

## **5.4.1 COASTAL EROSION**

This section provides a profile and vulnerability assessment for the coastal erosion hazard.

### **HAZARD PROFILE**

Hazard Profile information is provided in this section, including information on description, extent, location, previous occurrences and losses and the probability of future occurrences within Burlington County.

#### **Description**

Erosion and flooding are the primary coastal hazards that lead to the loss of lives or damage to property and infrastructure in developed coastal areas. Coastal storms are an intricate combination of events that impact a coastal area. A coastal storm can occur any time of the year and at varying levels of severity. One of the greatest threats from a coastal storm is coastal flooding caused by storm surge. Coastal flooding is the inundation of land areas along the oceanic coast and estuarine shoreline by seawaters over and above normal tidal action.

Tidal action undercuts the land along the shore, and gravity causes the land to slip into the water. As materials from banks slide into the waves, erosion continues. As this process continues, the shore recedes and the coastline moves farther inward.

Many natural factors affect erosion of the shoreline, including shore and nearshore geology, nearshore bathymetry, shoreline orientation, and climate change through increased storm frequency, temperature, and precipitation. Coastal shorelines change constantly in response to wind, waves, tides, sea-level fluctuation, seasonal and climatic variations, human alteration, and other factors that influence the movement of sand and material within a shoreline system.

High winds, erosion, heavy surf, unsafe tidal conditions, and fog are ordinary coastal hazard phenomena. Some or all of these processes can occur during a coastal storm, resulting in an often detrimental impact on the surrounding coastline. Factors including (1) storms such as Nor'easters and hurricanes, (2) decreased sediment supplies, and (3) sea-level rise contribute to these coastal hazards.

The visible loss (erosion) and gain (accretion) of coastal land is evidence of the way shorelines are reshaped in the face of dynamic weather conditions. Shorelines tend to change seasonally, accreting slowly during the summer months when sediments are deposited by relatively low-energy waves and eroding dramatically during the winter when sediments are moved offshore by high-energy storm waves, such as those generated by Nor'easters. Regardless of the season, coastal storms typically cause erosion. With the anticipated change in climate, an increase in intensity and frequency of storms is expected. This will, in turn, increase the likelihood of severe erosion episodes along the coast of New Jersey.

Coastal erosion can result in significant economic loss through the destruction of buildings, roads, infrastructure, natural resources, and wildlife habitats. Damage often results from the combination of an episodic event with severe storm waves and dune or bluff erosion.

Some of the methods used by property owners to stop or slow down coastal erosion or shoreline change can actually exacerbate the problem. Attempting to halt the natural process of erosion with seawalls and other hard structures typically worsens the erosion in front of the structure, prevents any sediment behind the structure from supplying down-drift properties with sediment, and subjects down-drift beaches to

increased erosion. Without the sediment transport associated with erosion, some of the State's greatest assets and attractions – beaches, dunes, barrier beaches, salt marshes, and estuaries – are threatened and will slowly disappear as the sediment sources that feed and sustain them are eliminated.

The New Jersey coastline is constantly changing as the result of wind, currents, storms, and sea-level rise. Because of this, developed shorelines are often stabilized with hardened structures (seawalls, bulkheads, revetments, rip-rap, gabions, and groins) to protect coastal properties from erosion. While hardened structures typically prove to be beneficial in reducing property damage, the rate of coastal erosion typically increases near stabilization structures, which impact natural habitats, spawning grounds, recreational activity areas, and public access (Frizzera, 2011).

The State of New Jersey has over 130 miles of coastline, most of which is within close proximity to major metropolitan centers of the mid-Atlantic as can be seen in Figure 5.4.1-8. Beach restoration and maintenance is an ongoing process for New Jersey. The State legislature provides \$25 million annually for beach restoration and every beach on the Atlantic is currently under either a design, engineering or construction phase. According to the New Jersey Department of Environmental Protection (NJDEP) website there are 41 Federal and/or State coastal engineering projects either under construction or recently completed (NJDEP, 2013).

