

Floodplain Management Plan Repetitive Loss Area Analysis

Cape May City, New Jersey



Prepared by Rutala Associates

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Introduction

Cape May City has aggressively worked to prepare a comprehensive Floodplain Management Plan. This Repetitive Loss Area Analysis has been prepared to continue this effort in compliance with the *National Flood Insurance Community Rating System Coordinator's Manual, 2017*. The Analysis will help achieve the following objectives:

- Assess flood risk to NFIP properties
- Determine localized improvements to reduce flooding
- Contextualize the City's resiliency measures

The Community Rating System, administered by the Federal Emergency Management Agency, rewards proactive and voluntary floodplain management activities undertaken by the City with discounts on flood insurance premiums. A Repetitive Loss Area Analysis is a creditable activity for the Community Rating System. The repetitive loss area encompasses various sections of Cape May's neighborhoods. The areas were determined by the concentration and distribution of repetitive loss properties and properties with substantial historic flood claims.

In 2020-2021, Cape May was a participating jurisdiction in the 2021 Cape May County Hazard Mitigation Plan Update. The plan was updated to help qualify Cape May City and other communities qualify for mitigation funding from the FEMA Hazard Mitigation Assistance program. The plan outlined local and city-wide mitigation projects to undertake within the next five years. Its recommendations are incorporated into this Repetitive Loss Area Analysis.

When an insurable building suffers flood damage with damage claims totaling more than \$1,000 over a given ten-year period, a property becomes a repetitive loss property. A severe repetitive loss property is one that is covered by the National Flood Insurance Program that has had at least four claim payments over \$5,000 (with a cumulative amount over \$20,000) or had received two separate claim payments for the building with the cumulative amount exceeding the market value of the building. These buildings are expensive to insure. Despite comprising less than one percent of all insured properties, severe repetitive loss properties account for over a quarter of flood claims nationwide. Eliminating or mitigating damage to repetitive loss structures is important for ensuring an area's vitality and for reducing the financial burden of flood losses.

Cape May's repetitive loss properties are older residential properties that were not constructed to floodplain management standards and have significant exposure to current and future flooding. The geographic concentration of at-risk properties in the neighborhood resulted in the City mapping nine areas of concentrated losses as repetitive loss areas pursuant to Activity 510 of the Community Rating System. A repetitive loss area includes properties that both are and are not repetitive losses and supports generalized analysis of the neighborhood to protect the confidentiality of individual flood insurance information. A map of the repetitive loss areas is provided below in Figure 3.

The Repetitive Loss Area Analysis has followed a five-step process as defined by the *Community Rating System Coordinators Manual (2017)*:

- 1.) Notification of properties in the repetitive loss area via direct mailing.
- 2.) Analyze plans or studies by outside agencies.
- 3.) Perform a site visit of buildings in the repetitive loss area.
- 4.) Review approaches to mitigating flood risk and protecting properties.
- 5.) Document the findings in a report.

Property identifiers such as addresses and pictures of specific buildings in this study have been excluded from the publicly available copy of the report. Addresses and property-specific information can be requested from the City's building office. In addition, this report will be revised annually to reflect any changes in the neighborhood and be available for download from the City's website.

Background

The City of Cape May is a 2.2 square mile community located at the southern tip of the mainland of New Jersey, where the Atlantic Ocean meets the Delaware Bay, approximately 70 miles southeast of Philadelphia, PA.

Figure 1: Cape May City Study Area Features



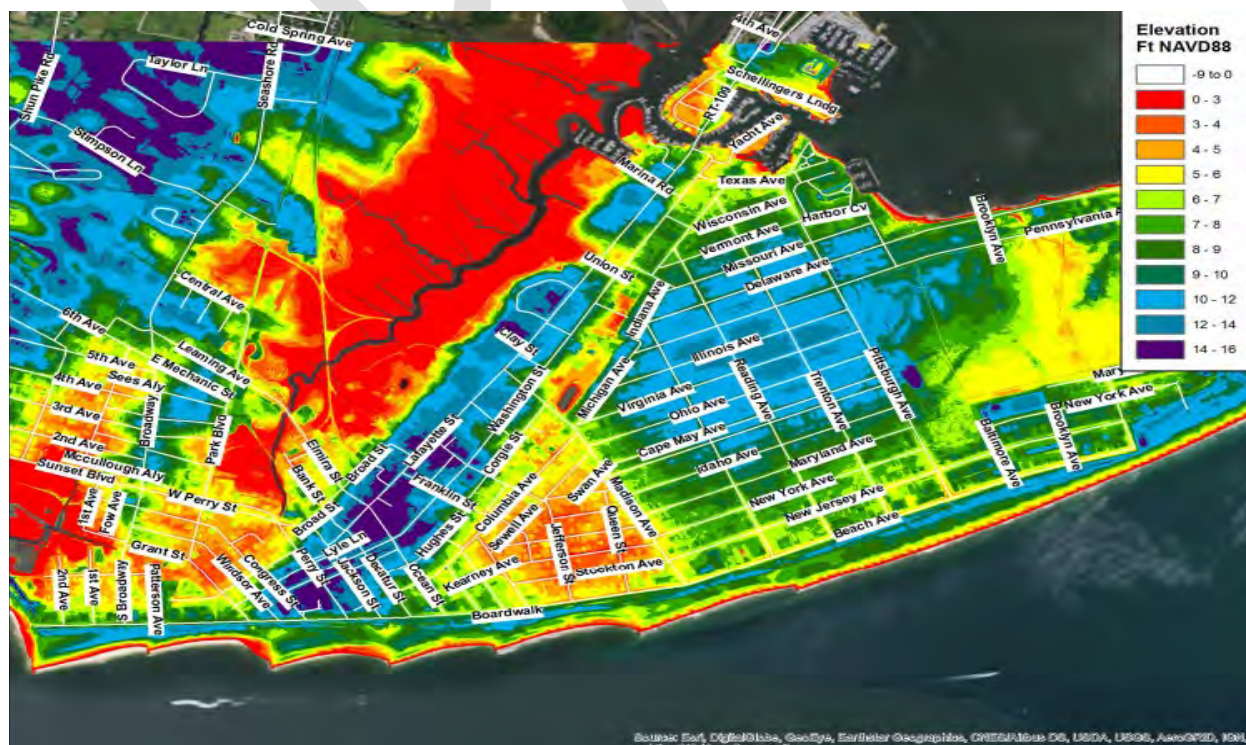
The Atlantic Ocean is located to the south, the municipalities of Lower Township and the Borough of West Cape May are located to the west, Cape May Harbor is located to the north, and Cape May Inlet is located to the east. Cape May Inlet and Harbor are connected to the Delaware Bay via the Cape May Canal. Cape Island Creek is a tidal creek which connects the

