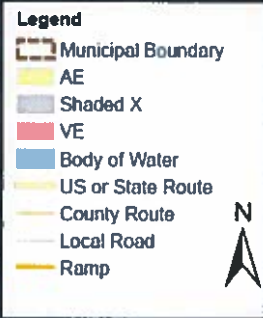
Review of Existing Information

- Current FIRM Map
- Preliminary FIRM Map
- 1982 Master Plan
- 1999 Master Plan
- 2005 Master Plan
- 2005 Town Center Goals and Objectives
- 2006 Land Use Plan Element Amendment
- 2010 Emergency Operating Plan
- 2012 Floodplain Management Plan
- 2014 Strategic Recovery Planning Report
- Current Ocean Township Flood Control Ordinance
- Ocean County Hazard Mitigation Plan

Phase 2 – Risk Assessment
Task 4 – Assess the Hazard



ABFE Map



Phase 2 – Risk Assessment

Task 5 – Assess the Problem

Problem Assessment

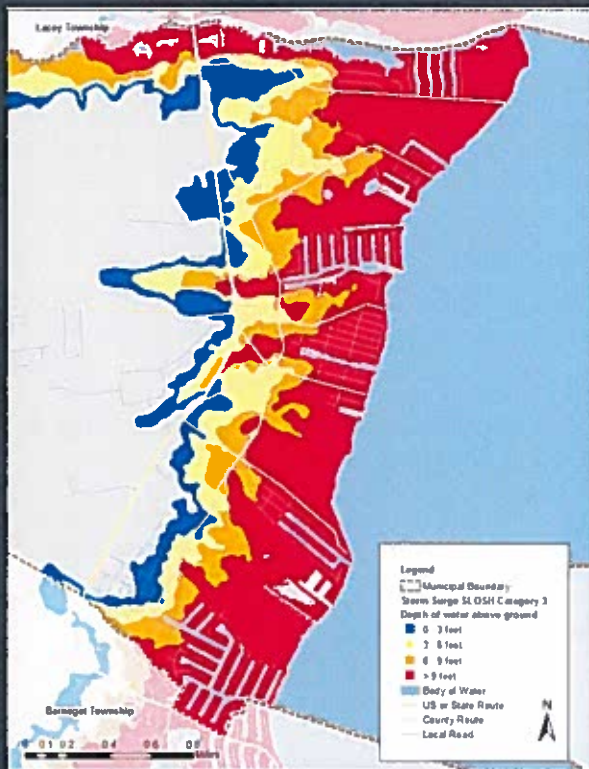
- ±10,200 properties total
- ±1,500 residential properties and 40 commercial properties within the SFHA
- Flooding generally occurs as a result of Coastal Flooding due to the Township's location on the Barnegat Bay.
- Localized flooding resulting from non-coastal events is also a consideration, although it has less potential to result in significant damage.
- Result of development, loss of natural flood storage, increase of impervious coverage.
- Critical facilities are outside of the floodplain

Hazard Impact

- Damage to property
- Damage to infrastructure
- Impact on emergency services
- Health Impacts (mold, lead, asbestos, etc...)
- Economic Impacts



Phase 2 – Risk Assessment Task 5 – Assess the Problem



Storm Surge (SLOSH Category 3)



Phase 3 – Mitigation Strategy

Task 6 – Set Goals

Over the course of the various Floodplain Management Plan Steering Committee meetings, the Committee discussed the goals that the Township would like to achieve with the Floodplain Management Plan to increase resiliency and mitigate future storm events. The following is a list of the goals agreed upon by the Committee:

- Reduce loss from flood damage through codes and standards;
- Educate decision makers and the public about stormwater management and floodplain management;
- Coordinate and prioritize maintenance of the stormwater management system;
- Protect existing properties by encouraging property owners to build higher than the base flood elevation;
- Protect health and safety;
- Improve the quality of life in Ocean Township;
- Ensure that public funds are used in the most efficient manner.



Phase 3 – Mitigation Strategy

Task 7 – Activities

Preventative Measures

- Develop GIS to increase resiliency and enable for better preparation and planning
- Preserve Open Space
- Review/Update Stormwater Management Ordinance
- Review/Update Flood Control Ordinance
- Erosion Setback Ordinance (along Barnegat Bay)
- Zoning Amendments/Building Code Updates
- Maintain/Update Stormwater Infrastructure

Property Protection

- Acquisition (Blue Acres, NRCS programs)
- Relocation
- Adjusting Building Codes/Elevation Requirements
- Flood Insurance (encourage participation)

Natural Resource Protection

- Wetlands
- Erosion and Sediment Control
- Barnegat Bay

Emergency Services

- Hazard Warnings
- Hazard Response Operations
- Critical Facilities Protection/Relocation
- Health and Safety Maintenance

Structural Projects

- Stormwater Infrastructure Maintenance/Improvements

Public Information

- Mapping
- Outreach



Phase 3 – Mitigation Strategy Task 8 – Action Plan

PREVENTATIVE MEASURES					
Action Item	Priority	Responsible Party	Deadline	Budget	Funding Source
Prepare a 5-year Capital Improvement Plan	High	Township Staff and T&M Associates	July 2015	\$30,000	NJDCA Grant (secured)
Create an automated and expedited system for zoning and construction permit administration	High	Township Staff and T&M Associates	July 2015	\$25,000	NJDCA Grant (secured)
Develop a Geographic Information System (GIS) Program	High	Township Staff and T&M Associates	July 2015	\$50,000	NJDCA Grant (secured)
Update Zoning Ordinances in the waterfront development districts as they relate to resiliency	High	Township Staff and T&M Associates	August 2015		Township General Funds
Continue to support open space preservation throughout the Township	Low	County, State, Federal, and nonprofit partners	Ongoing	Township Staff Time	TBD
Increase participation in the Community Rating System (CRS) Program	Medium	Township Staff	October 2015	Township Staff Time	Township General Funds
Enforce the Township Stormwater Management Plan & Ordinance	Ongoing	Planning, Zoning, Code Enforcement & Construction Departments	Ongoing	Township Staff Time	Township General Funds

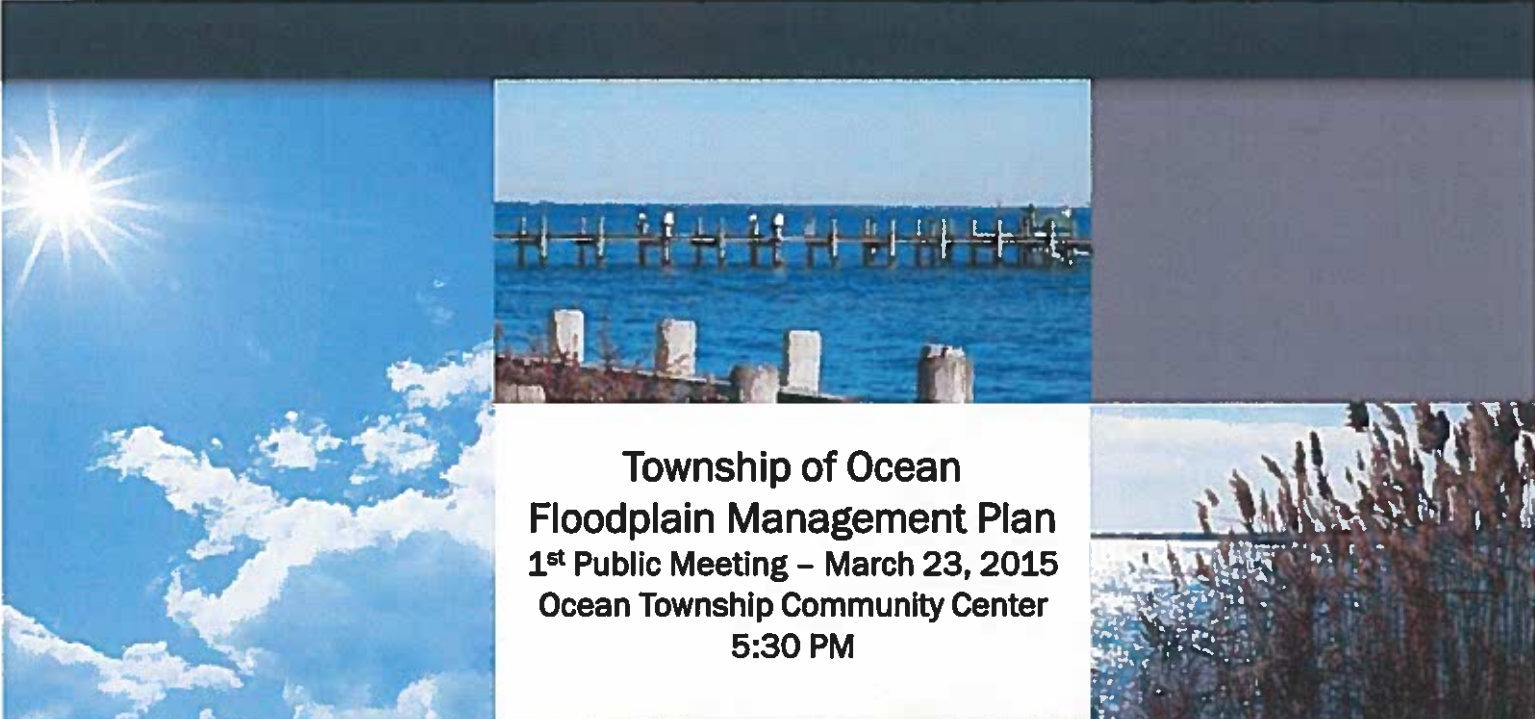


Phase 4 – Plan Maintenance

Adopt Plan

- Please submit comments to pjeffery@tandmassociates by Friday, May 1, 2015.
- Ocean Township Planning Board meeting to adopt plan: May 7, 2015
- Update Plan will be posted to Township website prior to final Adoption.





**Township of Ocean
Floodplain Management Plan
1st Public Meeting – March 23, 2015
Ocean Township Community Center
5:30 PM**

Floodplain Management Plan



Floodplain Management Plan Project Background



- Ocean Township was awarded a grant to update their Floodplain Management Plan (FMP) through the NJ Department of Community Affairs (DCA).
- The main objective of the FMP is to provide an overall strategy of programs, projects and measures that will reduce the impacts of hazards on the community and promote resiliency within flood hazard areas.
- The FMP provides the community with credits under the Community Rating System (CRS) which can lower flood insurance premiums within the community.
- One of the main goals of the FMP committee is to increase collaboration during the planning process to obtain input and comment from as many sources as possible.



National Flood
Insurance Program
NFIP

- NFIP provides Federally backed flood insurance within a participating communities which enact and enforce floodplain regulations
- Through the Community Rating System, communities are rewarded for taking measures and enacting programs which reduce flood damage to existing buildings, manage development outside of flood hazard areas, protect new buildings beyond the minimum standards, etc



Community Rating System (CRS)

- Goals

- Reduce and avoid flood damage to insurable property.
- Strengthen and support the insurance aspects of the NFIP.
- Foster comprehensive floodplain management.

- Benefits of Participation

- Development of a stronger and more resilient community.
- Discounts on flood insurance for residents.



Community Rating System (CRS)

Table 110-1. CRS classes, credit points, and premium discounts.

CRS Class	Credit Points (cT)	Premium Reduction	
		In SFHA	Outside SFHA
1	4,500+	45%	10%
2	4,000-4,499	40%	10%
3	3,500-3,999	35%	10%
4	3,000-3,499	30%	10%
5	2,500-2,999	25%	10%
6	2,000-2,499	20%	10%
7	1,500-1,999	15%	5%
8	1,000-1,499	10%	5%
9	500-999	5%	5%
10	0-499	0	0

Ocean Township is currently a 6



Community Rating System (CRS)

Table 110-2. Credit points awarded for CRS activities.

Activity	Maximum Possible Points ¹	Maximum Points Earned ²	Average Points Earned ³	Percentage of Communities Credited ⁴
300 Public Information Activities				
310 Elevation Certificates	110	110	45	100%
320 Map Information Service	90	70	50	93%
330 Outreach Projects	350	175	72	89%
340 Hazard Disclosure	80	57	16	71%
350 Flood Protection Information	125	98	39	92%
360 Flood Protection Assistance	110	65	49	41%
370 Flood Insurance Promotion ⁵	110	0	0	0%
400 Mapping and Regulations				
410 Floodplain Mapping	802	585	64	50%
420 Open Space Preservation	2,820	1,548	463	70%
430 Higher Regulatory Standards	2,042	784	213	69%
440 Flood Data Maintenance	222	171	87	89%
450 Stormwater Management	785	540	107	84%
500 Flood Damage Reduction Activities				
510 Floodplain Mgmt. Planning	822	373	167	46%
520 Acquisition and Relocation	2,250	1,701	165	24%
530 Flood Protection	1,600	632	45	12%
540 Drainage System Maintenance	570	449	212	77%
600 Warning and Response				
610 Flood Warning and Response	395	353	129	37%
620 Levees ⁶	235	0	0	0%
630 Dams ⁷	180	0	0	0%



Community Rating System (CRS)

Table 510-1. Planning steps for mitigation and for the CRS.

Multi-hazard Mitigation Planning	CRS	Maximum
Phase I - Planning process		
§201.6(c)(1)	1. Organize	15
§201.6(b)(1)	2. Involve the public	120
§201.6(b)(2) & (3)	3. Coordinate	35
Phase II - Risk assessment		
§201.6(c)(2)(i)	4. Assess the hazard	35
§201.6(c)(2)(ii) & (iii)	5. Assess the problem	52
Phase III - Mitigation strategy		
§201.6(c)(3)(i)	6. Set goals	2
§201.6(c)(3)(ii)	7. Review possible activities	35
§201.6(c)(3)(iii)	8. Draft an action plan	60
Phase IV - Plan maintenance		
§201.6(c)(5)	9. Adopt the plan	2
§201.6(c)(4)	10. Implement, evaluate, revise	26
Total		382



Phase I Step 1: Organize

Waretown's Floodplain Management Committee was formed by Township Committee Resolution 2015-91 and consists of the following members:

Construction Official – Louis Fischer (*staff*)
Municipal Clerk – Diane B. Ambrosio (*staff/resident*)
Planning/Zoning – Laurie Clune (*staff/resident*)
Code Enforcement – Renee Dronebarger (*staff*)
Police/OEM – Lt. George Thomas or designee (*Staff*)
Historical Society – Adele Shaw or designee (*Stakeholder*)
Planning Board – William Sneddon (*Stakeholder/Resident*)
Planning Board – Dan Collamer (*Stakeholder/Resident*)
Zoning Board – John Petroselli (*Stakeholder/Resident*)
Resident – Kevin Harnett (*Resident*)
Resident – Chris West (*Resident*)
DPW/Parks/Recreation – Matt Ambrosio (*Staff/Resident*)



Phase I
**Step 2: Involve
the Public**

- Conduct the planning process through the FMP Committee
- Hold Public Meetings to gain public input on natural hazards, problems, possible solutions and eventually to review the FMP.