### Extent

As described in the NJDEP Coastal Management Program website, manifestations of these hazards occur at broadly different rates. Their expression ranges from the gradual, such as sea level rise and chronic erosion that can be measured on a decadal time-scale, to catastrophic events like hurricanes, extra-tropical storms, and storm surges that can be measured in terms of days or even hours. Just as their rates of occurrence differ, so are their effects expressed in profoundly different ways.

- **Catastrophic** events alter the natural features of the shoreline, such as beaches, dunes, and wetlands, and threaten people and property. In New Jersey, construction of new residential development, reconstruction of existing residential development, and the conversion of single family dwellings into multi-unit dwellings continue in hazardous areas. Although application of more stringent construction standards and techniques results in more storm-resistant structures, the value of property at risk has appreciably increased. With anticipated accelerating sea level rise and increasing storm frequency and intensity, vulnerability to the risks of coastal hazards will be exacerbated and the costs of damages and losses resulting from the events will increase. Catastrophic events require anticipatory preparations for the inevitability of an event, the capacity for rapid response to an imminent threat of an event, and preparation for addressing the aftermath of an event (NJDEP, 2013).
- **Gradually occurring** phenomena are more predictable and allow for long-range planning and measured preparation. On-going data collection, research, and modeling continue to refine our knowledge concerning the effects of climate change on the expression of phenomena that are regarded as coastal hazards. The U.S. Geological Survey evaluated the vulnerability of the mid-Atlantic region to the effects of sea level rise. The results of the study are presented in the report, Potential for Shoreline Changes Due to Sea-Level Rise along the U.S. Mid-Atlantic Region. The USGS study indicates that most of New Jersey's coast is highly susceptible to the effects of sea level rise (NJDEP, 2013).
- **Sea Level Change** - While the precise rate of sea level rise is uncertain, current models indicate that climate change will cause the rate to increase. Based on the trend of sea level rise from 1961 through 2003, sea level would rise by almost 6-inches by the end of this century in the absence of any effects of climate change. Taking climate change into account, sea level is projected to rise between 7 and 21 inches by 2100. This increase would result in the threat of more sustained

extreme storm surges, increased coastal erosion, escalating inundation of coastal wetlands and saline intrusion (NJDEP, 2013).

- **Coastal Wetlands** buffer uplands from chronic and episodic erosion caused by wave action. Conserving areas that allow for the landward migration of coastal wetlands in response to sea level rise is an example of a step that can be taken to enable the persistence of this valuable and productive feature of our coast. New Jersey's Coastal Management Program in concert with other State programs, as well as federal and local agencies, and non-profit organizations is proceeding on many fronts to reduce the societal, economic, and environmental risks associated with coastal hazards. The Coastal Management Program is collecting information that will be used to determine the relative vulnerability of coastal areas to natural hazards. Part of this effort involves examining the factors that are conducive to the landward migration of coastal wetlands, the development of pioneering coastal wetlands along open water areas and the transformation of freshwater wetlands to tidal wetlands (NJDEP, 2013).
- **Climate Change** - Several agencies, organizations, and academic institutions have addressed the potential effects of climate change on New Jersey and its coast. The New Jersey Global Warming Web site provides information regarding the State's initiatives regarding climate change. The Union of Concerned Scientists prepared an overview of how climate change may affect New Jersey including the state's coastal area. The Woodrow Wilson School of Public and International Affairs at Princeton University examined the potential effects of climate induced accelerated sea level rise on the New Jersey coast (NJDEP, 2013).