Harbor and a wetland complex to the west known as the Fow Tract. The eastern end of the City is occupied by the United States Coast Guard (USCG) Training Center, which occupies approximately 20 percent of the land area in the City. Another wetland complex known as the Sewell Tract is located on the east side of the City adjacent to the USCG Training Center.

As of the 2010 Census, there were 4,034 people in the permanent year-round population in Cape May City. Summer population increases substantially to between 40,000 and 50,000 people with the influx of visitors and second home usage in the town. The tourism industry is one of the most important industries in Cape May City. Tourism generates approximately one out of every three jobs. The economy of Cape May City and adjacent coastal communities relies to some extent on a transient workforce to supply tourism industry employees, especially in the summer. Each summer tourists flock to Cape May City's beach, promenade, and restaurants for day trips and extended vacations. Cape May City and Cape May Point State Park (just south of the town) serve as a popular birding destination for tourists seeking to catch a glimpse of the migratory birds that stop along the shoreline. Birding as a tourism experience is year-round.

Cape May is a historic seaside resort situated at the southern tip of Cape May County and New Jersey. Known both as America's first seaside resort as well as the Queen of seaside resorts, the City in its entirety is a designated National Historic Landmark. Cape May's legendary historic district, Washington Street Mall, network of small businesses and bed and breakfasts, miles of beaches, and its hosting of the US Coast Guard's Training Center contribute to the City's one-of-a-kind status as a seasonal resort and residential community.

Figure 2: Cape May City Topographic Map



Cape May is a uniquely situated community at the Jersey Shore with variable degrees of flood vulnerability. A large section of the City is located on high ground located outside of the current Special Flood Hazard Area. However, other neighborhoods in the City are low-lying and vulnerable to flooding from storm surge and tidal flooding. Cape May's beaches are also particularly prone to erosion due to its geography and various structural interventions that trap sand farther up the coast.

Historically, much of Cape May was a tidal wetland. Over the course of the early 1900s, the area was gradually filled for residential and Federal Government land development purposes. Along Lafayette Street, which is located between Frog Hollow and Cape Island Creek, ground elevations are approximately greater than +10 feet North American Vertical Datum of 1988 (NAVD88). The north central part of the city, in the vicinity of Illinois and Virginia Avenues, also has ground elevations which are generally greater than 10 feet. The lowest ground elevations in the city are within Frog Hollow (approximately +3 to +4 feet NAVD88) and along Beach Avenue (approximately +5 to +6 feet NAVD88).

The following figure is derived from the Flood Insurance Study undertaken for Cape May in 2017. This identifies the most recent flood data for various locations in the City.

Figure 3: Base Flood Elevations and Transects for Cape May City, NJ

Flood Source	Transect		Starting Wave Conditions for 1% Annual Chance		Starting Stillwater Elevations Range of Stillwater Elevations (ft NAVD88)			
	#	Coordinates	Significant Wave Height	Peak Wave Period	10%	2%	1%	0.2%
Atlantic Ocean	58	N 38.941412 W 74.883776	9.98	13.28	6.1 5.8 – 6.2	7.8 7.0-7.8	8.5 7.8-8.5	11.3 9.2-11.3
Atlantic Ocean	59	N 38.941412 W 74.883776	10.1	12.92	6.0 5.8-7.2	7.7 6.9-7.7	8.4 7.7-8.4	11.1 9.0-11.1
Atlantic Ocean	60	N 38.933080 W 74.902288	10.78	12.71	5.8 3.7-6.3	7.7 7.2-7.8	8.5 8.0-8.5	11.0 9.6-11.1
Atlantic Ocean	61	N 38.930518 W 74.910757	9.65	13.18	6.0 5.9-6.3	7.6 7.2-7.7	8.3 8.0-8.4	10.7 9.7-10.8
Atlantic Ocean	62	N 38.929185 W 74.919659	10.58	12.66	6.0 5.2-6.3	7.6 7.3-7.6	8.3 8.0-8.3	10.5 9.5-10.5
Atlantic Ocean	63	N 38.929183 W 74.926473	9.76	12.7	6.0 2.1-6.4	7.5 6.8-7.6	8.2 7.4-8.3	10.4 8.8-10.5

Flood Source	Transect		Starting Wave Conditions for 1% Annual Chance		Starting Stillwater Elevations Range of Stillwater Elevations (ft NAVD88)			
	#	Coordinates	Significant Wave Height	Peak Wave Period	10%	2%	1%	0.2%
Source: 2017 Flood Insurance Study, Cape May County								

Cape May has historically experienced flooding problems caused by the combined effects of elevated ocean water levels (“storm surge”), wave action, and heavy precipitation during hurricanes and nor'easters. The location of the city at the southern tip of New Jersey makes it particularly vulnerable to coastal storms which gather strength over the ocean. The most damaging coastal storm events in Cape May over the past 60 years include: the Ash Wednesday Storm in March 1962, the nor'easter in 1980, Hurricane Gloria in 1985, the Halloween Storm in 1991, the nor'easters in January and December 1992, Hurricane Irene in 2011, Hurricane Sandy in 2012, and the nor'easter in January 2016.