Phase I
Step 2: Coordinate

- Review of existing studies, reports and technical information:
 - Current Municipal FMP
 - Current Flood Control Ordinance
 - FEMA/Other Mapping
- Coordinate with agencies and organizations outside the community's governmental structure

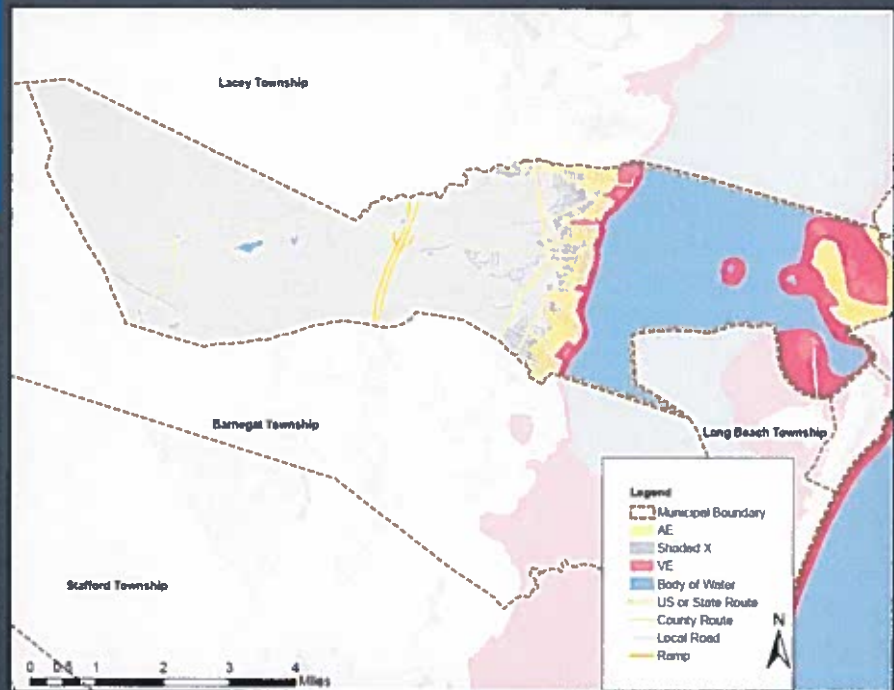


Phase II
**Step 4: Asses the
Hazard**

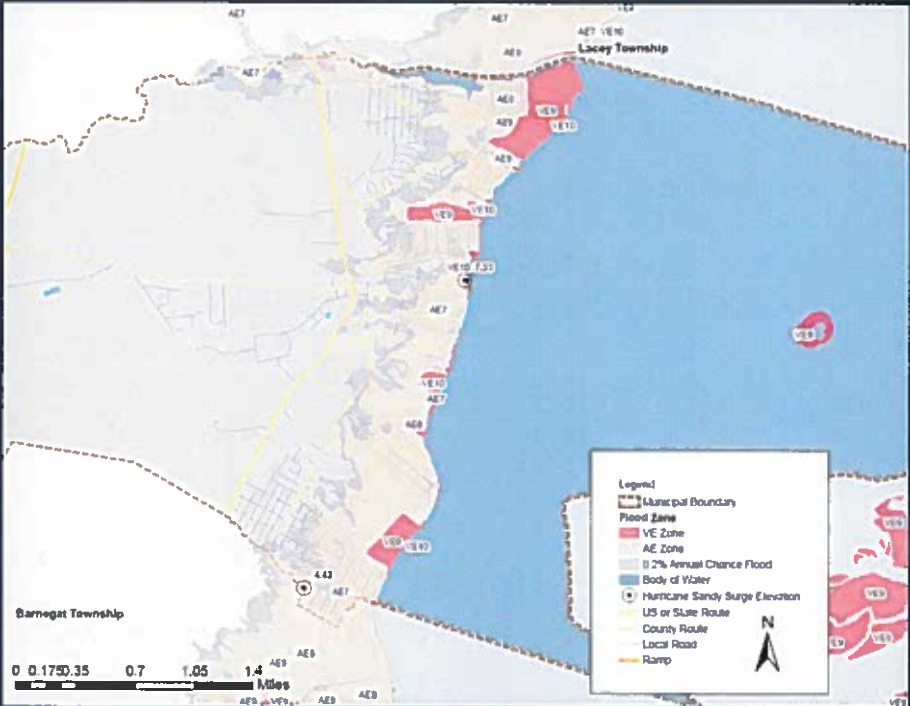
- Current Flood Hazards
- Review of Special Flood Hazard Areas
- Areas not Mapped on the FIRM which have flooded in the past
- Other Flood Studies (SLOSH)
- Dams/Levees that could result in flooding were they to fail
- Other Hazards:
 - Tsunamis
 - Ice jams
 - Earthquakes
 - Wildfires
 - Tornados/Wind Storms
 - Development within the watershed
 - Climate Change/Sea Level Rise



FEMA ABFE Data



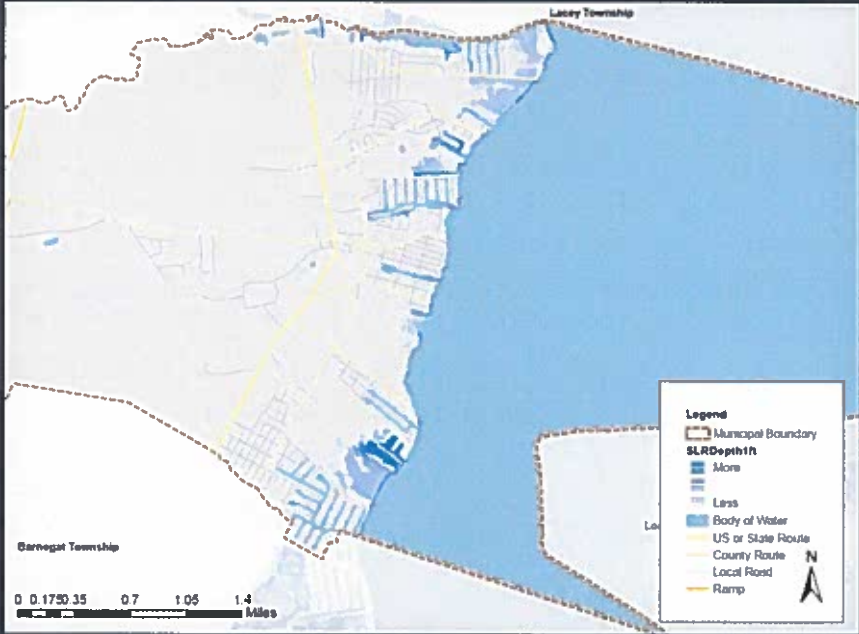
SANDY Surge Elevations



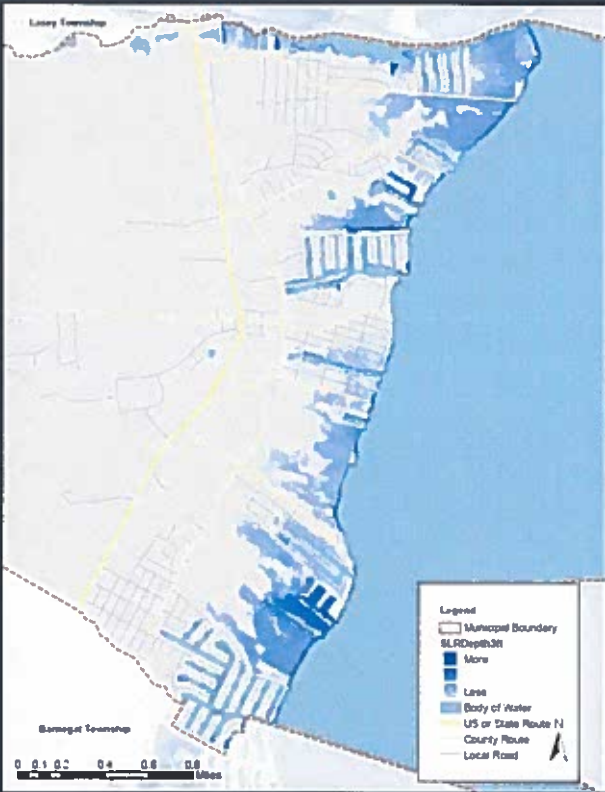
SANDY Surge Extent



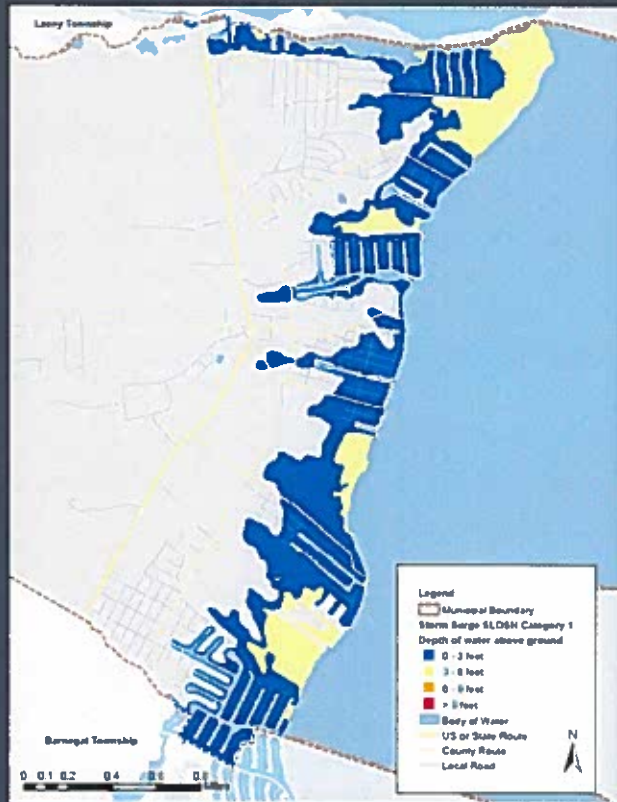
Sea Level Rise 1 Foot



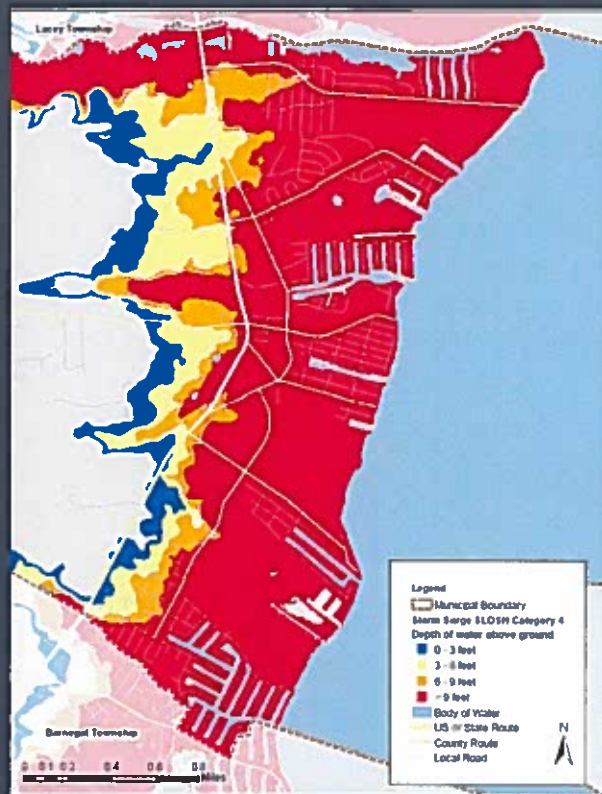
Sea Level Rise 3 Feet



SLOSH Category 1



SLOSH Category 4



***Public Questions
or Comments?***

Appendix C: Sample Letter to Outside Agencies



YOUR GOALS. OUR MISSION.

February 2, 2015

Michele A Rivers, Municipal Clerk
Barnegat Township
900 West Bay Avenue
Barnegat, NJ 08005
clerk@barnegat.net

Dear Ms. Rivers;

Ocean Township is currently in the process of preparing a Floodplain Management Plan to be incorporated as an element of the Township Master Plan. The Floodplain Management Plan will identify and assess flood hazards within the Township, establish the goals and objectives for floodplain management in Ocean, and present a series of actions designed to minimize flooding and mitigate the impacts from flooding in the future. The Plan is being funded through a Post- Sandy Planning Assistance Grant issued by the New Jersey Department of Community Affairs (DCA). As we continue to recover from the effects of Superstorm Sandy, the Township has prioritized flood prevention and mitigation as key elements of its post- Sandy planning strategy. The project implements recommendations of the Strategic Recovery Planning Report (SRPR) adopted by the Township Committee in June of 2014.

As part of the Floodplain Management planning process, we are seeking the input of valued stakeholders to develop a foundation for assessing known hazards and flood impacts in Ocean. We would appreciate any information from your organization regarding flood hazards in the Ocean Township and/ or anything your agency or organization is doing that may affect flooding or properties in flood-prone areas. Additionally, we would like to invite you, or another representative of your agency or organization to become more actively involved in our floodplain management planning process. Your input and involvement in this planning process is important to help identify key floodplain management issues affecting the Ocean Township and to establish goals and objectives to make Ocean more resilient to flooding events in the future.

Please contact Christine Bell, Staff Planner, T&M Associates at 732-671-6400 or cbell@tandmassociates.com on or before January 15, 2015 if you have any comments, suggestions, input, or would like to set up a meeting to discuss the floodplain management plan in greater detail.

Sincerely,

James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Veronica Laureigh, Municipal Clerk
Township of Lacey
818 Lacey Road
Forked River, NJ 08731
laceyclerk@laceytownship.org

Dear Mrs. Laureigh;

Ocean Township is currently in the process of preparing a Floodplain Management Plan to be incorporated as an element of the Township Master Plan. The Floodplain Management Plan will identify and assess flood hazards within the Township, establish the goals and objectives for floodplain management in Ocean, and present a series of actions designed to minimize flooding and mitigate the impacts from flooding in the future. The Plan is being funded through a Post- Sandy Planning Assistance Grant issued by the New Jersey Department of Community Affairs (DCA). As we continue to recover from the effects of Superstorm Sandy, the Township has prioritized flood prevention and mitigation as key elements of its post- Sandy planning strategy. The project implements recommendations of the Strategic Recovery Planning Report (SRPR) adopted by the Township Committee in June of 2014.