### Location

Coastal erosion hazards and the vulnerability of development and infrastructure vary significantly by geographic region. By virtue of their location at the interface between oceans and land, coastal areas are among the most dynamic environments on earth susceptible to a broad range of natural hazards. Many parts of New Jersey's densely populated coast are highly vulnerable to the effects of flooding, storm surge, episodic erosion, chronic erosion, sea level rise, and extra-tropical storms. Much of the developed shoreline of New Jersey has been stabilized with seawalls and other armaments, which in some areas have caused extensive beach loss (NJOEM, 2012).

The State of New Jersey suffers significant erosion. While Burlington County has no open water on the Atlantic Ocean or Delaware Bay, it has two distinct areas that are at risk of shoreline erosion: the western border along the Delaware River and the southeastern portion along Mullica River Great Bay and its tributaries. The coastal boundary of the State of New Jersey encompasses the latter area (Craghan et al., 2010).

As defined through the New Jersey Coastal Management Program (NJCMP), the coastal zones of New Jersey includes all areas where the State has authority, through the NJDEP and the Meadowlands Commission, to regulate land and water uses that may have significant impact on coastal resources. The primary implementing authorities for NJCMP are the Coastal Area Facility Review Act (CAFRA), the Waterfront Development Law, the Wetlands Act of 1970, Tidelands Statutes and the Hackensack Meadowlands Reclamation Development Act (NJDEP, 2002).

Figure 5.4.1-1 illustrates the coastal boundary of the State of New Jersey. The figure indicates that Burlington County is in the CAFRA area. The portion of the County in the CAFRA area is a small, 19 acre, center in the Township of Bass River, where U.S. Route 9, a county road and the Garden State Parkway intersect. The rest of the southeast portion of the County is in Pinelands protected area zoning (Craghan et al., 2010).

Figure 5.4.1-1. New Jersey Coastal Boundary Map



Source: NJOEM, 2012

Note: The red line indicates the location of the CAFRA area.

A majority of the County is located along the Delaware River, where it is densely populated and, in some areas, heavily industrialized. Burlington County has four islands along the Delaware River: Newbold, Burlington, Hawk and Amico Islands (Craghan et al, 2010).

**Previous Occurrences and Losses**

Coastal erosion can occur gradually as a result of natural processes or from catastrophic events such as hurricanes, Nor’Easters and tropical storms. Coastal erosion also results from sea-level change, which occurs for a variety of reasons. Based on all sources researched, known events that have caused coastal erosion in Burlington County are identified in Table 5.4.1-1. The events listed in the table include those discussed previously in the 2008 county plan, in addition to events researched for this 2013 update. This table does not necessarily include all weather events that have occurred throughout the County.

**SECTION 5.4.1: RISK ASSESSMENT – COASTAL EROSION**

Table 5.4.1-1. Coastal Erosion Events between 1936 and 2012

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts	Source(s)
September 19, 1936	Hurricane	N/A	N/A	This storm was a Category 2 hurricane when it passed by Burlington County, roughly paralleling the New Jersey shoreline. Coastal areas incurred flooding and beach erosion.	2008 Burlington County HMP
August 1, 1944	Tropical Storm	N/A	N/A	This tropical storm passed through the Delmarva Peninsula and subsequently made landfall in New Jersey at Cape May. Severe beach erosion and high tides were noted in coastal areas.	2008 Burlington County HMP
January 7-8, 1996	Blizzard	N/A	N/A	A record-breaking snowfall hit most of New Jersey, causing municipalities to exceed their annual snow budget, several buildings to collapse, and over 57,000 homes to lose power. The storm produced moderate flooding with moderate-to-severe beach erosion from Manasquan south along the Jersey Shore. A total of 28 deaths and numerous injuries were reported, as well as over \$50 million in damages.	NOAA-NCDC
February 16, 2003	Snow	N/A	N/A	The most powerful storm to affect New Jersey since the Blizzard of 1996 struck during the President's Day Weekend. Governor James McGreevey declared a state of emergency on the 16th. It cost state and local officials 14 million dollars to clear roadways statewide. Most businesses reopened on the 18th, but schools and state courthouses remained closed. The worst damage from the storm inland was caused by the weight of the snow and sleet which caused numerous roof collapses and collapses of "Florida rooms". Moderate tidal flooding and moderate to locally severe beach erosion affected coastal communities. In Burlington County, hundreds of residents were forced to leave their Tricia Meadows homes in Mount Laurel on the 17th after drifting snow blocked the roof top furnace flue and vent pipes. Carbon monoxide was building within their homes. A shelter was opened at a nearby school. Volunteers helped clear the roofs and residents returned that evening. The roof of an apparel printing business in Lumberton collapsed. Planes were grounded at McGuire Air Force Base through the 18th. Specific snow accumulations in Burlington County included 21.0 inches in Mount Laurel, 20.0 inches in Bordentown, and 19.0 inches in Tabernacle. Statewide, this event caused nearly \$20 million in damages.	2008 Burlington County HMP