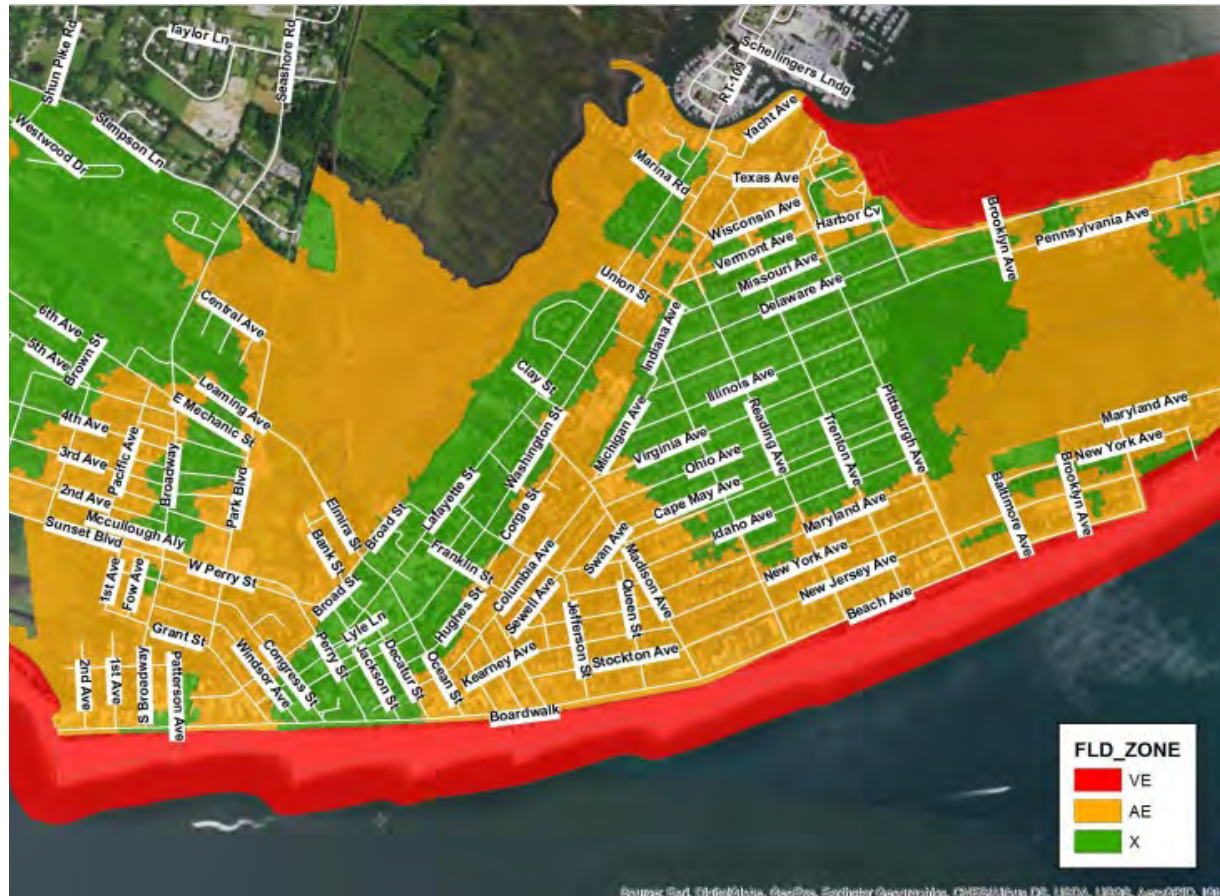
Ocean water levels are recorded by the National Oceanic and Atmospheric Administration (NOAA) at the Cape May, NJ Tide Gage (Station ID 8536110). This gage is located at the west end of the Cape May Canal at the Cape May – Lewes Ferry terminal. This tide gage was established in 1965 and provides the longest continuous record of coastal flooding in the area. The top ten highest water levels recorded over the period of record are listed in Figure 4. No adjustment to water surface elevation has been made for sea level rise or fall in this table.

Figure 4: Top Ten Highest Water Levels at Station 8536110

Rank	Elevation (Ft NAVD 88)*	Date	Storm Type
1	5.96	1/23/2016	Nor'easter
2	5.87	10/29/2012	Hurricane Sandy
3	5.79	9/27/1985	Hurricane Gloria
4	5.67	10/29/2011	Nor'easter
5	5.64	10/25/1980	Nor'easter
6	5.53	12/11/1992	Nor'easter
7	5.52	1/4/1992	Nor'easter
8	5.50	3/3/1994	Nor'easter
9	5.37	8/28/2011	Hurricane Irene
10	5.25	10/14/1977	Nor'easter

Source: NOAA/NOS, as of 4/2018

Figure 5: FEMA Flood Insurance Rate Map for Cape May City



The floodplain management planning process identified nine repetitive loss areas in Cape May. The repetitive loss areas comprise all of Cape May's identified unmitigated repetitive loss properties. These areas are shown on the following figure and include the following (discussed in greater detail in the following sections):