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Sincerely,


James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Gail J. Wetmore, Municipal Clerk
Barnegat Light Borough
10 East 7th Street
P.O. Box 576
Barnegat Light, NJ 08006

Dear Ms. Wetmore;

Ocean Township is currently in the process of preparing a Floodplain Management Plan to be incorporated as an element of the Township Master Plan. The Floodplain Management Plan will identify and assess flood hazards within the Township, establish the goals and objectives for floodplain management in Ocean, and present a series of actions designed to minimize flooding and mitigate the impacts from flooding in the future. The Plan is being funded through a Post- Sandy Planning Assistance Grant issued by the New Jersey Department of Community Affairs (DCA). As we continue to recover from the effects of Superstorm Sandy, the Township has prioritized flood prevention and mitigation as key elements of its post- Sandy planning strategy. The project implements recommendations of the Strategic Recovery Planning Report (SRPR) adopted by the Township Committee in June of 2014.

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Sincerely,


James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Lynda Wells, Municipal Clerk
Long Beach Township
6805 Long Beach Boulevard
Brant Beach, NJ 08008
wells@longbeachtownship.com

Dear Ms. Wells;

Ocean Township is currently in the process of preparing a Floodplain Management Plan to be incorporated as an element of the Township Master Plan. The Floodplain Management Plan will identify and assess flood hazards within the Township, establish the goals and objectives for floodplain management in Ocean, and present a series of actions designed to minimize flooding and mitigate the impacts from flooding in the future. The Plan is being funded through a Post- Sandy Planning Assistance Grant issued by the New Jersey Department of Community Affairs (DCA). As we continue to recover from the effects of Superstorm Sandy, the Township has prioritized flood prevention and mitigation as key elements of its post- Sandy planning strategy. The project implements recommendations of the Strategic Recovery Planning Report (SRPR) adopted by the Township Committee in June of 2014.

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Sincerely,


James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Richard J Buzby Jr., Chief of Police
Ocean Police Department
665 Radio Road
Ocean, NJ 08087

Dear Chief Buzby;

Ocean Township is currently in the process of preparing a Floodplain Management Plan to be incorporated as an element of the Township Master Plan. The Floodplain Management Plan will identify and assess flood hazards within the Township, establish the goals and objectives for floodplain management in Ocean, and present a series of actions designed to minimize flooding and mitigate the impacts from flooding in the future. The Plan is being funded through a Post- Sandy Planning Assistance Grant issued by the New Jersey Department of Community Affairs (DCA). As we continue to recover from the effects of Superstorm Sandy, the Township has prioritized flood prevention and mitigation as key elements of its post- Sandy planning strategy. The project implements recommendations of the Strategic Recovery Planning Report (SRPR) adopted by the Township Committee in June of 2014.

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Sincerely,

James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Frank Runza, Fire Chief
Parkertown Volunteer Fire Department
Station 70
830 Railroad Drive
Ocean, NJ 08087


Dear Chief Runza;

Ocean Township is currently in the process of preparing a Floodplain Management Plan to be incorporated as an element of the Township Master Plan. The Floodplain Management Plan will identify and assess flood hazards within the Township, establish the goals and objectives for floodplain management in Ocean, and present a series of actions designed to minimize flooding and mitigate the impacts from flooding in the future. The Plan is being funded through a Post- Sandy Planning Assistance Grant issued by the New Jersey Department of Community Affairs (DCA). As we continue to recover from the effects of Superstorm Sandy, the Township has prioritized flood prevention and mitigation as key elements of its post- Sandy planning strategy. The project implements recommendations of the Strategic Recovery Planning Report (SRPR) adopted by the Township Committee in June of 2014.

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Sincerely,



James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

West Tuckerton Volunteer Fire Department
Station 71
505 Route 9 S
Ocean, NJ 08087

To Whom it May Concern;

Ocean Township is currently in the process of preparing a Floodplain Management Plan to be incorporated as an element of the Township Master Plan. The Floodplain Management Plan will identify and assess flood hazards within the Township, establish the goals and objectives for floodplain management in Ocean, and present a series of actions designed to minimize flooding and mitigate the impacts from flooding in the future. The Plan is being funded through a Post- Sandy Planning Assistance Grant issued by the New Jersey Department of Community Affairs (DCA). As we continue to recover from the effects of Superstorm Sandy, the Township has prioritized flood prevention and mitigation as key elements of its post- Sandy planning strategy. The project implements recommendations of the Strategic Recovery Planning Report (SRPR) adopted by the Township Committee in June of 2014.

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Sincerely,

James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Jennifer Tompkins, Captain
Great Bay Regional Volunteer EMS
Squad 85
PO Box 437
Ocean, NJ 08087

Dear Captain Tompkins;

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Sincerely,

James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Rich Lacovara, Chairman
Ocean
Environmental Commission
665 Radio Road
Ocean, NJ 08087

Dear Mr. Lacovara;

Ocean Township is currently in the process of preparing a Floodplain Management Plan to be incorporated as an element of the Township Master Plan. The Floodplain Management Plan will identify and assess flood hazards within the Township, establish the goals and objectives for floodplain management in Ocean, and present a series of actions designed to minimize flooding and mitigate the impacts from flooding in the future. The Plan is being funded through a Post- Sandy Planning Assistance Grant issued by the New Jersey Department of Community Affairs (DCA). As we continue to recover from the effects of Superstorm Sandy, the Township has prioritized flood prevention and mitigation as key elements of its post- Sandy planning strategy. The project implements recommendations of the Strategic Recovery Planning Report (SRPR) adopted by the Township Committee in June of 2014.

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Please contact Christine Bell, Staff Planner, T&M Associates at 732-671-6400 or cbell@tandmassociates.com on or before January 15, 2015 if you have any comments, suggestions, input, or would like to set up a meeting to discuss the floodplain management plan in greater detail.

Sincerely,

James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Ocean
Natural Lands Trust Committee
665 Radio Road
Ocean, NJ 08087


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Sincerely,


James W. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Ocean County Sheriff's Office
Office of Emergency Management
Robert J. Miller Airpark
PO Box 2191
Toms River, NJ 08754
OceanCountyEmergencyManagement@co.ocean.nj.us


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Sincerely,


James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

David McKeon, Planning Director
Ocean County Planning Department
129 Hooper Ave
PO Box 2191
Toms River, NJ 08754
dmckeon@co.ocean.nj.us

Dear Mr. McKeon;

Ocean Township is currently in the process of preparing a Floodplain Management Plan to be incorporated as an element of the Township Master Plan. The Floodplain Management Plan will identify and assess flood hazards within the Township, establish the goals and objectives for floodplain management in Ocean, and present a series of actions designed to minimize flooding and mitigate the impacts from flooding in the future. The Plan is being funded through a Post- Sandy Planning Assistance Grant issued by the New Jersey Department of Community Affairs (DCA). As we continue to recover from the effects of Superstorm Sandy, the Township has prioritized flood prevention and mitigation as key elements of its post- Sandy planning strategy. The project implements recommendations of the Strategic Recovery Planning Report (SRPR) adopted by the Township Committee in June of 2014.

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Sincerely,

James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Christine Raabe, Director
Ocean County Soil Conservation District
714 Lacey Road
Forked River, NJ 08731
craabe@soildistrict.org

Dear Ms. Raabe;

Ocean Township is currently in the process of preparing a Floodplain Management Plan to be incorporated as an element of the Township Master Plan. The Floodplain Management Plan will identify and assess flood hazards within the Township, establish the goals and objectives for floodplain management in Ocean, and present a series of actions designed to minimize flooding and mitigate the impacts from flooding in the future. The Plan is being funded through a Post- Sandy Planning Assistance Grant issued by the New Jersey Department of Community Affairs (DCA). As we continue to recover from the effects of Superstorm Sandy, the Township has prioritized flood prevention and mitigation as key elements of its post- Sandy planning strategy. The project implements recommendations of the Strategic Recovery Planning Report (SRPR) adopted by the Township Committee in June of 2014.

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James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Zenobia Fields, Director, Department of Planning
North Jersey Transportation Planning Authority
One Newark Center
17th Floor
Newark, NJ 07102
zfields@njtpa.org

Dear Ms. Fields;

Ocean Township is currently in the process of preparing a Floodplain Management Plan to be incorporated as an element of the Township Master Plan. The Floodplain Management Plan will identify and assess flood hazards within the Township, establish the goals and objectives for floodplain management in Ocean, and present a series of actions designed to minimize flooding and mitigate the impacts from flooding in the future. The Plan is being funded through a Post- Sandy Planning Assistance Grant issued by the New Jersey Department of Community Affairs (DCA). As we continue to recover from the effects of Superstorm Sandy, the Township has prioritized flood prevention and mitigation as key elements of its post- Sandy planning strategy. The project implements recommendations of the Strategic Recovery Planning Report (SRPR) adopted by the Township Committee in June of 2014.

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Sincerely,



James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

David Lamm, State Conservation Engineer
Natural Resources Conservation Service
Somerset State Office
220 Davidson Avenue
4th Floor
Somerset, NJ 08873
david.lamm@nj.usda.gov


Dear Mr. Lamm;

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Sincerely,


James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

NJ Coastal Management Program
401-07D P.O. Box 420
401 East State Street
Trenton, NJ 08625
AskCMP@dep.state.nj.us

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Sincerely,


James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Public Affairs Office
US Army Corps of Engineers
Philadelphia District
The Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107
edward.c.voigt@usace.army.mil; richard.g.pearsall@usace.army.mil; stephen.rochette@usace.army.mil;
michael.t.boyle@usace.army.mil

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Sincerely,


James M. Onis, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

American Red Cross
Jersey Coast Chapter
150 West Park Avenue
Ocean, NJ 07712

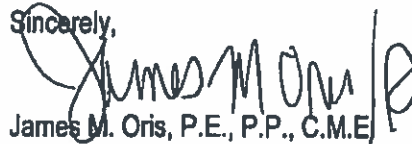
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Sincerely,



James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Helen Henderson, Atlantic Coast Programs Manager
American Littoral Society
Barnegat Bay Office
18 Harthshorne Drive
Suite 1
Highlands, NJ 07732
Helen@LittoralSociety.org

Dear Ms. Henderson;

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James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Christopher Huch, Community Resiliency Specialist
Jacque Cousteau Reserve
130 Great Bay Blvd.
Tuckerton, NJ 08087
huch@marine.rutgers.edu

Dear Mr. Huch;

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James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Gina Woolley, Executive Officer
Shore Builders Association of Central Jersey
190 Oberlin Avenue North
Lakewood, NJ 08701
gina@shorebuilders.org

Dear Ms. Woolley;

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James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Lawrence Fary, Construction Coordinator
Comcast Cable
751 Brick Boulevard
Brick, NJ 08723
Lawrence_Fary2@cable.comcast.com

Dear Mr. Fary;

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Sincerely,


James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

John H. Moyle, State Floodplain Manger
New Jersey Department of Environmental Protection
PO Box 420
Trenton, NJ 08625
john.moyle@dep.state.nj.us

Dear Mr. Moyle;

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James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Joseph Ruggeri, State Floodplain Manger
New Jersey Department of Environmental Protection
PO Box 420
Trenton, NJ 08625
joseph.ruggeri@dep.state.nj.us

Dear Mr. Ruggeri;

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Sincerely,


James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Stan Hales, Program Director
Barnegat Bay Partnership
Ocean County College
College Drive, PO Box 2001
Toms River, NJ 08754
shales@ocean.edu


Dear Dr. Hales;

Ocean Township is currently in the process of preparing a Floodplain Management Plan to be incorporated as an element of the Township Master Plan. The Floodplain Management Plan will identify and assess flood hazards within the Township, establish the goals and objectives for floodplain management in Ocean, and present a series of actions designed to minimize flooding and mitigate the impacts from flooding in the future. The Plan is being funded through a Post- Sandy Planning Assistance Grant issued by the New Jersey Department of Community Affairs (DCA). As we continue to recover from the effects of Superstorm Sandy, the Township has prioritized flood prevention and mitigation as key elements of its post- Sandy planning strategy. The project implements recommendations of the Strategic Recovery Planning Report (SRPR) adopted by the Township Committee in June of 2014.

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Please contact Christine Bell, Staff Planner, T&M Associates at 732-671-6400 or cbell@tandmassociates.com on or before January 15, 2015 if you have any comments, suggestions, input, or would like to set up a meeting to discuss the floodplain management plan in greater detail.

Sincerely,


James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Britta Forsberg- Wenzel,
Save Bamegat Bay
PO Box 155
Lavallette, NJ 08735
bwenzel@savebamegatbay.org

Dear Ms. Forsberg- Wenzel;

Ocean Township is currently in the process of preparing a Floodplain Management Plan to be incorporated as an element of the Township Master Plan. The Floodplain Management Plan will identify and assess flood hazards within the Township, establish the goals and objectives for floodplain management in Ocean, and present a series of actions designed to minimize flooding and mitigate the impacts from flooding in the future. The Plan is being funded through a Post- Sandy Planning Assistance Grant issued by the New Jersey Department of Community Affairs (DCA). As we continue to recover from the effects of Superstorm Sandy, the Township has prioritized flood prevention and mitigation as key elements of its post- Sandy planning strategy. The project implements recommendations of the Strategic Recovery Planning Report (SRPR) adopted by the Township Committee in June of 2014.

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Sincerely,


James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

Mike Bennett,
Atlantic City Electric
West Creek Operations Building
US Highway 9
West Creek, NJ 08092

Dear Mr. Bennett;

Ocean Township is currently in the process of preparing a Floodplain Management Plan to be incorporated as an element of the Township Master Plan. The Floodplain Management Plan will identify and assess flood hazards within the Township, establish the goals and objectives for floodplain management in Ocean, and present a series of actions designed to minimize flooding and mitigate the impacts from flooding in the future. The Plan is being funded through a Post- Sandy Planning Assistance Grant issued by the New Jersey Department of Community Affairs (DCA). As we continue to recover from the effects of Superstorm Sandy, the Township has prioritized flood prevention and mitigation as key elements of its post- Sandy planning strategy. The project implements recommendations of the Strategic Recovery Planning Report (SRPR) adopted by the Township Committee in June of 2014.

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Sincerely,



James M. Oris, P.E., P.P., C.M.E.
Township Engineer



YOUR GOALS. OUR MISSION.