Note (1): This table does not represent all events that may have occurred throughout the County.

Note (2): Monetary figures within this table were U.S. Dollar (USD) figures calculated during or within the approximate time of the event. If such an event would occur in the present day, monetary losses would be considerably higher in USDs as a result of increased U.S. Inflation Rates.

FEMA Federal Emergency Management Agency

HMP

Hazard Mitigation Plan



NOAA National Oceanic and Atmospheric Administration  
NCDC National Climatic Data Center

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### Impacts of Climate Change, Sea Level Rise and Coastal Erosion

Over the past several decades, the northeast U.S. has experienced noticeable changes in its climate. Since 1970, the average annual temperature rose by 2°F and the average winter temperature increased by 4°F. Heavy precipitation events increased in magnitude and frequency during this time as well (U.S. Environmental Protection Agency [USEPA], 2013).

Along with an increase in temperature, it is expected the amount of precipitation received in the northeast U.S. will increase as well. During winter months, more rain will fall rather than snow, which would likely increase the number and impact of flooding events. The intensity and duration of rain-producing events may increase as well. Sea level rise, storm surges, erosion and the destruction of coastal ecosystems will likely contribute to an increase in coastal flooding events (USEPA, 2013b).

Severe storms can cause erosion along the shorelines and are the largest cause of shoreline change. With a changing climate, coastal areas may experience an increase in the number, intensity and duration of storms, which could cause areas to experience more coastal erosion. Beaches are the first form of protection against waves and create a buffer between waves and coastal properties. When beaches are cut back during storms, they lose this buffering ability, which makes further coastal erosion more likely to occur. As beaches erode, vulnerable properties are at a greater risk (Sea Grant, Date Unknown).

As the rate of sea level rise increases, coastal erosion may increase as well. Higher sea levels could affect the coastal zone by causing a greater shoreline retreat, increasing coastal erosion, destroying properties, and cause saltwater intrusion into bays, rivers and underground water resources (Sea Grant, Date Unknown).

In New Jersey, there is more than 400 miles of shoreline that include the New York Harbor, Raritan Bay, the Atlantic Ocean and the Delaware River and Bay; with an additional 2,500 miles along back barriers and tributaries to these waterbodies, and rising sea levels threaten these coastal areas. If sea level were to rise two feet, approximately 61 square miles of dry land would be inundated. As sea level rises, the lowest lands will be eroded or inundated by the tides (Craghan et al., 2010).

Sea level is rising between three and four millimeters each year (or 12 to 16 inches per century) along New Jersey's coastline and is a major concern in the State. It is projected to rise more than the global average in the northeast portion of the State. Ocean beaches are eroding, prompting beach nourishment projects along most of the developed shoreline. Along the shores of the Delaware Bay, beaches and marshes are eroding and aging dikes are increasingly vulnerable. These effects could be more widespread if rising global temperatures cause the rate of sea level rise to accelerate. The Intergovernmental Panel on Climate Change (IPCC) estimates that by the end of the next century, sea level is likely to increase zero to three inches per decade (Craghan et al., 2010; NJDEP, 2013).