Figure 6: Cape May City Repetitive Loss Areas

RLA #	Name	Approximate Location
1	West Side	Mount Vernon Avenue; First Avenue; Second Avenue
2	Cape Island Creek Culvert	Claghorn Place; Congress Street; Windsor Avenue
3	Jackson Street at Beach Avenue	Intersection of Jackson Street at Beach Avenue
4	Frog Hollow	Neighborhood bounded by Beach Avenue and Columbia Street between Madison Avenue and Gurney Street

RLA #	Name	Approximate Location
5	Philadelphia Avenue	Blocks surrounded intersection of Beach Avenue and Philadelphia Avenue
6	Pittsburgh Avenue	Blocks surrounded intersection of Beach Avenue and Pittsburgh Avenue
7	Sewell Point	Beach Avenue between Baltimore Avenue and Wilmington Avenue
8	Buck Landing	Cape May Island Creek near Cape May Harbor
9	Devil's Reach	Cape May Harbor at Schellenger Creek

Figure 7: Repetitive Loss Areas of Cape May



Study Methodology, Results, and Analysis

The repetitive loss study was conducted using the five-step process described in the CRS Coordinator's Manual. These steps include:

- Step 1: Advise all properties of repetitive loss area status.
- Step 2: Contact agencies or organizations that have plans or studies pertaining to flooding. (Completed as part of the Floodplain Management Planning Process)
- Step 3: Visit each building in the repetitive loss area and collect basic information.
- Step 4: Review alternative approaches and determine whether any property protection measures, or drainage improvements are feasible.
- Step 5: Document the findings.

Rutala Associates conducted site visits on the dates listed in the table below. No abnormal tidal conditions were observed during the survey dates.

Figure 8: Survey Dates

March 15, 2021
March 16, 2021
March 17, 2021
March 18, 2021
March 19, 2021

The site visits consisted of taking pictures of identified repetitive loss area properties and documenting the foundation type, whether flood vents were present, and whether mitigation measures were in place. Detailed building information was not available for this study because the Survey did not have access to detailed building data and did not undertake detailed property inspections. Property surveys were limited in detail to what could be obtained visually in the public right-of-way. For a number of properties, ground-level vegetation or building orientation prevented the identification of the presence of flood vents.

The Repetitive Loss Area includes approximately 523 properties. The number of structures was determined based on 2021 property tax records and the list of unmitigated repetitive loss properties in Cape May.

Step 1: Project Notification

A notice to property owners notifying them of the analysis and providing an email address to which to send flood-related comments and observations was mailed on January 22, 2021. A copy of this notice is provided in Appendix 1.

Step 2: Planning Coordination and Review

National Flood Insurance Program, Community Rating System

The City's records show that there were 141 repetitive-loss (RL) properties in Cape May in 2018. Of these 141 properties, 54 are unmitigated and are particularly vulnerable to future flood damage. A property is considered a repetitive-loss property when there are two or more losses reported that were paid more than \$1,000 for each loss. The two losses must be within 10 years of each other and be at least 10 days apart. Only losses from January 1, 1978 that are closed are considered. Cape May's 54 remaining unmitigated repetitive loss properties have experienced 147 losses totaling \$2.9M as of 2018.

The City has been actively involved in the NFIP's Community Rating System and is a statewide leader. The City currently has a Class 5 rating, which provides for a 25 percent discount on flood insurance. More than 1,500 communities nationwide, including 95 in New Jersey, participate in the CRS. Only 29 communities are in Class 5 or lower.

The CRS recognizes and encourages community floodplain management activities that exceed the minimum NFIP standards. In addition to the benefit of reduced insurance rates, CRS floodplain management activities enhance public safety, reduce damage to property and public infrastructure, avoid economic disruption and losses, reduce human suffering and protect the environment. Participating in the CRS provides an incentive to maintain and improve a community's floodplain management program over the years. Implementing some CRS activities can help projects qualify for certain other federal assistance programs. Participating communities can earn credit for undertaking a variety of flood-reduction measures, including preserving open space, mandating that buildings in flood zones be elevated higher than FEMA requires, and incorporating predictions of future sea-level rise into their regulatory maps. Overall, creditable activities are grouped into four categories: public information, mapping and regulations, flood damage reduction, and warning and response. Different amounts of points are awarded for different measures, as explained in the FEMA manual.

United States Army Corps of Engineers

Shore Protection

Throughout the Jersey Shore, the US Army Corps, NJDEP Division of Coastal Engineering, and local municipalities partner for periodic beach replenishments. In this process, sand is pumped from offshore locations onto eroding coastlines and is graded to meet a design height. After the initial beachfill, the project is maintained cyclically. Dunes have been effective in protecting property on the landward side of the dune and for re-creating the typical barrier island habitat and its inherent shore protection qualities. Cape May receives beach replenishments. The littoral current, wave action, structural interventions have caused long-term and severe erosion to Cape Island and Cape May City in particular. Cape May City and Cape May Point receive regular beach nourishments in partnership with the

two communities, Lower Township, the Nature Conservancy and Cape May Point State Park, the US Army Corps of Engineers, and NJDEP.