February 2, 2015

David Menaker
New Jersey Natural Gas
1415 Wyckoff Road
PO Box 1464
Wall, NJ 07719

Dear Mr. Menaker;

Ocean Township is currently in the process of preparing a Floodplain Management Plan to be incorporated as an element of the Township Master Plan. The Floodplain Management Plan will identify and assess flood hazards within the Township, establish the goals and objectives for floodplain management in Ocean, and present a series of actions designed to minimize flooding and mitigate the impacts from flooding in the future. The Plan is being funded through a Post- Sandy Planning Assistance Grant issued by the New Jersey Department of Community Affairs (DCA). As we continue to recover from the effects of Superstorm Sandy, the Township has prioritized flood prevention and mitigation as key elements of its post- Sandy planning strategy. The project implements recommendations of the Strategic Recovery Planning Report (SRPR) adopted by the Township Committee in June of 2014.

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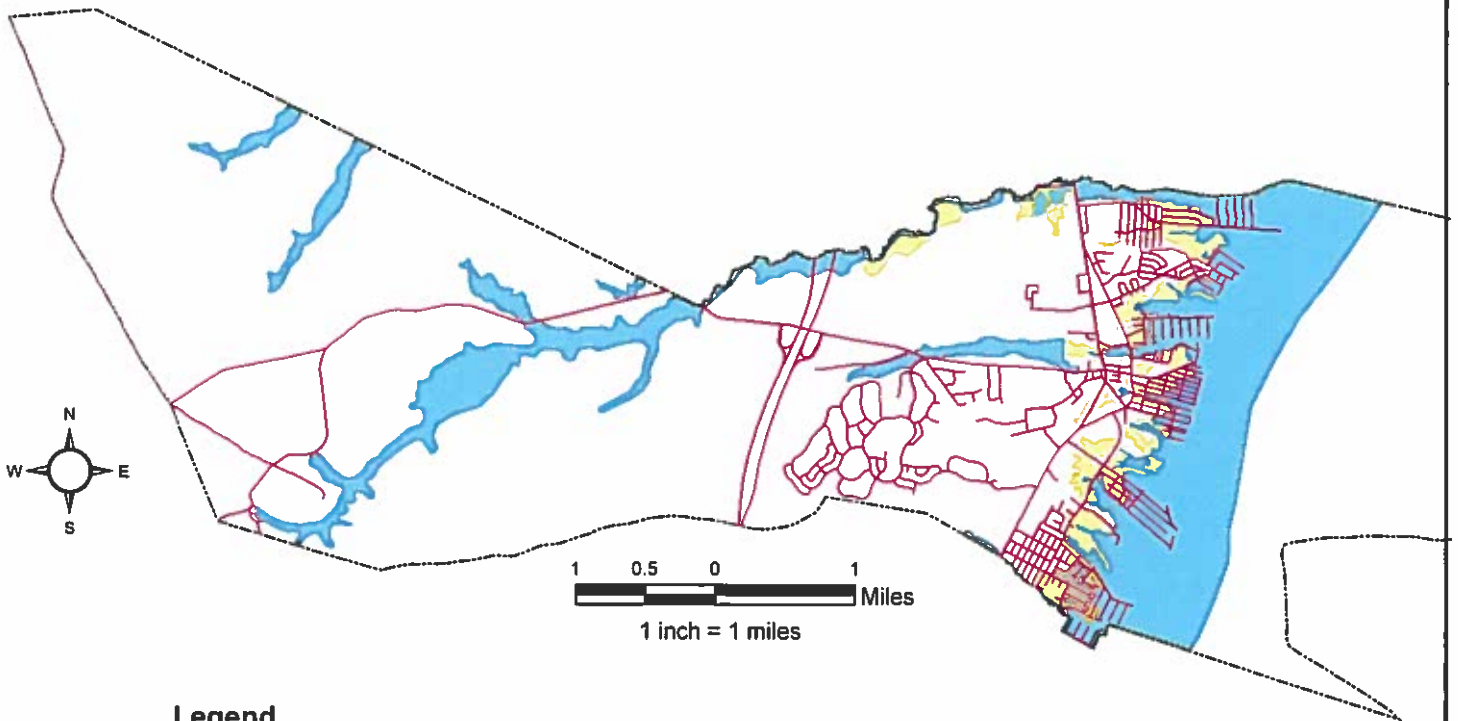
Please contact Christine Bell, Staff Planner, T&M Associates at 732-671-6400 or cbell@tandmassociates.com on or before January 15, 2015 if you have any comments, suggestions, input, or would like to set up a meeting to discuss the floodplain management plan in greater detail.