In Burlington County, along the Delaware River coast, wetlands will most likely migrate inland as sea level rises in the eastern portion of the County along the Mullica River. However, the vast majority of the County's shorelines along the Delaware River and its tributaries will be protected. In the Great Bay area, the unincorporated area of New Gretna (Bass River Township) is the primary area prone to sea level rise and needs to be protected. The remainder of the eastern part of the County will most likely be protected (Craghan et al., 2010).

### Probability of Future Events

As indicated in the FEMA Multi-Hazard Identification and Risk Assessment Report, coastal erosion is measured as the rate of change in the position or horizontal displacement of a shoreline over a specific

period of record, measured in units of feet or meters per year. Erosion rates vary as a function of shoreline type and are influenced primarily by episodic events. Monitoring of shoreline change based on a relatively short period of record does not always reflect actual conditions and can misrepresent long term erosion rates. Shorelines that are accreting, stable or experiencing mild rates of erosion over a long-term period are generally considered as not subject to erosion hazard. However, short-term and daily erosion can expose a segment of coast to an episodic storm event and associated erosion damages at any given time. Detailed methods of determining return periods and frequencies of occurrence of coastal erosion are very difficult to determine due to limited information and the relatively short period of recorded data in most areas. The long-term patterns of coastal erosion are also difficult to detect because of substantial and rapid changes in coastlines in the short-term (that is, over days or weeks from storms and natural tidal processes). It is usually severe short-term erosion events, occurring either singly or cumulatively over a few years, that cause concern and lead to attempts to influence the natural processes. Analysis of both long- and short-term shoreline changes are required to determine which is more reflective of the potential future shoreline configuration (FEMA, 1997).

As mentioned above, coastal erosion problem is an ongoing problem along many areas of the New Jersey coastline. It is difficult, if not impossible, to assign a probability to the near constant small ongoing erosion that may occur over a continuous period of time. However, a probability can be assigned to larger storm events such as Nor'easters and hurricanes which can result in significant storm induced coastal erosion. As described in the sections below related to Nor'easters and Hurricanes, the probabilities of these events range from a few a year (Nor'easters) to less than one significant event per decade on average (hurricanes). The period of time over which this data is provided suggests the probability of coastal erosion will be about the same in the future, with year-to-year variation (NJ HMP, 2012).

In Section 5.3, the identified hazards of concern for Burlington County were ranked. The probability of occurrence, or likelihood of the event, is one parameter used for ranking hazards. Based on historical records and input from the County Planning Committee, the probability of occurrence for coastal erosion in Burlington County is considered 'rare' (hazard event is not likely to occur within 100 years), as presented in Table 5.3-3).

### VULNERABILITY ASSESSMENT

To understand risk, a community must evaluate what assets are exposed or vulnerable in the identified hazard area. While coastal erosion is not generally considered an imminent threat to public safety, its impact to property, infrastructure, environmental resources and local economies is clear. The following text evaluates and estimates the potential impact of coastal erosion on Burlington County including:

- Overview of vulnerability
- Data and methodology used for the evaluation
- Impact on: (1) life, safety and health of residents, (2) general building stock, (3) critical facilities, (4) economy and (5) future growth and development
- Further data collections that will assist understanding of this hazard over time

#### Overview of Vulnerability

While Burlington County has no open water on the Atlantic Ocean or Delaware Bay, it has two distinct areas that are at risk of shoreline erosion: the western border along the Delaware River and the southeastern portion along Mullica River Great Bay and its tributaries. The coastal boundary of the State of New Jersey encompasses the latter area (NJDEP, 2007; NJDEP, 2002).