Beach Avenue Seawall

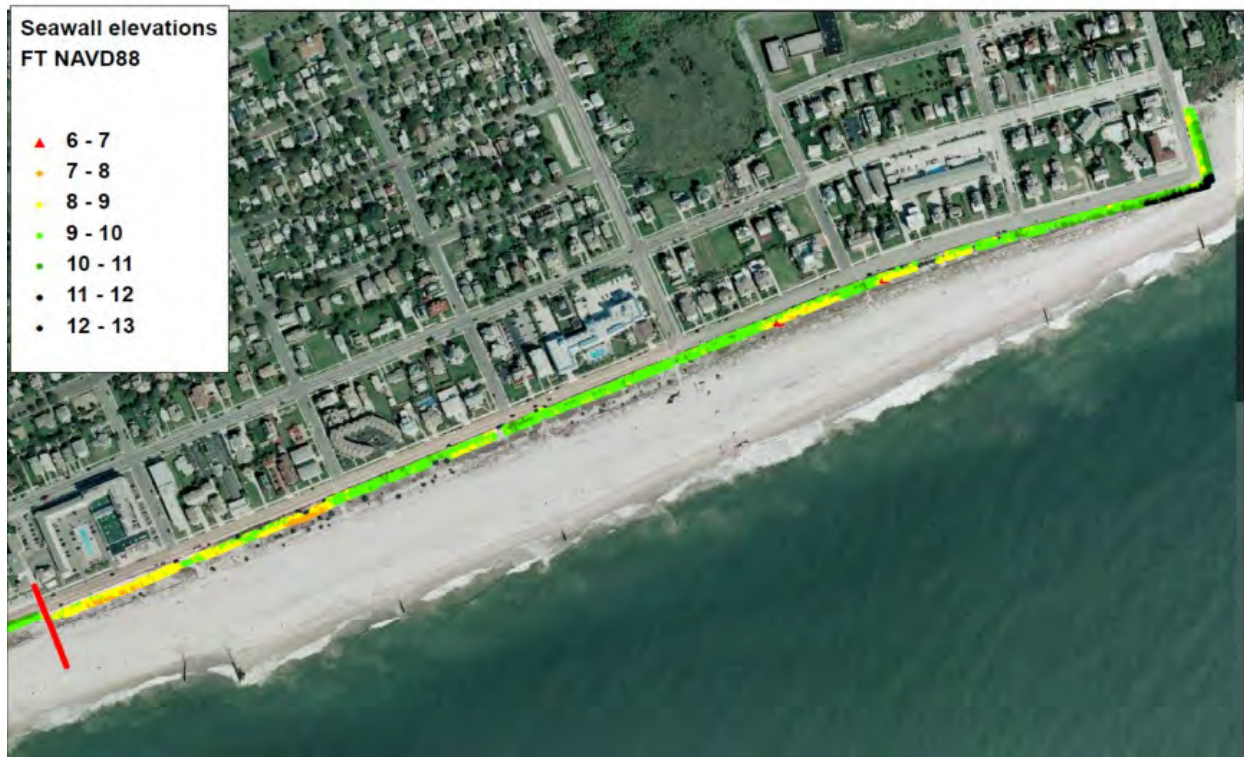
A timber bulkhead provided coastal storm risk management along the ocean front of Cape May through the 1960s. The seawall was constructed following the destruction of the bulkhead and boardwalk by the Ash Wednesday Storm in March of 1962. The seawall is constructed of large rocks (approximately 4 to 5 feet in diameter) with concrete grouted within the voids. It extends from 2nd Avenue on the west side of the City to Wilmington Avenue on the east side. From 2nd Avenue to Madison Avenue, the top of the seawall is covered by an asphalt promenade that is used for recreation (Figure 7). This length of the seawall also has a concrete retaining wall on the street side. From Philadelphia Avenue to Wilmington Avenue, the seawall does not have an asphalt promenade and has a two-foot timber bulkhead on the street side.

Figure 9: Sections of Seawall with and without Asphalt Promenade



The Army Corps project area is vulnerable to ocean flooding due to the existing condition of a seawall that runs parallel between the beach and Beach Avenue. The seawall is constructed of stone and concrete and extends from 2nd Avenue on the west side of the City to Wilmington Avenue on the east side. From 2nd Avenue to Madison Avenue, the top of the seawall maintains an approximate elevation between 10 and 11 feet NAVD88. However, over the single city block between Madison Avenue and Philadelphia Avenue, the top elevation of the seawall drops by approximately 2 feet. From Philadelphia Avenue to Wilmington Avenue, the top elevation of the seawall varies between 7 and 10 feet. This area has historically experienced flooding problems which are increasing in frequency, duration, and intensity and are caused by the combined effects of tidal surge, wave action, and heavy precipitation during hurricanes and major nor'easters.

Figure 10: Elevation of Top of Seawall from Philadelphia Avenue to Wilmington Avenue



Wave and tidal action from Superstorm Sandy also brought approximately 8,000 cubic yards of sand over the seawall and onto Beach Avenue. The intersection of Beach Avenue and Wilmington Avenue was particularly impacted and had sand deposition in the street that was approximately 8 feet high. A private company was dispatched to clean this area and they worked extended hours from November 6th to November 10th to remove sand from the street and surrounding properties.

On November 6, 2013, the City of Cape May submitted a letter to the US Army Corp of Engineers - Philadelphia District requesting that a Federal Interest Determination be conducted to determine potential hurricane and storm damage reduction solutions for the seawall area following the severe flooding and erosion which occurred during Superstorm Sandy.

In August 2014, the Army Corps issued the Federal Interest Determination for the Cape May City Seawall Project. The Federal Interest Determination states “The study area is expected to continue to present a significant flood risk with associated damages due to dense residential and commercial development on flat, low-lying topography with exposure to tidal and wave action flooding from the Atlantic Ocean. The likelihood of future storms with intensities like Sandy, along with sea level rise, is placing this section of the City of Cape May at increasing risk for more frequent flooding. Given these conditions, flood damages predicted for the 50-year planning horizon in the City of Cape May study area are likely to be

substantial. Opportunities for flood risk management through a combination of structural and non-structural measures exist in the study area.”

The Federal Interest Determination identified at least one potential solution to reduce the coastal flooding risk to public health, safety, and property in the seawall study area. The economic analysis of the identified alternative, the installation of 4,800 linear feet of vinyl sheet pile bulkhead, resulted in a benefit-to-cost ratio that is equal to 5.25.