Sincerely,


James M. Oris, P.E., P.P., C.M.E.
Township Engineer

Appendix D: Effective FIRM Maps

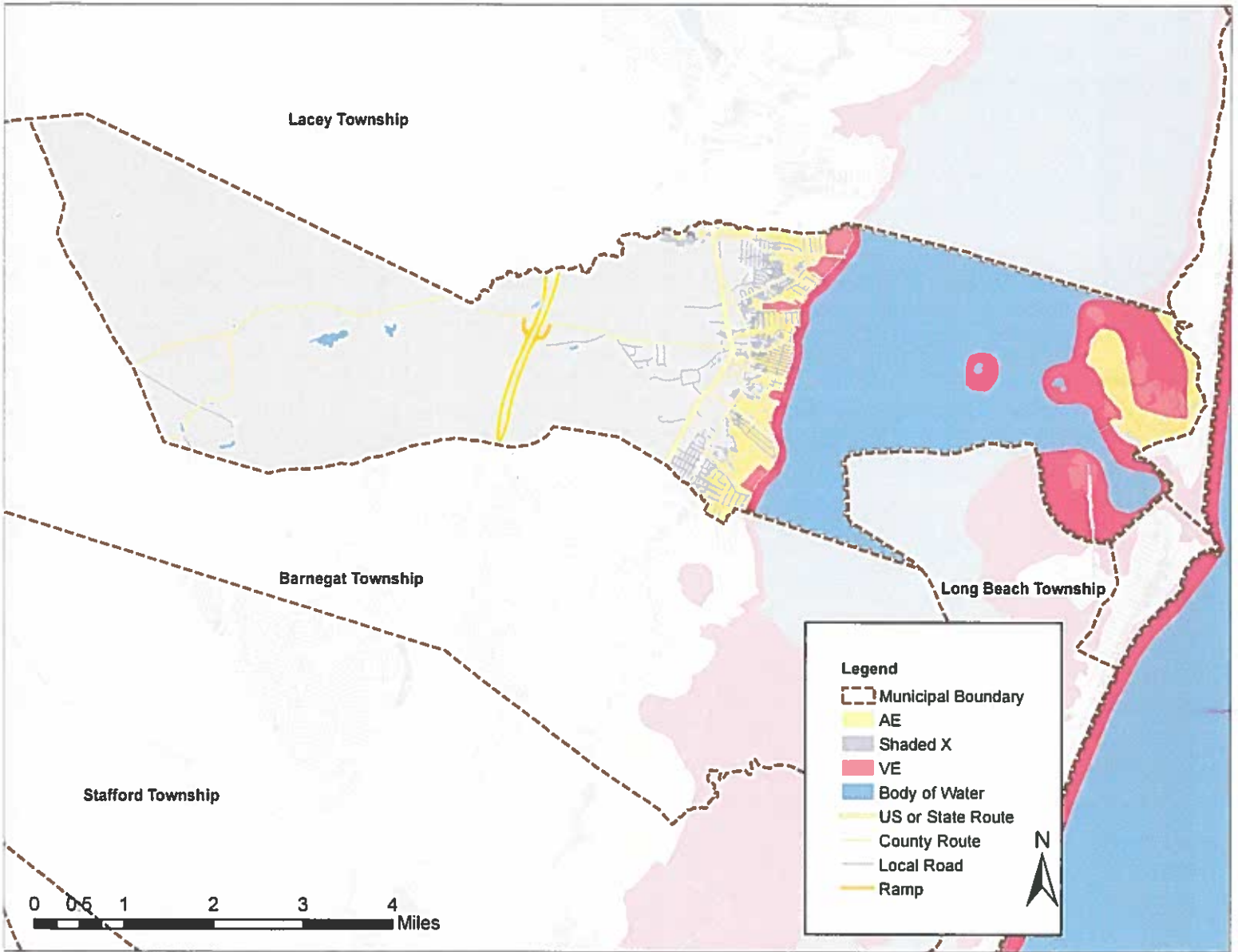
Ocean Township Effective Floodplain



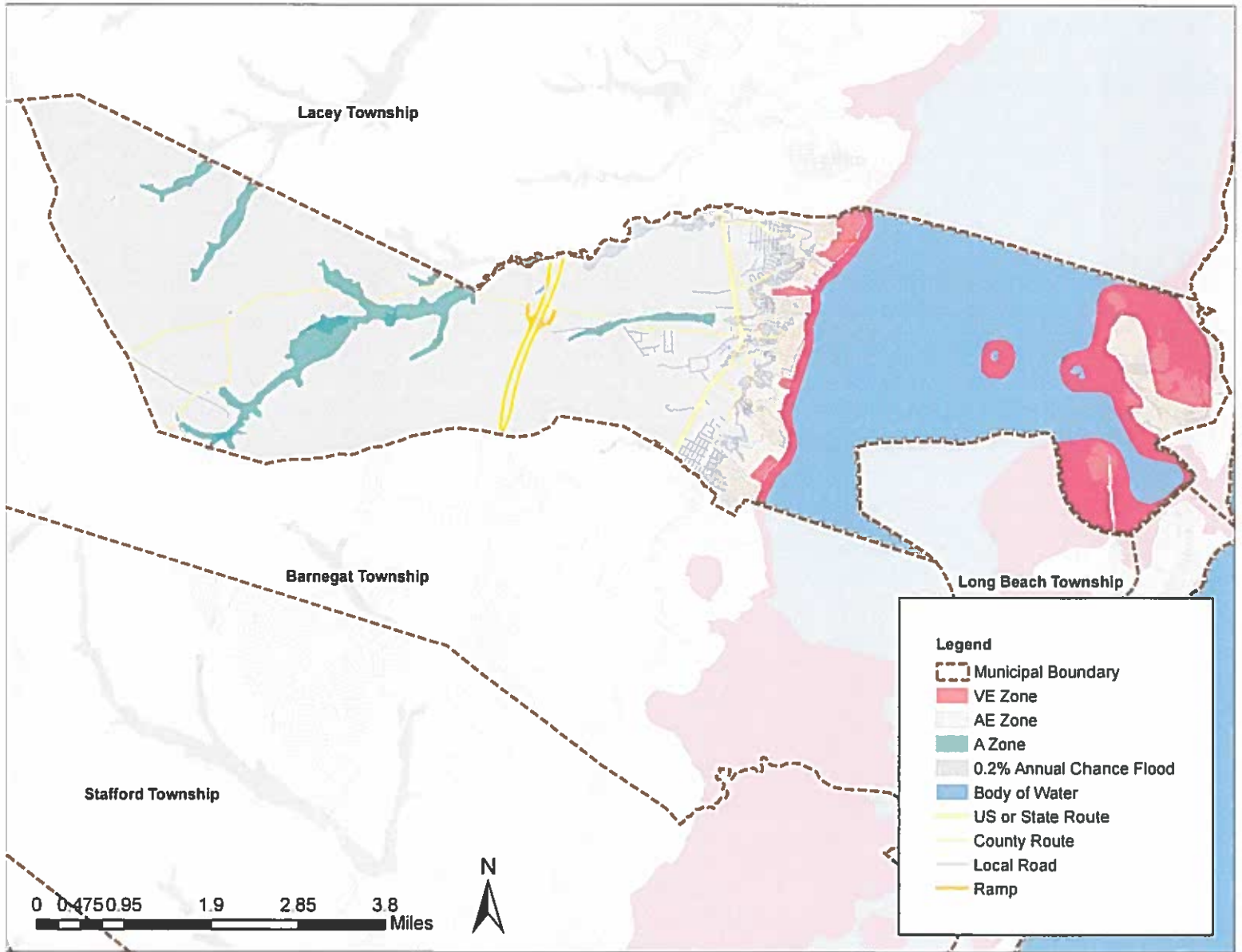
Legend

-  100 Year Floodplain
-  500 Year Floodplain
-  Road Centerlines

Appendix E: Advisory Base Flood Map

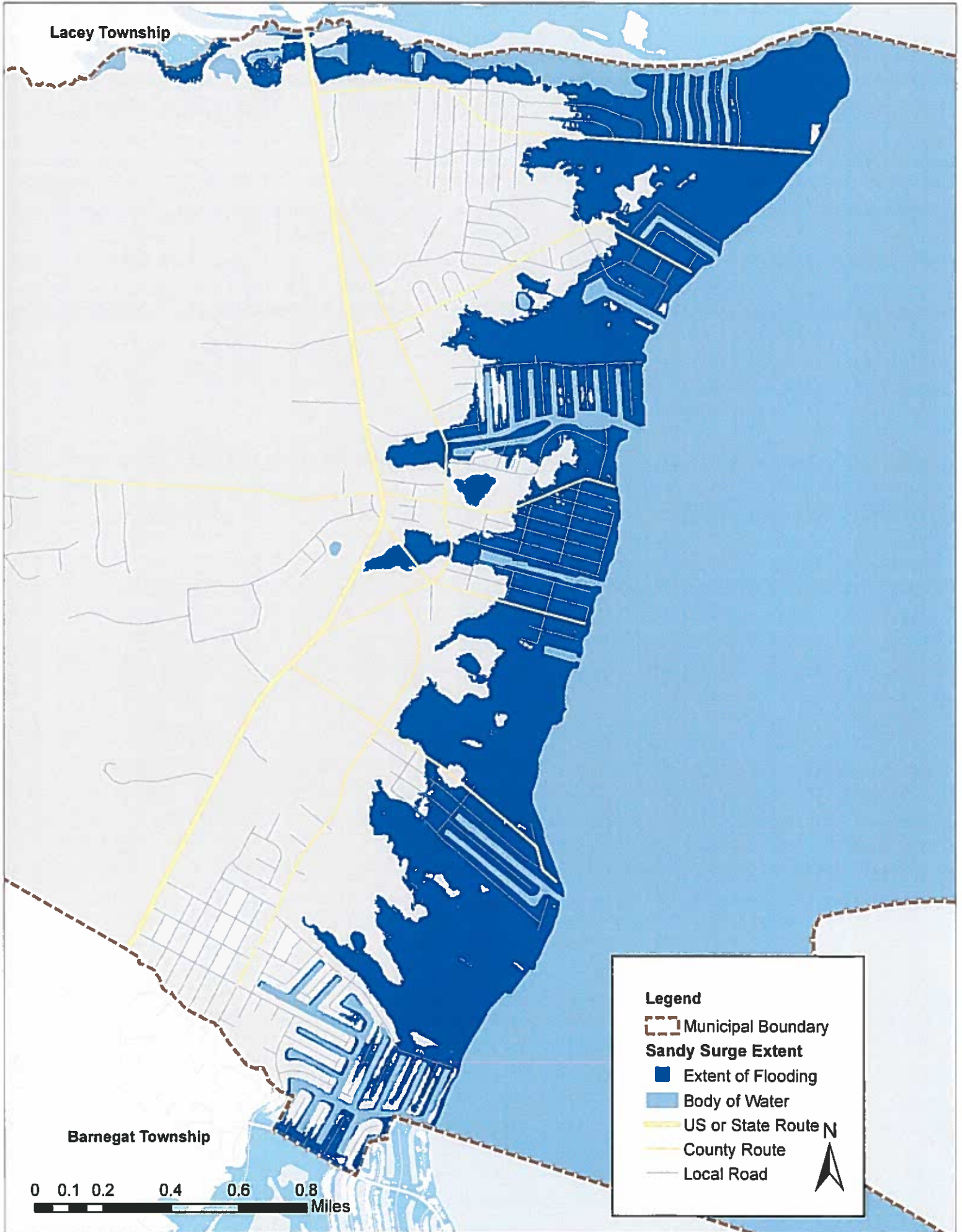


Appendix F: Preliminary FIRM Map



Appendix G: Superstorm Sandy Surge Elevation Maps

Lacey Township



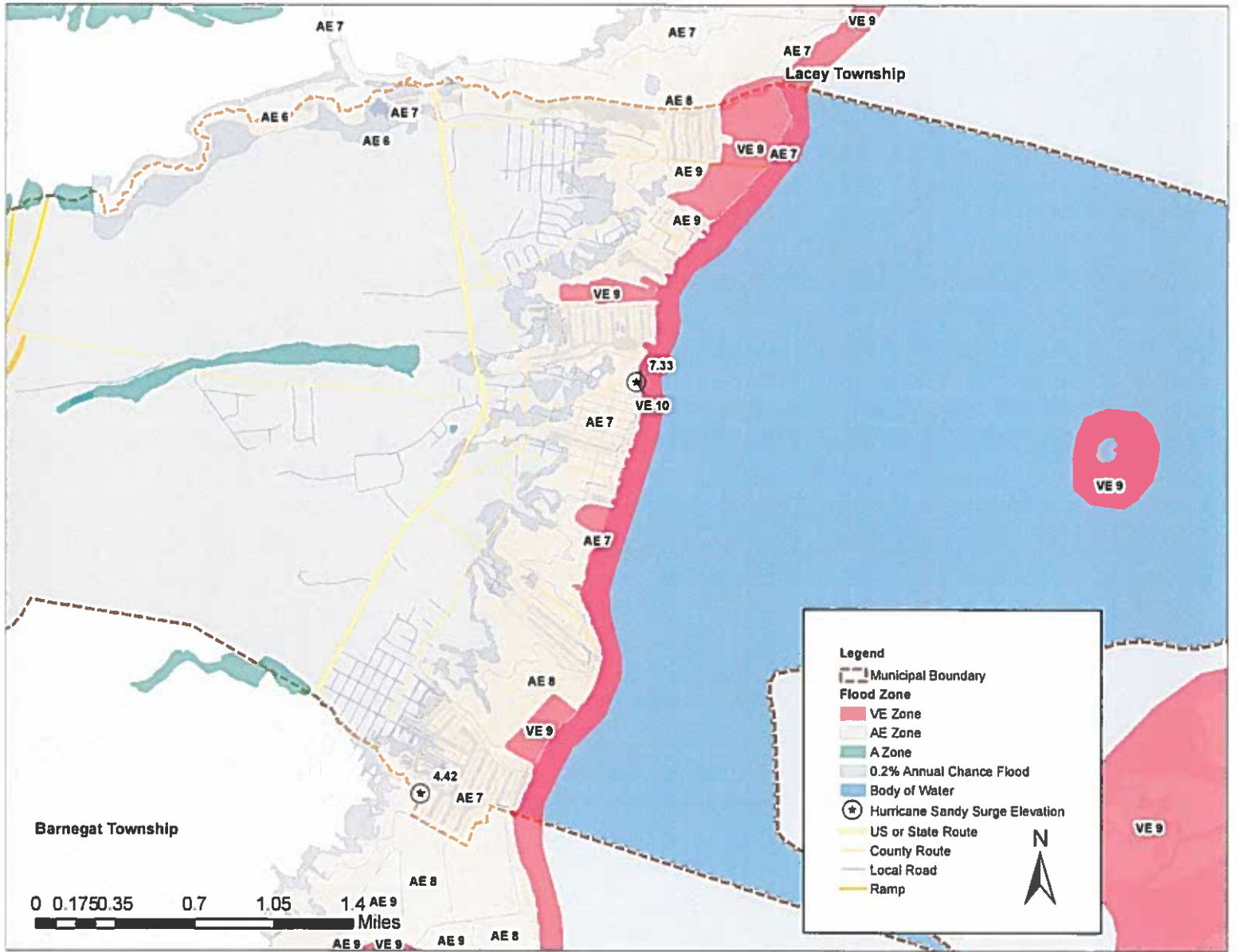
Barnegat Township



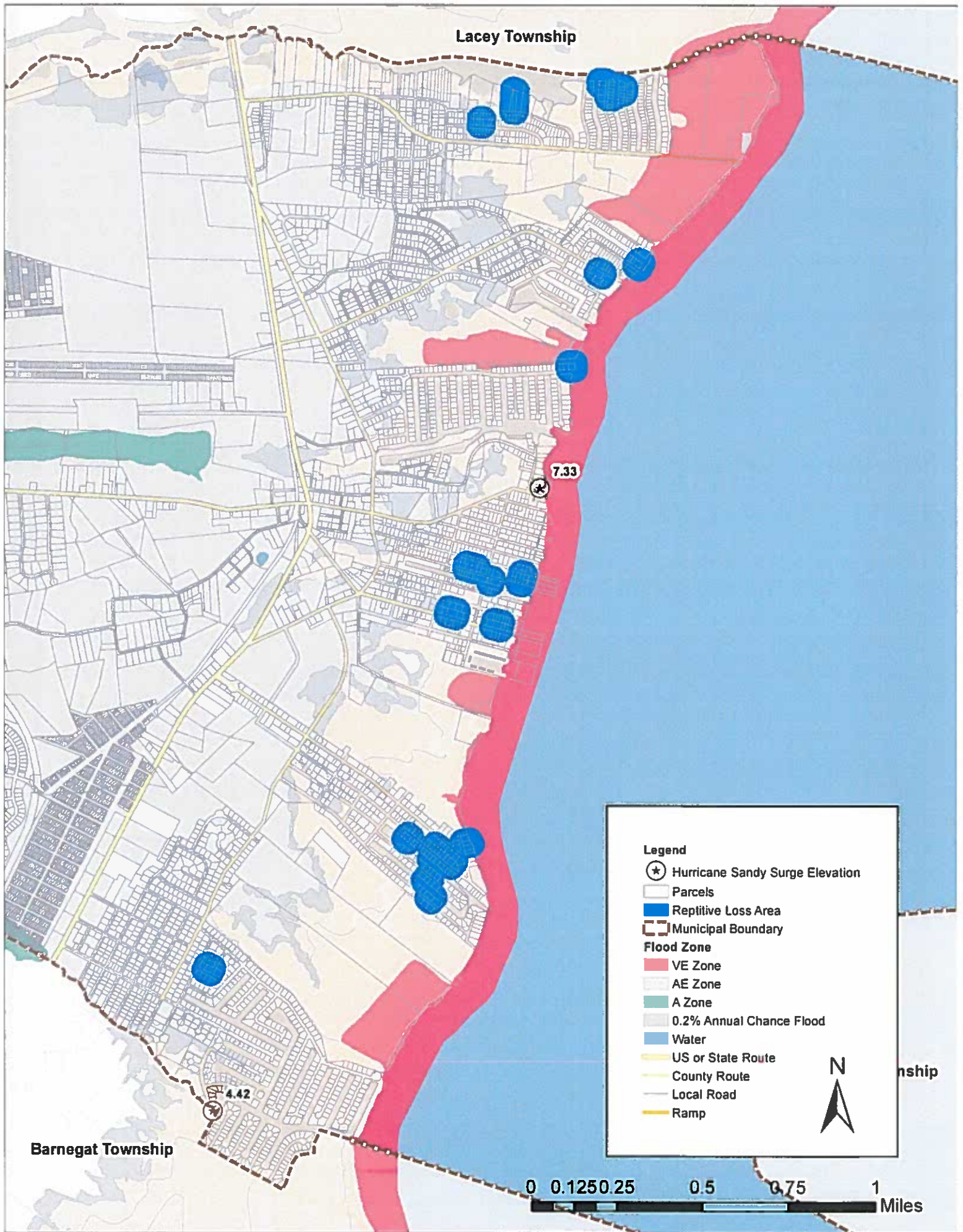
Legend

- Municipal Boundary
- Sandy Surge Extent**
 - Extent of Flooding
 - Body of Water
- US or State Route
- County Route
- Local Road

N

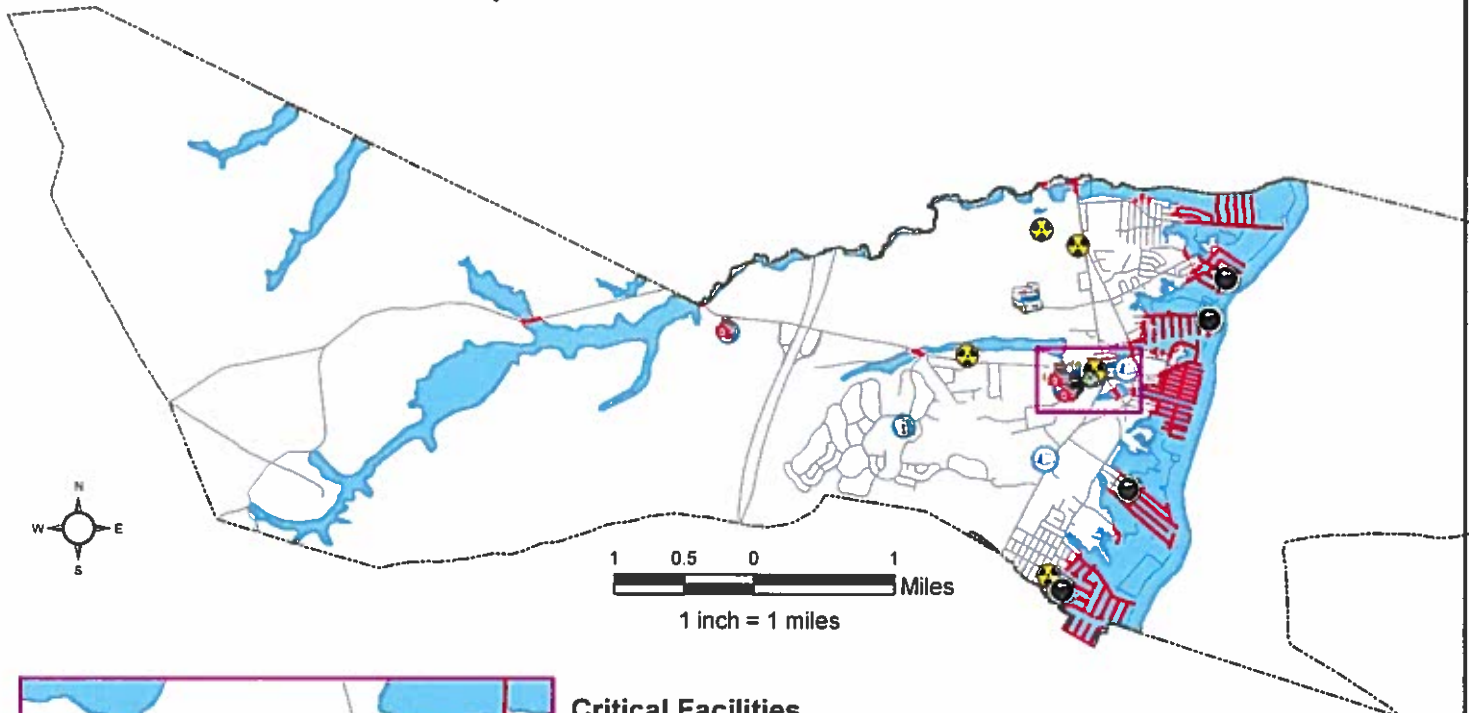


Appendix H: Repetitive Loss Areas Map



Appendix I: Critical Facilities Map

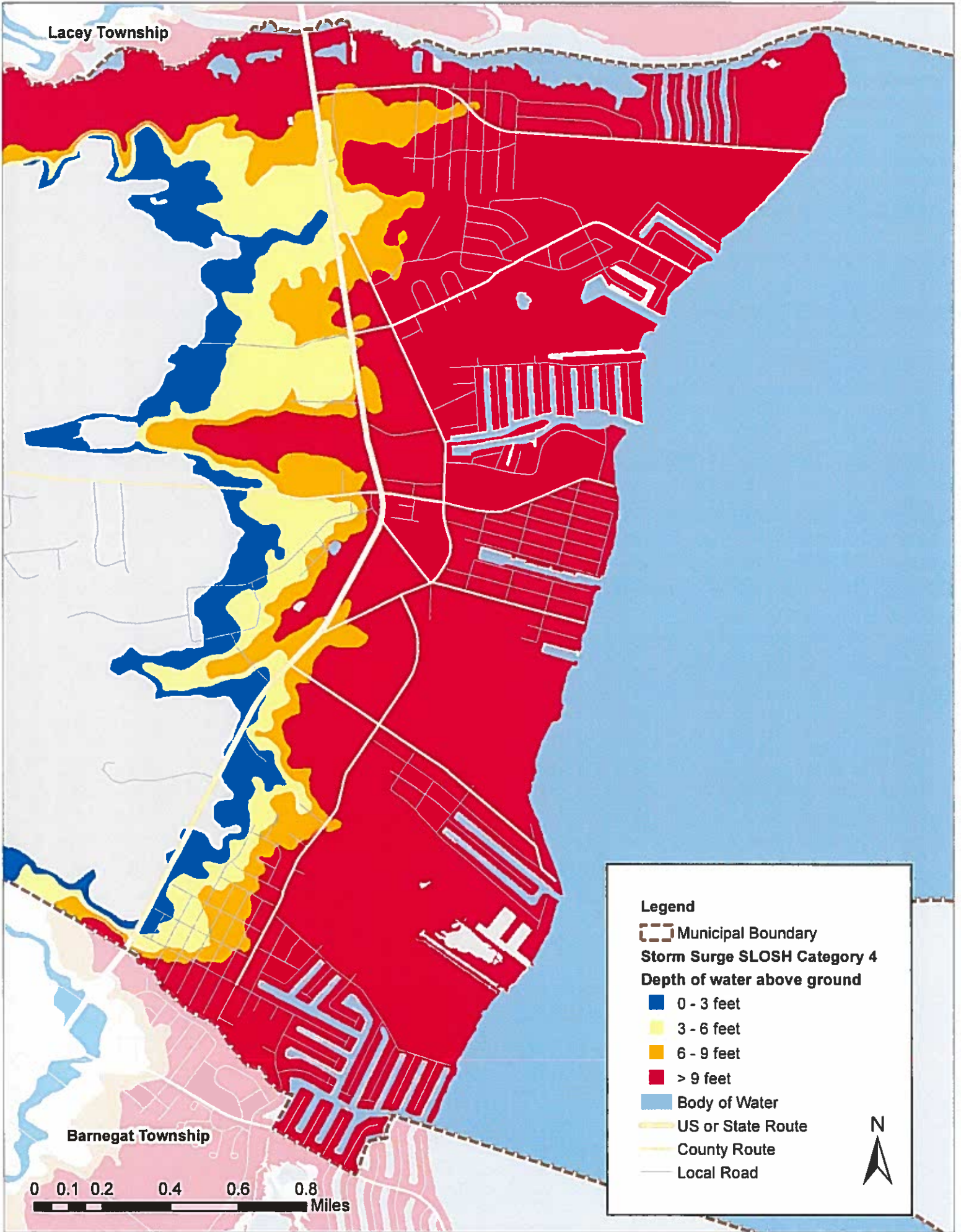
Ocean Township Critical Facilities and Flooded Roads