As described in detail earlier in this profile, principal natural causes of erosion are wave action, wind action, and overland runoff through intense precipitation. Other contributing factors that can significantly increase erosion of a natural protective feature include length of fetch, wind direction and speed, wave length, height and period, near-shore water depth, tidal influence, increased lake levels, and overall strength and duration of storm events. Additionally, sea-level rise will exacerbate coastal erosion.

#### Data and Methodology

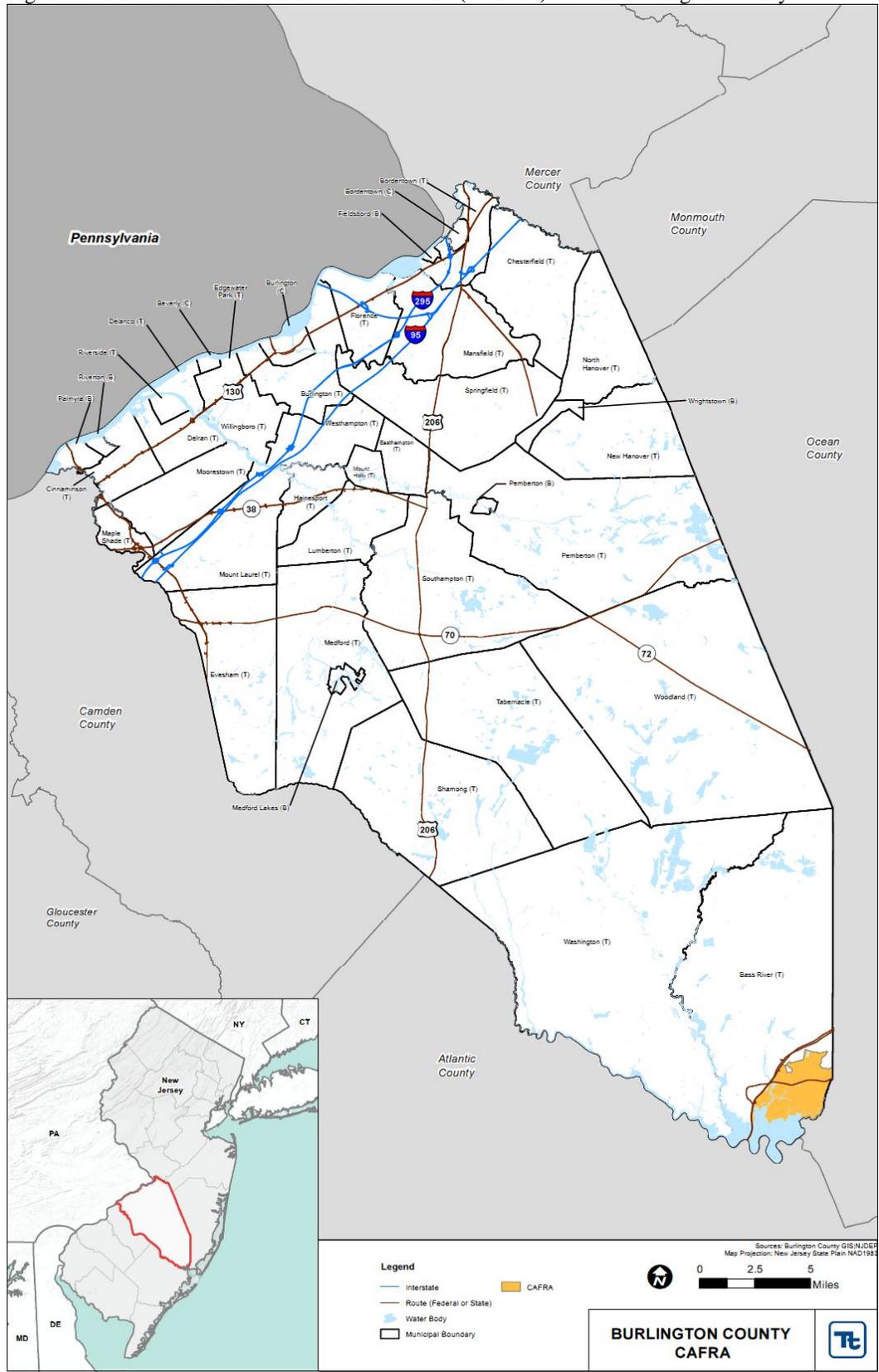
The CAFRA boundary, which legislates land use within the coastal area, was used to determine exposure to the coastal erosion hazard. As noted above, land within this boundary is under the jurisdiction of the Coastal Area Facilities Review Act (CAFRA), N.J.S.A. 13:19-1 et seq (as amended to July 19, 1993). This area includes the Advisory V-zone and any area indicated by the Advisory data with wave action.