Given the significant interest in moving this project to construction, the City of Cape May agreed to be the local sponsor for the feasibility study. In 2015, the Army Corps kicked off a feasibility study which examined existing conditions and explore flood risk management solutions for the study area.

In February 2021, the Army Corps completed the Draft Integrated Feasibility Report & Environmental Assessment. This entire project will occur on public property. The public benefits of this project are to protect critical public infrastructure, reduce flooding in this low-lying area, improve access for emergency services to residents and visitors in this neighborhood and enhancing public access to the beaches. The tentatively selected plan consists of raising the elevation of the existing stone seawall along Beach Avenue and Wilmington Avenue along its current alignment by placing a reinforced concrete cap on top of the existing stone seawall to elevation +17 feet (NAVD88) for a length of 350 feet. At this elevation, the existing stone seawall would be raised approximately 7.5 feet from its existing elevation of approximately +9.4 ft (NAVD88). The construction commencement date is estimated to be June 2023 and is estimated to cost \$3.749 million dollars (October 2020 Price Level) and includes a contingency of percent.

At each end of the project limit inclusive of the 350 ft. concrete cap, a taper will be required in order to transition from the top of the new concrete cap down to the elevation of the top of the existing stone seawall. The taper will be placed at a 12H:1V slope and span a distance of approximately 90 feet on each end of the concrete cap, bringing the total length of concrete cap to 530 feet. The landward face of the concrete cap would be formed or stamped with a stone look façade so that it looks more like a natural feature and blends into the current environment. Plantings will be placed in front of the landward face of the seawall for aesthetic purposes. On the seaward side of the concrete cap, sand will be graded into the concrete cap to form a partial dune which will be graded into the existing adjacent dune to the southwest. This placed sand will prevent the need for a handrail on the seaward side for public safety. In order to stabilize the placed sand from erosion, dune vegetation will be planted.

The tentatively selected plan will be refined to incorporate public comments. Engineering and economic analyses will be revised as appropriate to reflect any revisions to the plan. The final version of this report will describe changes to the plan.

Figure 11: Army Corps Project Location - Corner of Beach and Wilmington Avenue



Figure 12: Army Corps Project Location – 530 Foot Section where elevated barrier is proposed



Figure 13: Superstorm Sandy Impact in Seawall Area



Delaware Avenue Living Shoreline

This project is located on the north side of the City along the Cape May Harbor. This area is an approximate 0.4-mile length of Delaware Avenue that continually experiences severe shoreline erosion due to tidal surge and wave action during hurricanes and major nor'easters. The erosion threatens the integrity of Delaware Avenue, a county road, which is the main route for the delivery of supplies to the U.S. Coast Guard Training Center. The erosion also threatens an underground sewer utility line that runs along the northern right-of-way of the road. The Army Corps study has determined that it is within Federal interest to construct the most environmentally suitable, least-cost protection alternative to address the shoreline erosion problems for the protection of Delaware Avenue and the sewer utility line. Cape May County is the local sponsor of this project and construction is expected to be completed by mid 2023.

Cape May Harbor Dredging

The purpose of this project is to provide a safe navigation channel for commercial, recreational and US Coast Guard. This project provides for an entrance channel 25 feet deep and 400 feet wide, protected by two parallel stone jetties, and extending from the 25-foot depth curve in the ocean to a line 500 feet landward of a line joining the inner ends of the jetties: hence 20 feet deep and 300 feet wide to deep water in Cape May Harbor. The total length of the section included in the project is about 2 1/4 miles. Funds are used for channel surveys and maintenance dredging. This authorized project provides a safe navigation channel for commercial, recreational and US Coast Guard use. The USCG, Station Cape May uses this federal channel to conduct critical life safety operations. The channel supports the commercial fishing industry, specifically the largest Fishery Landing in NJ (13th largest in

the US), contributing \$81M/year in direct fish value and over \$300M in economic value to the region.

Figure 14: Cape May Harbor Dredging Project



Federal Coastal Storm Risk Management (CSRM) Project

Coastal storm risk management is also provided along the shorefront of Cape May by a Federal beach project that extends from the west side of Cape May Inlet to the terminal groin near 2nd Avenue. Initial construction was completed in 1991 and periodic nourishment is scheduled for every 2 years. The design includes a berm and groins but does not include a dune. Any dunes that are present on the ocean side of the seawall have accreted naturally or were constructed by the City.

New Jersey Back Bays Study

The Army Corps of Engineers is currently undertaking a study to reduce flooding resulting from storm events in the back bay areas of the Jersey Shore, including Cape May. According to the Army Corps, the following efforts will be undertaken:

- Assess the study area's problems, opportunities and future without project conditions;
- Assess the feasibility of implementing system-wide coastal storm risk management solutions such as policy/programmatic strategies, storm surge barriers at selected inlet entrances, or tidal gates at selected lagoon entrances;
- Assess the feasibility of implementing site-specific perimeter solutions such as a combination of structural, non-structural, and natural and nature-based features;

- *Assess the impacts of back bay strategies and solutions on the Atlantic Coast Coastal Storm Risk Management Program towards developing recommendations within a systems context given likely future scenarios.*

An interim report was released in 2019 and serves as a first step towards achieving an engineering solution, project selection, and funding. Efforts being studied currently include nature-based features, floodwalls, storm surge barriers, and non-structural measures such as elevating structures. Environmental concerns and logistical challenges may prevent storm surge barriers in the back-bay areas located north of the City, which indicates that non-structural or smaller-scale solutions may be more feasible for Cape May specifically. The Plan is currently under development at the time of this Plan's drafting and the City will continually monitor the Army Corps' efforts.