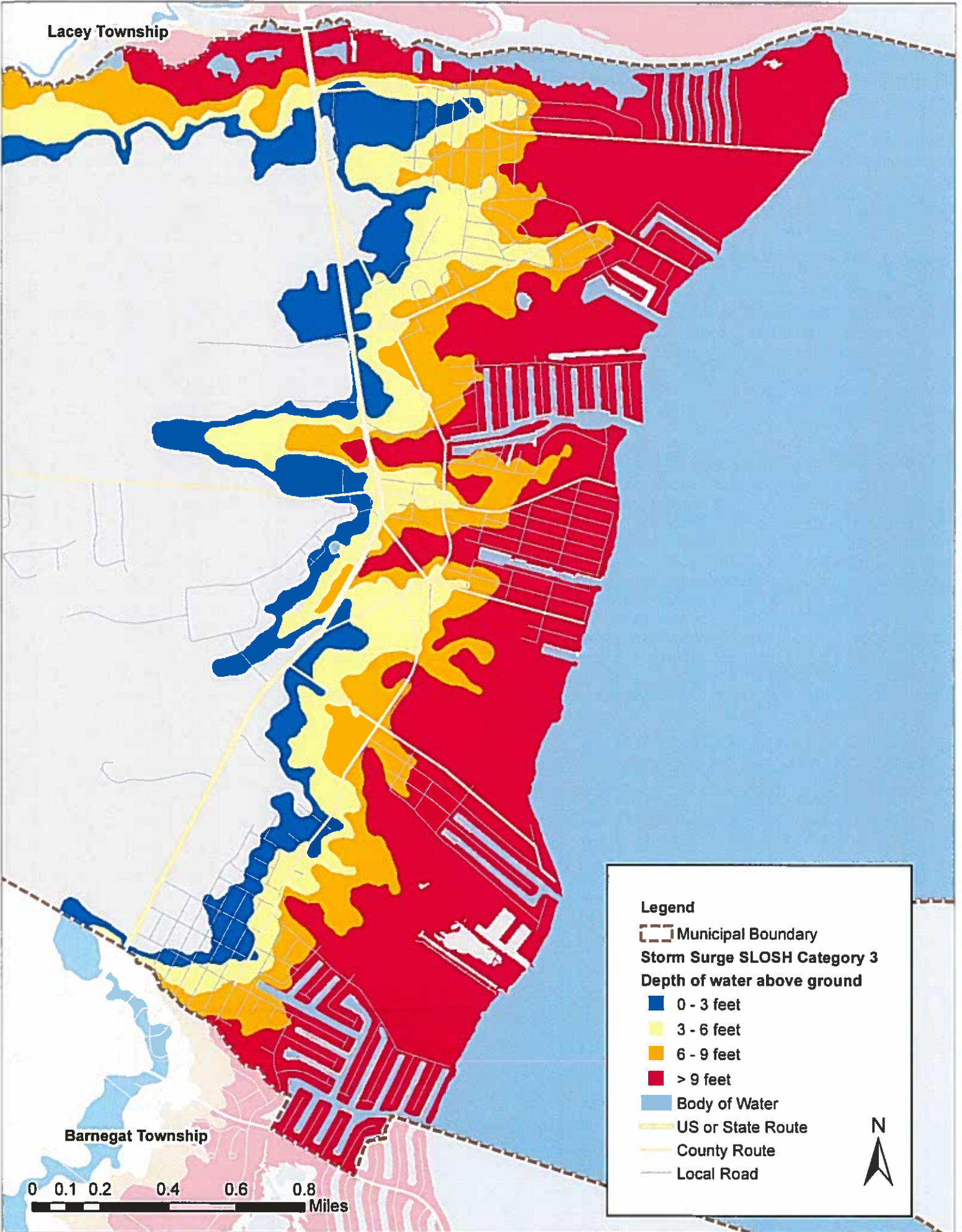
Critical Facilities

- | | | | |
|--|------------------------------|--|--------------------------|
| | Chemical Handling Facilities | | Emergency Medical Center |
| | City Facilities | | Firehouse |
| | Daycare | | Police Station |
| | Disaster Assessment Center | | Schools |
| | Evacuation Areas | | Flooded Roads |
| | Shelter | | Road Centerlines |
| | Shelter/Disaster Center | | 100 Year Floodplain |
| | | | 500 Year Floodplain |