The asset data (population, building stock and critical facilities) presented in the County Profile section (Section 4) were used to support an evaluation of assets exposed to this hazard. To determine what assets are exposed to coastal erosion, available and appropriate GIS data was overlaid upon the CAFRA polygon. Bass River Township is the only municipality in Burlington County located within the CAFRA zone. The asset data exposed is presented in Figure 5.4.1-2.

In addition, projected sea-level rise data (in one-foot increments) available from Jacques Cousteau National Estuarine Research Reserve (<http://slrviewer.rutgers.edu/about.html>) was considered and used for this analysis. Please note these levels do not include additional storm surge due to a hurricane or Nor'easter. The current Advisory maps and preliminary DFIRMS also do not include the effects of sea-level rise. Miller et al. projects an approximate 2-foot in sea-level rise by 2050 for the State of New Jersey in *A geological perspective on sea-level rise and impacts along the U.S. mid-Atlantic coast* (July 2013, Submitted to Earth's Future). For the purposes of this planning effort, the year 2050 and associated projected 2-foot rise was used as a reasonable and responsible planning horizon.

**SECTION 5.4.1: RISK ASSESSMENT – COASTAL EROSION**

Figure 5.4.1-2. Coastal Area Facilities Review Act (CAFRA) Area in Burlington County



Source: NJDEP



**Impact on Life, Health and Safety**

Coastal erosion is not generally considered an imminent threat to public safety when the changes are gradual over many years. However, drastic changes to the shoreline may occur as a result of a single storm event which can threaten homes and public safety. The population exposed is also considered vulnerable to this hazard. Only a small area in southeastern corner of Burlington County is located within the jurisdiction of CARFA. Coastal erosion is a possibility in this area of the county, as it is tidally influenced.

Census blocks do not follow the boundaries of the CAFRA boundary and can grossly over or under estimate the population exposed when using the centroid or intersect of the Census block with these areas. Table 5.4.1-2 summarizes the approximate population located within Bass River Township.

Table 5.4.1-2. Approximate Population in the CAFRA Boundary

Municipality	Total Population (2010 U.S. Census)	Population In CAFRA Boundary	% of Total Population
Bass River Township	1,443	271	18.8%
<b>Burlington County</b>	<b>448,734</b>	<b>271</b>	<b>&lt;1%</b>

Source: NJDEP; U.S. Census, 2010

Note: % = Percent; CAFRA = Coastal Area Facilities Review Act

To estimate the approximate population exposed to two-feet of sea level rise, the Jacques Cousteau National Estuarine Research Reserve 2-foot sea level rise boundary was used. Table 5.4.1-3 summarizes the approximate population in the area mapped with 2-feet of sea level rise by municipality.