As of 2019, there were two alternatives under consideration for the South Region, which includes Cape May City. These mitigation alternatives include:

- 5A: Non-Structural Solutions (no storm surge barriers/bay closures, or floodwalls)
- 5D(1)/5D(2): Perimeter/levee Protection for Cape May and West Cape May

In the fall of 2019, the New Jersey Back Bays Study was put on hold due to lack of federal funding. In the spring of 2021, the U.S. Army Corps of Engineers resumed study activities. A draft report that outlines a tentatively selected plan will be released in the summer of 2021. The draft report will be open for public and agency comments. In addition, public meetings will be scheduled to share information about the report and solicit feedback. The tentatively selected plan will include a combination of measures – inlet and cross-bay barriers, floodwalls and levees, structure elevation and wet/dry floodproofing, and natural and nature-based features. Essentially, the plan maximizes benefits relative to the costs of implementation but also assesses social effects and environmental quality impacts.

Federal Emergency Management Agency (FEMA)

FEMA has approved a grant to prepare conceptual design to extend the seawall-promenade for seven blocks (approximately 4,500 feet) between Philadelphia Avenue and Madison Avenue extending northeasterly, to the corner of Beach Avenue and Wilmington Avenue where an Army Corps project is proposed. The project will be designed to provide resiliency as well as to provide for pedestrian and bicycle access. A second grant for the engineering and final plans for this project has been tentatively approved by FEMA.

NJDEP Shore Protection Program

The New Jersey Department of Environmental Protection is involved in Cape May for the administration of coastal engineering projects/Shore Protection Program and its regulation of coastal areas through permitting and land use. Cape May is within the State of New Jersey's CAFRA (Coastal Area Facility Review Act) Zone, which includes regulations for a variety of developments in the coastal zone. The state also regulates coastal wetlands, waterfront

development, and provides consistency determinations for federally funded projects. The NJDEP also undertakes shore protection projects such as beach nourishment and construction/maintenance of shore protection structures throughout the State.

The New Jersey Department of Environmental Protection has developed a draft Coastal Resilience Plan to serve as a guide for future investment in mitigation projects. According to the Department, the plan will function as follows:

As part of the Climate Change Resilience Strategy, DEP has developed the draft Coastal Resilience Plan (CRP), which addresses the issues specific to New Jersey's coastal zone. New Jersey's coastal areas provide immeasurable value to the state's economic, social, and cultural identity, as well as supply important ecological resources and ecosystem services. With 80% of New Jersey's population residing in the coastal zone, responding effectively to the impending threats of climate change is imperative. The CRP is the first step for the DEP to evaluate how its policies and programs allow for local, regional, and state response to climate change within the coastal zone to combat threats of climate change and flooding.

The plan guides policies, regulations, resource allocation and funding in the coastal zone to:

- reduce the impacts of coastal hazards;*
- increase resilience for structures, infrastructure systems, environmental resources, and coastal communities;*
- address the needs of socially vulnerable populations;*
- and attract equitable and sustainable investment.*

The CRP represents the early steps of a long-term strategy for climate change resilience and adaptation in New Jersey. The City of Cape May should follow this activity closely and provide comments on new policies that will impact the economic wellbeing of the City.

Cape May County Government

Cape May County Government is a strong partner with the City of Cape May. In addition to overseeing the County All Hazards Mitigation Planning effort, the County is actively involved in both the Delaware Avenue Living Shoreline Project and the Beach Avenue Seawall Project. The County is the local sponsor for the Delaware Avenue Project provided 25 percent of the project cost. The County is also a partner in the Beach Avenue Seawall Project and will be funding the replacement of the County bulkhead along Beach Avenue as part of this project.

Figure 15: County Bulkhead along Beach Avenue to be Replaced



In 2020-2021, Cape May County Emergency Management completed the five-year update to the County's Hazard Mitigation Plan (HMP). Pursuant to the Disaster Mitigation Act of 2000, a jurisdiction must have an updated hazard mitigation plan in order to qualify for funds from the FEMA Hazard Mitigation Assistance (HMA) program. HMA provides post-disaster funding through the Hazard Mitigation Grant Program and pre-disaster funding through the Flood Mitigation Assistance and Building Resilient Infrastructure and Communities program.

Cape May City participated in the plan update and developed 17 mitigation initiatives. These initiatives are summarized in the Figure below and are incorporated by reference into this Repetitive Loss Area Analysis.

Figure 16: Cape May HMP Mitigation Initiatives

Initiative Number	Mitigation Initiative Name	Problem Statement	Solution
2020-Cape May City-001	New Fire and OEM Department Building	Cape May's Fire and OEM are housed in a functionally obsolete building. The Fire and OEM building is susceptible to wind and rain damage and lacks an emergency command center.	Construct a new state of the art fire and OEM building that houses an emergency control center and enhances the ability of the City to respond to hazards.
2020-Cape May City-002	City Hall and Police Station Modernization	City Hall is functionally obsolete. It is a Contributing Building in the City's Historic District. It contains the City Administrative and police functions. The building requires updates to continue functioning in its current capacity to respond to natural hazards and be more resilient to hazard events.	Facilitate the modernization of the building to ensure critical functions during hazard events.
2020-Cape May City-003	Backup Power for Critical Facilities	Various Public Buildings lack backup power. This results in disrupted operations when the City is impacted by power outages and hazard events.	Installation of a back-up generator for the Cape May Convention Hall. This facility could provide temporary sheltering during non-flood related emergencies.
2020-Cape May City-004	Desalinization Plant Upgrades	Cape May has longstanding water supply issues owing to overdrawing wells and intrusion of saltwater into freshwater aquifers. The City has one of the first reverse-osmosis desalinization plant and requires additional upgrades to remain functional. The facility requires a rebuild.	Upgrade Desalinization plant - rebuild and new facility and advance planning/engineering.
2020-Cape May City-005	Transient Population Emergency Awareness	The City has a large visitor and second-home population during the summer season and fall/spring shoulder seasons. Informing these visitors and part-time residents of natural hazards is a challenge due to a lack of awareness of emergency resources.	Develop a geo-fencing alert system that will push alerts to all internet connected devices within the municipal boundaries. Additionally, develop a citywide siren system to reach visitors in the City regardless of location and length of stay.
2020-Cape May City-006	CR-640/Coast Guard Shoreline Protection (See 2020-	Delaware Avenue/CR-640 connects the US Coast Guard Training Center to Cape May and evacuation routes to the north. Delaware Avenue is protected	Install shoreline protection for CR-640 (entrance to Coast Guard Base) along the Cape May Harbor in the City of Cape May.