Appendix J: SLOSH Maps



Lacey Township

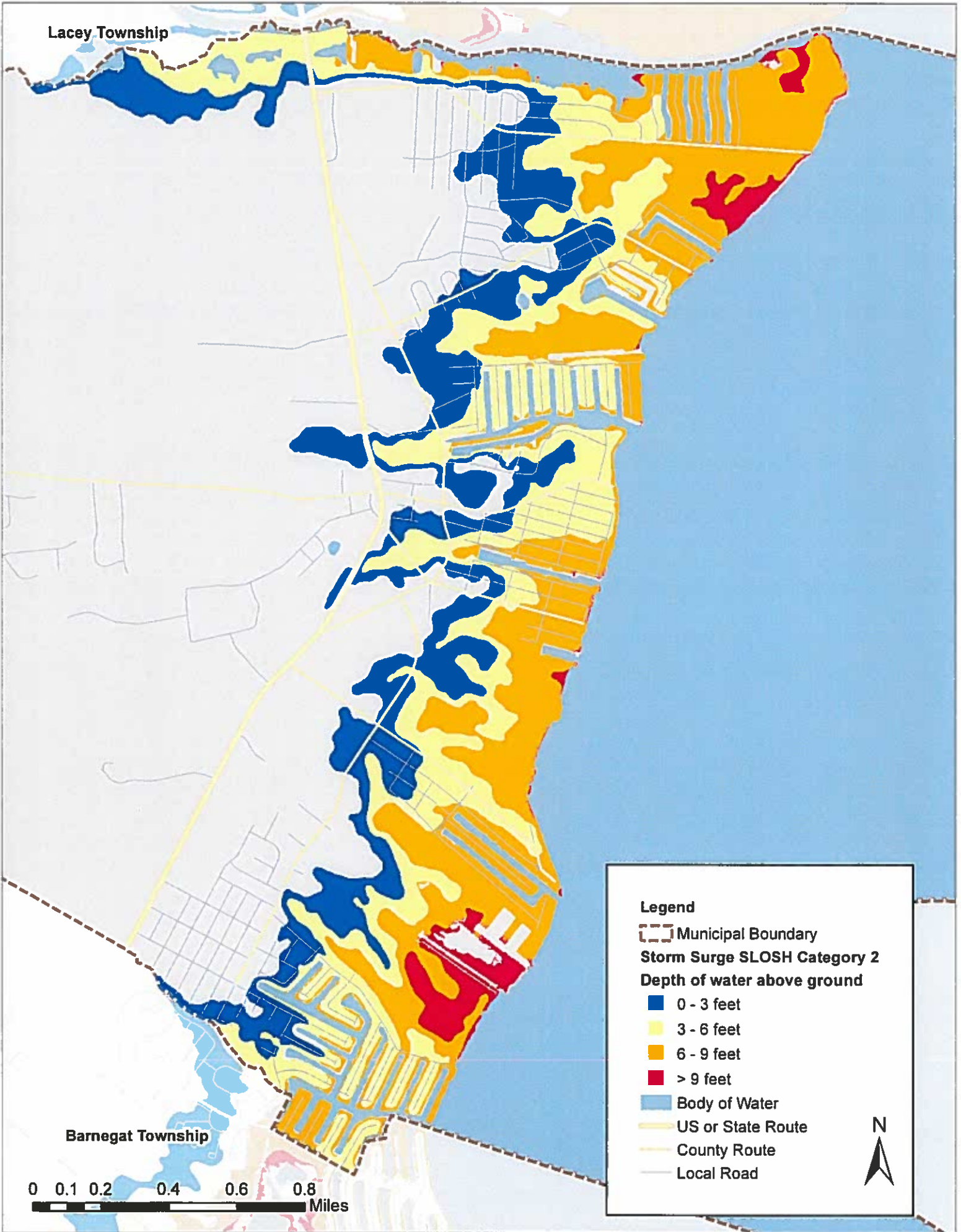


Barnegat Township

0 0.1 0.2 0.4 0.6 0.8 Miles



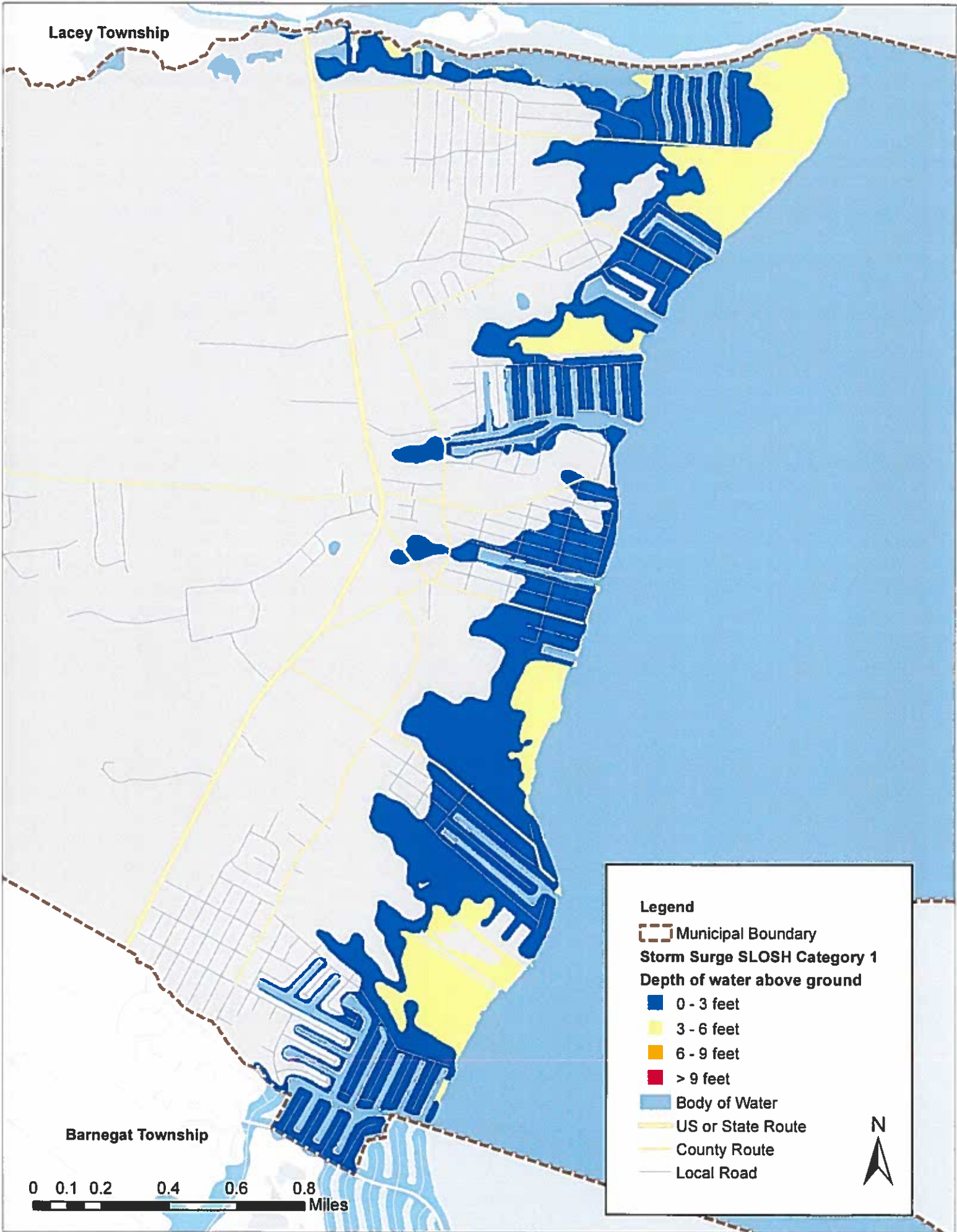
Lacey Township



Barnegat Township

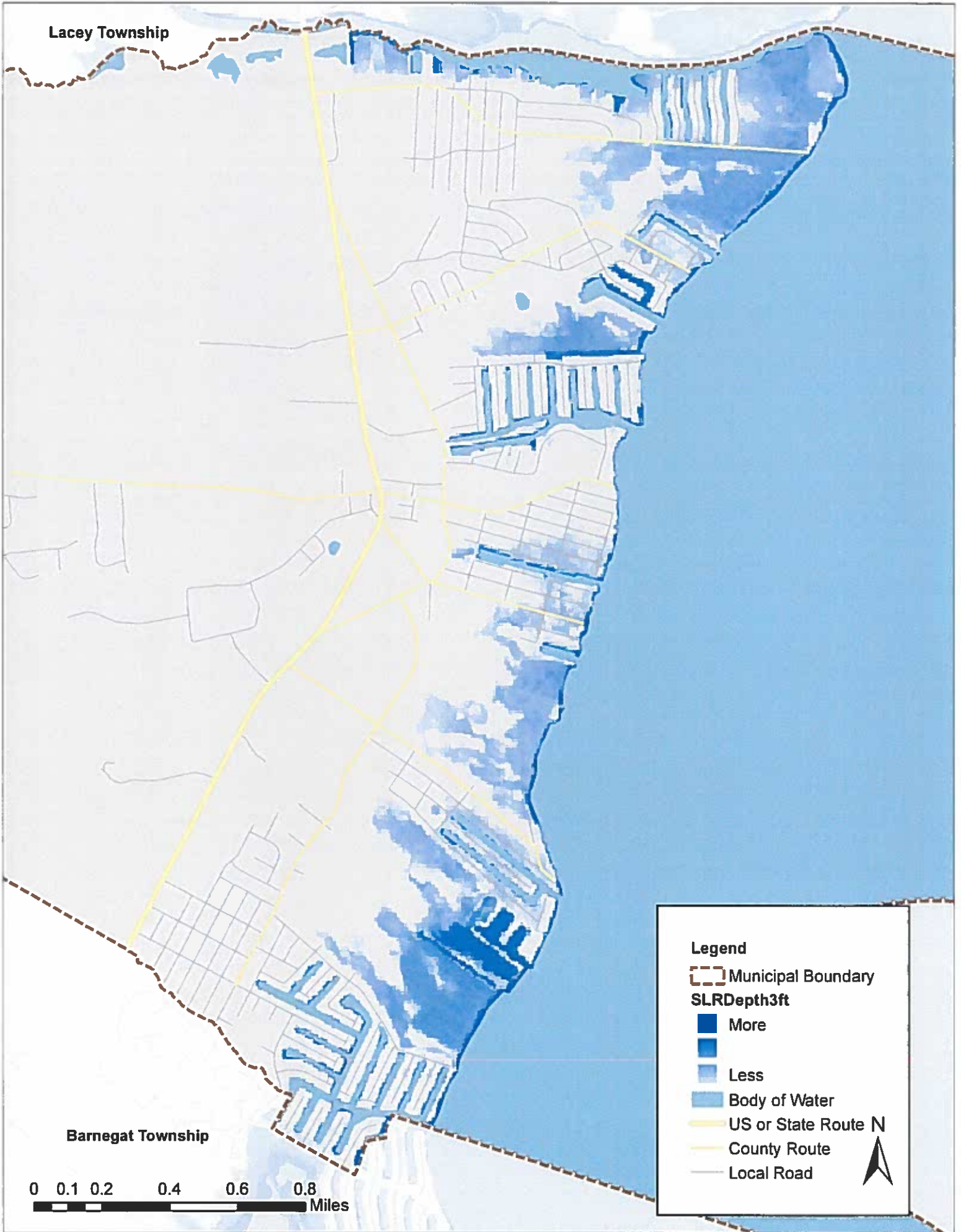
0 0.1 0.2 0.4 0.6 0.8 Miles





Appendix K: Sea Level Rise Maps

Lacey Township



Legend

 Municipal Boundary

SLRDepth3ft

 More

 3

 Less

 Body of Water

 US or State Route N

 County Route

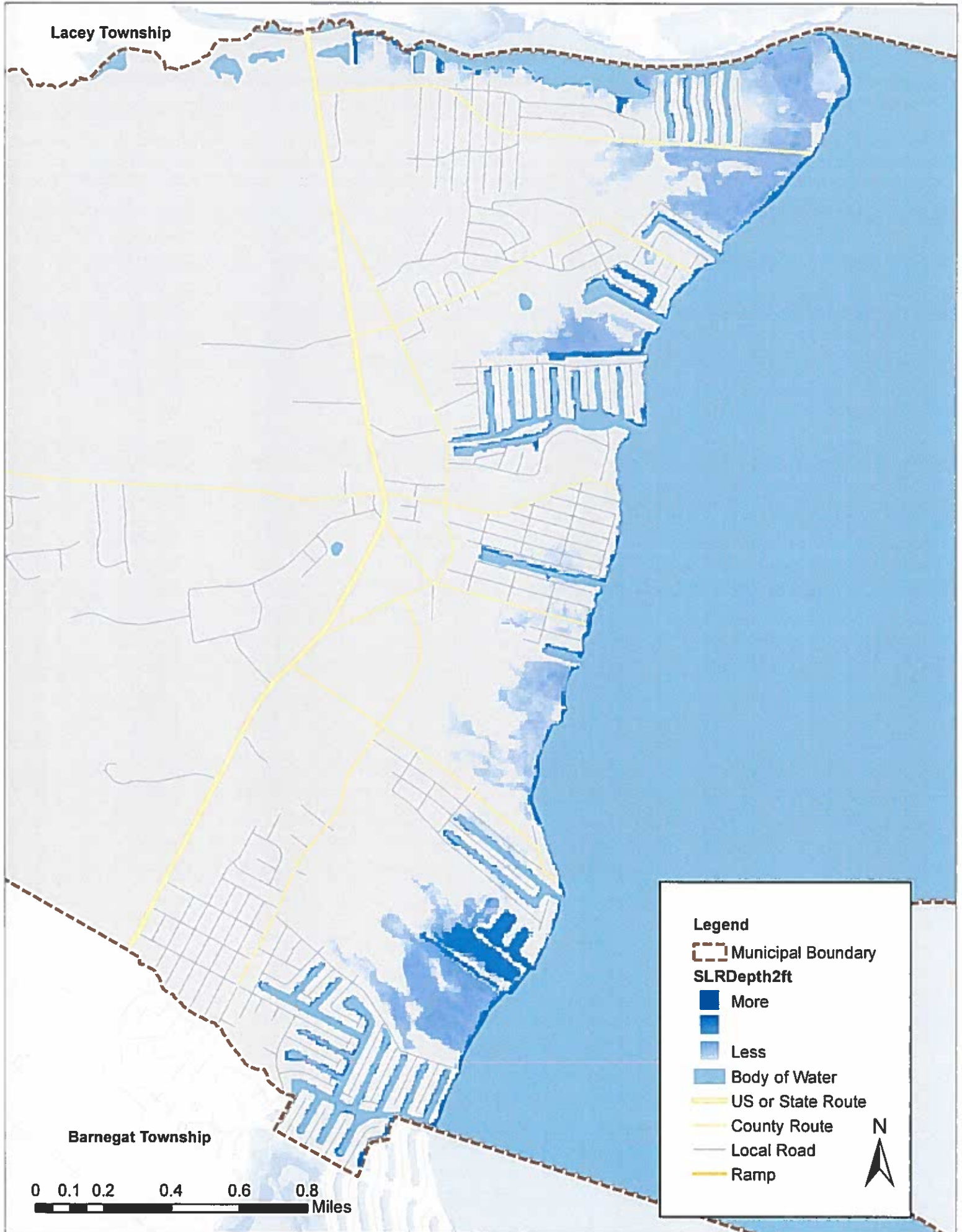
 Local Road











Barnegat Township

0 0.1 0.2 0.4 0.6 0.8 Miles

Lacey Township

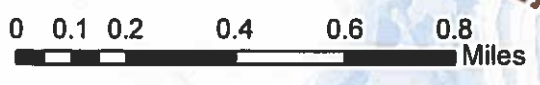


Legend

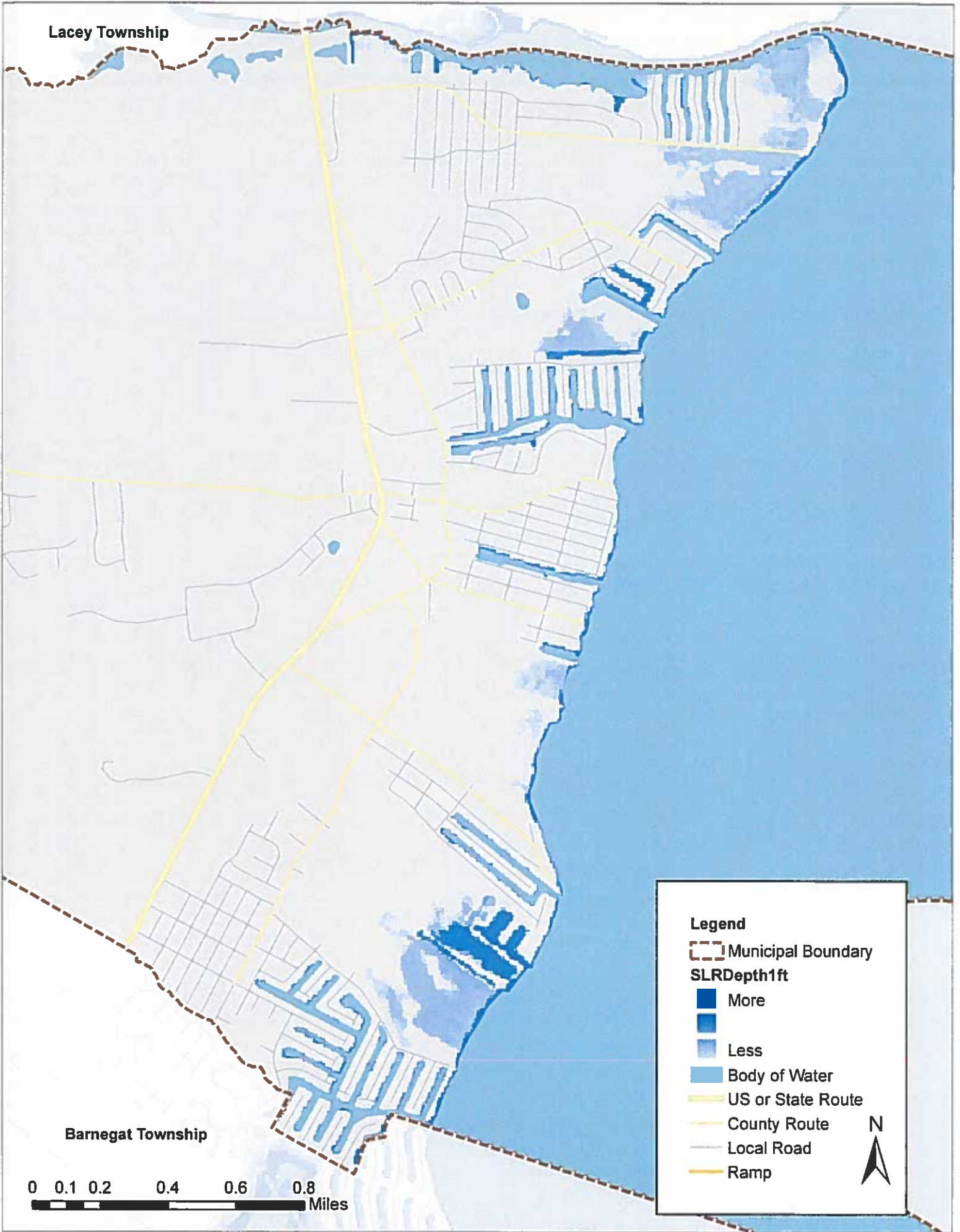
-  Municipal Boundary
- SLRDepth2ft**
-  More
-  Less
-  Body of Water
-  US or State Route
-  County Route
-  Local Road
-  Ramp



Barnegat Township



Lacey Township



Barnegat Township

0 0.1 0.2 0.4 0.6 0.8 Miles

Legend


 Municipal Boundary


SLRDepth1ft

 More


 Less

 Body of Water

 US or State Route

 County Route

 Local Road

 Ramp

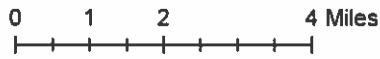


Appendix L: Marsh Retreat Maps

Marsh Retreat at 1 feet of Sea Level Rise Ocean Township (OC)

Legend

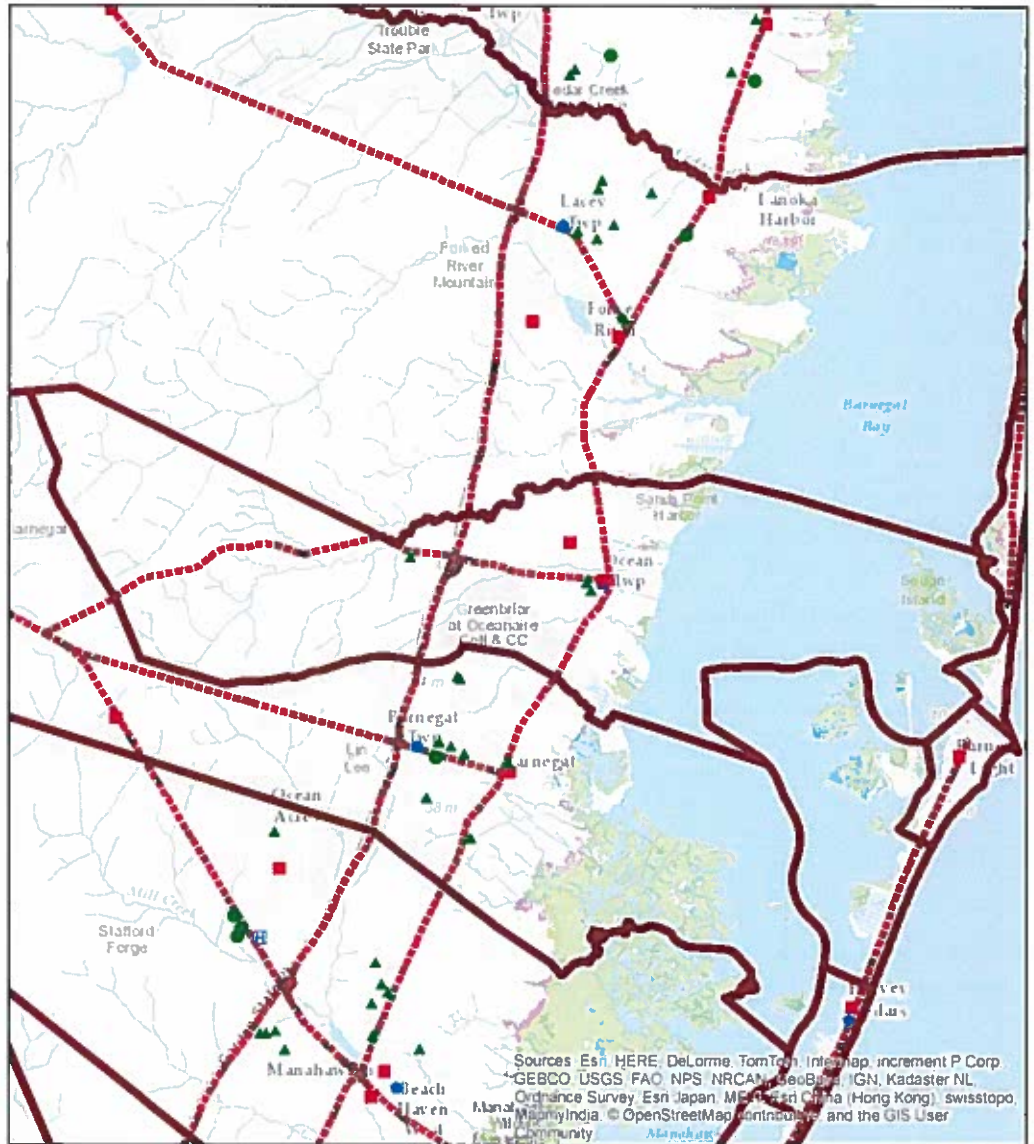
- Municipality
- ▲ Schools
- Fire Stations
- Law Enforcement
- Assisted Living
- ⊠ Hospitals
- Evacuation Routes
- Marsh Retreat at 1ft SLR**
- Unimpeded Marsh Retreat Zone
- Impeded Marsh Retreat Zone
- Marsh Conversion: Unconsolidated Shore
- Marsh Conversion: Open Water
- Unchanged Tidal Marsh