Table 5.4.1-3. Total Improved Value Exposure to 2-Feet of Sea Level Rise

Municipality	Total Population (2010 U.S. Census)	Population In Area Mapped with 2-feet of Sea Level Rise	% of Total Population
Bass River Township	1,443	24	1.6%
<b>Burlington County</b>	<b>448,734</b>	<b>24</b>	<b>.005%</b>

Source: Burlington County GIS; Rutgers, 2013

Note: % = Percent

**Impact on General Building Stock**

To estimate the potential losses to the general building stock, the exposure analysis methodology was used. Table 5.4.1-4 and Table 5.4.1-5 summarize the total improved value and replacement cost value of buildings in the CAFRA boundary by municipality. This exposure estimate is considered high if used to estimate potential losses because coastal erosion generally occurs in increments of inches to feet per year along the coastline and may not necessarily occur across the entire coastal resource area at the same time from one event. Nonetheless, the total improved value and replacement cost value of state facilities within this area represents an estimated total loss value for buildings.

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Table 5.4.1-4. Total Improved Value Exposure in the CAFRA Boundary

Municipality	Total Improved Value	Improved Value in CAFRA Boundary	% of Total RCV
Bass River Township	\$112,293,600	\$33,710,800	30%
<b>Burlington County</b>	<b>\$36,253,174,444</b>	<b>\$33,710,800</b>	<b>&lt;1%</b>

Source: NJDEP; Burlington County GIS

Note: % = Percent; CAFRA = Coastal Area Facilities Review Act

Table 5.4.1-5. Building Replacement Cost Value Exposure in the CAFRA Boundary

Municipality	Total RCV	RCV in CAFRA Boundary	% of Total RCV
Bass River Township	\$158,762,000	\$35,027,000	22%
<b>Burlington County</b>	<b>\$36,253,174,444</b>	<b>\$35,027,000</b>	<b>&lt;1%</b>

Source: HAZUS-MH; Burlington County GIS

Note: % = Percent; CAFRA = Coastal Area Facilities Review Act; RCV = Replacement Cost Value

To estimate the potential losses to the general building stock from two-feet of sea level rise, the exposure analysis methodology was used. Table 5.4.1-6 and Table 5.4.1-7 summarize the total improved value and replacement cost value of buildings in the area mapped with 2-feet of sea level rise.

Table 5.4.1-6. Total Improved Value Exposure to 2-Feet of Sea Level Rise

Municipality	Total Improved Value	Improved Value in Area Mapped with 2-feet of Sea Level Rise	% of Total RCV
Bass River Township	\$112,293,600	\$5,031,200	4.5%
<b>Burlington County</b>	<b>\$36,253,174,444</b>	<b>\$5,031,200</b>	<b>.01%</b>

Source: Burlington County GIS; Rutgers, 2013

Note: % = Percent

Table 5.4.1-7. Building Replacement Cost Value Exposure to 2-Feet of Sea Level Rise

Municipality	Total RCV	RCV in Area Mapped with 2-feet of Sea Level Rise	% of Total RCV
Bass River Township	\$158,762,000	\$2,523,000	1.6%
<b>Burlington County</b>	<b>\$36,253,174,444</b>	<b>\$2,523,000</b>	<b>.005%</b>

Source: HAZUS-MH; Rutgers, 2013

Note: % = Percent; RCV = Replacement Cost Value

### Impact on Critical Facilities

There are no identified critical facilities within the CAFRA boundary. There are no identified critical facilities within the 2-foot of sea-level rise boundary.

### **Impact on Economy**

Coastal erosion can also severely impact roads and infrastructure. There are 19.07 miles of roadway (freeway, major arterial and collector, and minor arterial) that lie within the CAFRA boundary, 4.93 miles of which are along an evacuation route.

### **Future Growth and Development**

As discussed in Section 4, areas targeted for future growth and development have been identified across the County. Any areas of growth located in the defined coastal risk areas could be potentially impacted by coastal erosion similar to those that currently exist within the County.

### **Additional Data and Next Steps**

When the New Jersey Coastal Management Program maps and the New Jersey Office of Coastal Management coastal risk assessment areas are updated, this section of the plan will be updated to reflect new areas and/or assets located in the coastal erosion hazard area. Additional data on historic costs incurred to reconstruct buildings and/or infrastructure due to coastal erosion impacts would assist in estimating future losses.