Year 2010 Population: 8332

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







Map Author: Rachael Sacatelli
Rutgers, New Brunswick
Center for Remote Sensing
and Spatial Analysis



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp, GEBCO, USGS, FAO, NPS, NRCAN, GeoBC, IGN, Kadaster NL, Ordnance Survey, Esri Japan, MEP, Esri China (Hong Kong), Swisstopo, AeryonIndia, © OpenStreetMap contributors, and the GIS User Community







Marsh Retreat at 2 feet of Sea Level Rise Ocean Township (OC)

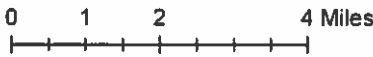
Legend

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

Evacuation Routes

Marsh Retreat at 2ft SLR

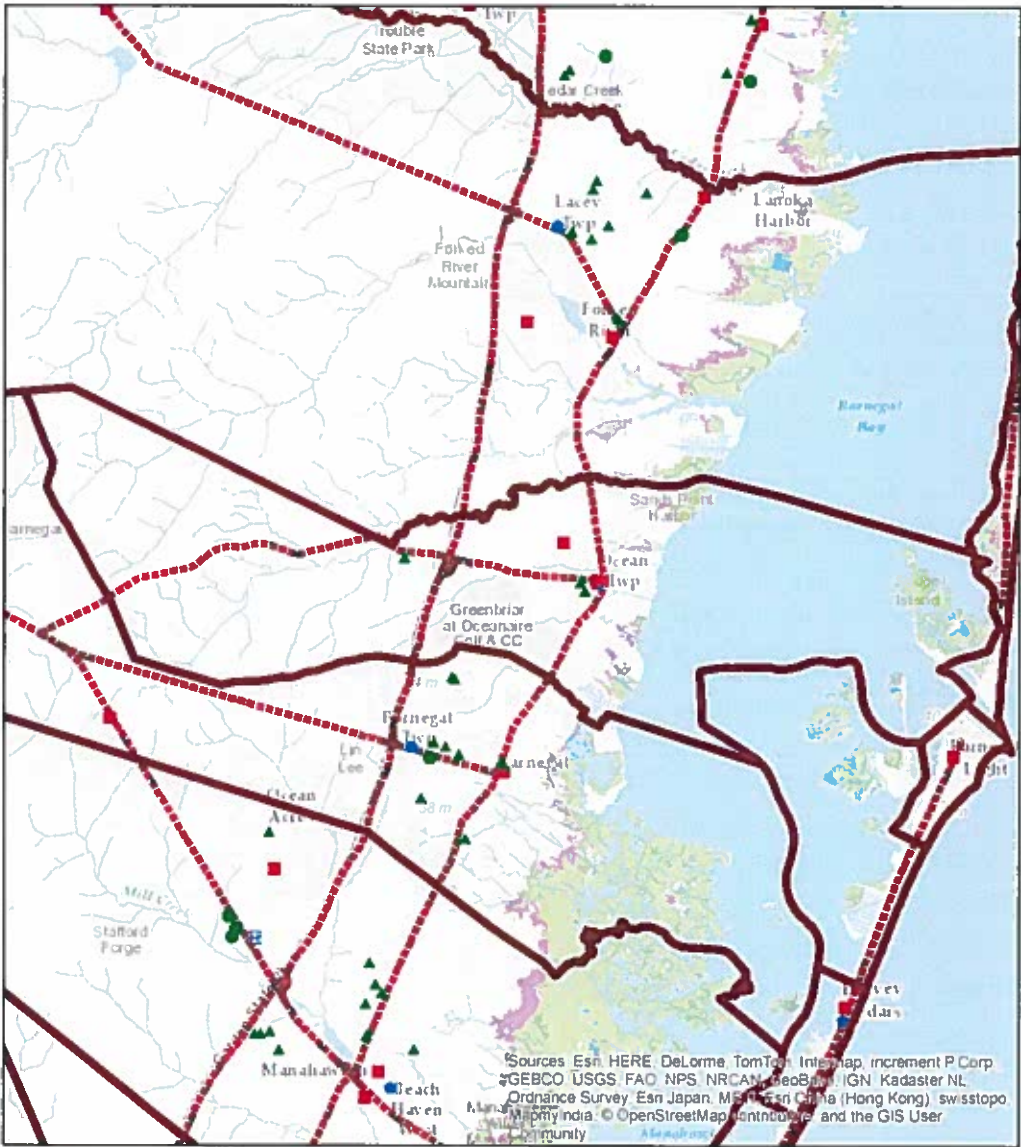
-  Evacuation Routes
-  Unimpeded Marsh Retreat Zone
-  Impeded Marsh Retreat Zone
-  Marsh Conversion: Unconsolidated Shore
-  Marsh Conversion: Open Water
-  Unchanged Tidal Marsh



Year 2010 Population: 8332

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Map Author: Rachael Sacatelli
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Marsh Retreat at 3 feet of Sea Level Rise Ocean Township (OC)

Legend

 Municipality

 Schools

 Fire Stations

 Law Enforcement

 Assisted Living

 Hospitals

 Evacuation Routes

Marsh Retreat at 3ft SLR

 Unimpeded Marsh Retreat Zone


 Impeded Marsh Retreat Zone

 Marsh Conversion: Unconsolidated Shore

 Marsh Conversion: Open Water

 Unchanged Tidal Marsh

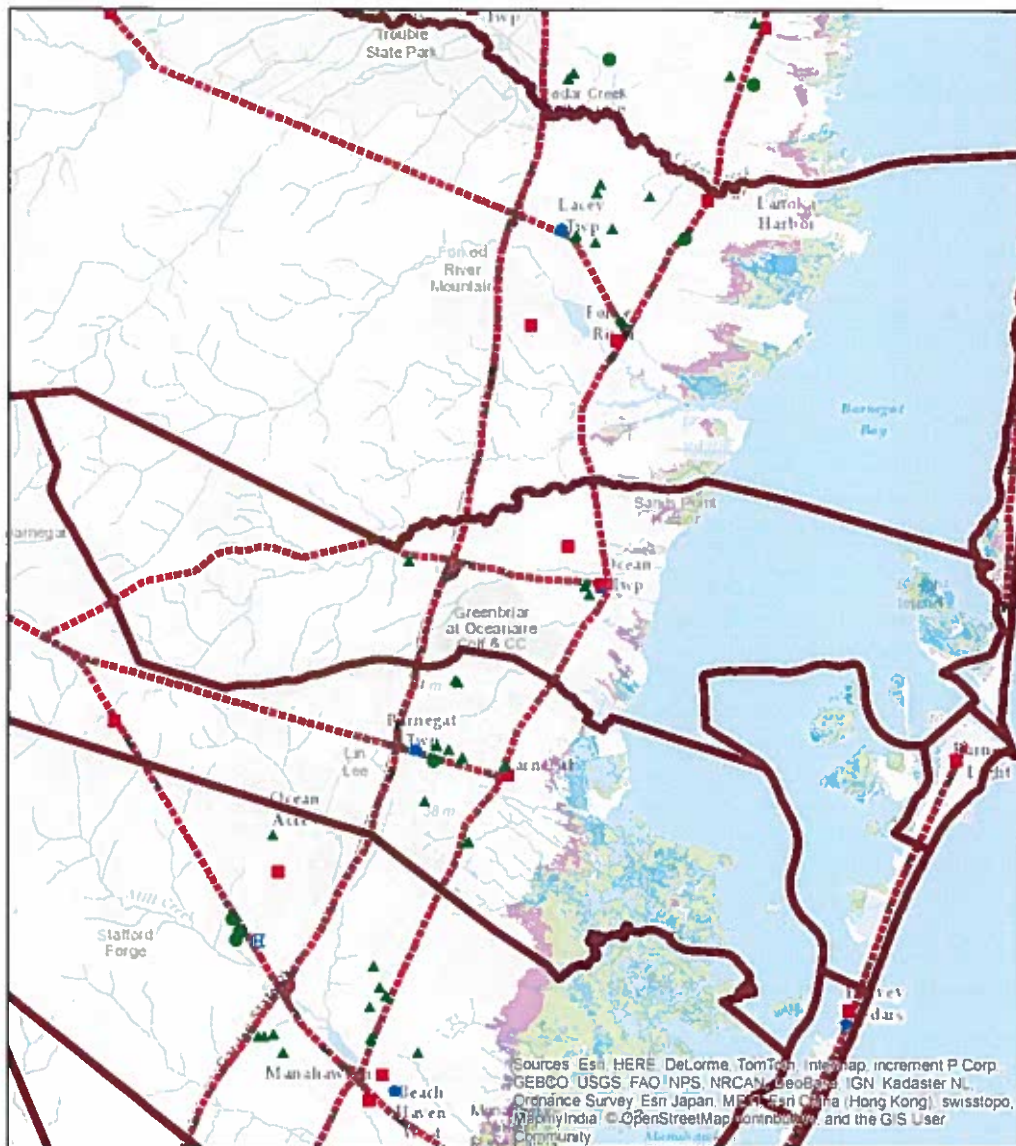
0 1 2 4 Miles



Year 2010 Population: 8332

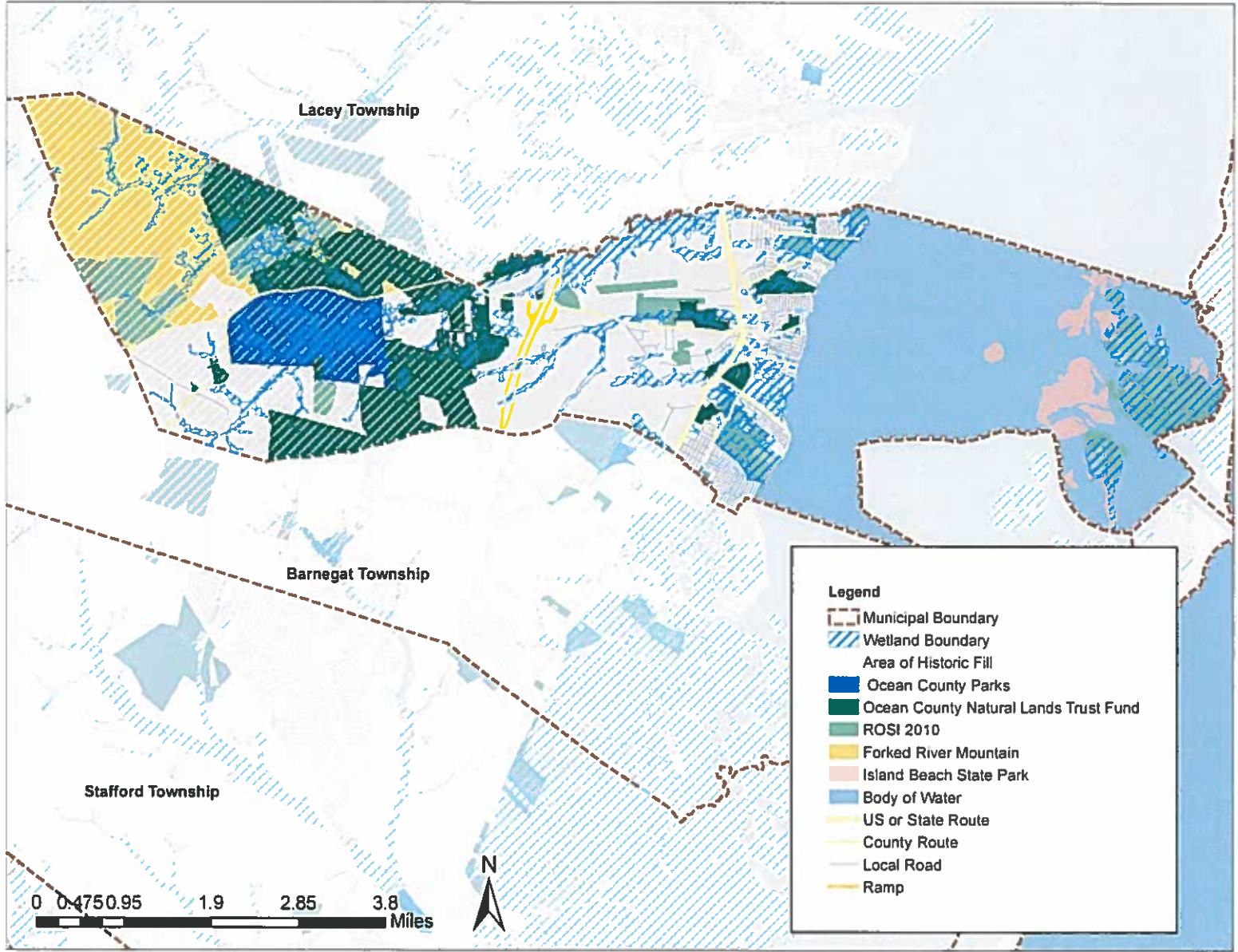
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Map Author: Rachael Sacatelli
Rutgers, New Brunswick
Center for Remote Sensing
and Spatial Analysis



Appendix M: Natural Features Map





Lacey Township

Barnegat Township

Stafford Township

Legend

-  Municipal Boundary
-  Wetland Boundary
-  Area of Historic Fill
-  Ocean County Parks
-  Ocean County Natural Lands Trust Fund
-  ROSI 2010
-  Forked River Mountain
-  Island Beach State Park
-  Body of Water
-  US or State Route
-  County Route
-  Local Road
-  Ramp

0 0.4750.95 1.9 2.85 3.8 Miles