Initiative Number	Mitigation Initiative Name	Problem Statement	Solution
		from Cape May Harbor by a rip-rap system that is subject to erosion and provides inconsistent protection.	
2020-Cape May City-007	Cape May Promenade Seawall Extension	The Cape May beach promenade protects the City from destructive storm surge and high tides. Currently the promenade seawall provides a consistent level of protection except for a gap between Madison Avenue and Wilmington Avenue. At this location there is a low rock wall and decrepit timber bulkhead. This gap presents a major vulnerability for a storm surge event in the eastern section of the City. A feasibility study for a new promenade wall was partially financed through an FMA grant.	Install a cap on the existing seawall from Madison Avenue to Wilmington Avenue.
2020-Cape May City-008	Seawall Retrofit	The Cape May promenade is a seawall that extends along the beachfront and protects the City from storm surge. The seawall is deteriorating in some sections and requires an overall elevation to account for rising sea levels	Undertake a retrofit of the existing seawall to increase its elevation and continue to protect Cape May.
2020-Cape May City-009	Cape May City Stormwater Pump Station Resilience	Cape May is vulnerable to nuisance and stormwater flooding due to low-lying land elevations near Cape Island Creek and Frog Hollow. The City has installed stormwater pump stations to mitigate the flood risk. However, if the pumps fail due to severe storms, the stormwater pumps will not be able to function.	Install backup power to two stormwater pump stations at Madison Avenue and Grant Avenue in Cape May City. Work with the City to properly site the generator, which could be comanaged with the City to provide backup power for their station on Queen Street and Benton Avenue.
2020-Cape May City-010	Venice Avenue Upgrades	The Venice Avenue pump station is located in a low-lying section of the City near Cape Island Creek. The pump station provides service to nearby properties. The land near the pump station floods when tide levels are just one foot above typical high tides. The Cape	Upgrade Venice Avenue pump station (increased capacity, backup power).

Initiative Number	Mitigation Initiative Name	Problem Statement	Solution
		May Police force is staffed in West Cape May (with the exception of Administration). Venice Avenue is an essential route back to the City of Cape May.	
2020-Cape May City-011	Cape May Back Bay Flood Study	Cape May has widely varying elevation ranging from areas of relative high ground near the City Center to low-lying former wetlands area in the periphery of the City. Due to the density of development and existing geography, large-scale flood protection infrastructure requires careful planning to maintain the historic integrity of the City and protect the existing ecosystems.	Work with County GIS to leverage recent LIDAR elevation data to identify areas that need a berm to prevent back bay flooding
2020-Cape May City-012	Cape May Back Bay Flood Mitigation Implementation	Cape May's Back Bay areas do not have the same structural protection as the oceanfront areas. Though certain portions of the waterfront received bulkheads (such as Harbor Lane in 2014), additional mitigation is needed to create a ring of protection for the City and surrounding communities.	Based on findings of previous initiative, develop, and implement a program to install dikes/barriers to protect from back bay flooding.
2020-Cape May City-013	Road Flood Mitigation Planning	Cape May has various low-lying streets found throughout the City. These streets are plagued by regular Nuisance flooding, particularly in the western and eastern ends of the City as well as the Elmira Street corridor. A combination of high tides and rainfalls will cause nuisance flooding that hinders access to the areas for residents and for emergency vehicles.	Develop a plan for road elevations and drainage improvements in low-lying sections of the City impacted by nuisance stormwater and tidal flooding.
2020-Cape May City-014	Sewell Point Acquisition	Sewell Point is a roughly 130-acre tract of undeveloped land located between the City's center and the Coast Guard Training Center. The land is privately owned, located in the Special Flood Hazard Area and is subject to litigation over	The City proposes to acquire the Sewell Point tract and conserve the land as open space, thereby reducing risk

Initiative Number	Mitigation Initiative Name	Problem Statement	Solution
		proposed development. The wetlands serve as a natural floodplain buffer.	to existing development and preventing the addition of more structures in the floodplain.
2020-Cape May City-015	Property Mitigation Support – Retrofit	Cape May has a number of repetitive loss, severe repetitive loss, and substantially damaged properties. Many of these structures were built without flood design standards. These properties require mitigation to prevent future losses and prevent loss of life and property damage. Progress has been made on elevating buildings and reconstructing new buildings that are more resistant to flooding.	Where appropriate, support retrofitting (e.g. elevation) of structures located in hazard-prone areas to protect structures from future damage, with substantial damages, repetitive loss and severe repetitive loss properties as priority. Identify facilities that are viable candidates for retrofitting based on cost-effectiveness versus relocation. Where retrofitting is determined to be a viable option, consider implementation of that action based on available funding.
2020-Cape May City-016	Dune System Enhancement	The dunes play an important role in the protection of Cape May's beaches and structures. Dune plantings take place regularly to help maintain and protect the dunes. However, nonindigenous plants have begun to take over the dunes, causing eyesores and threatening the dune grass.	Better maintenance will take place through researched, eco-friendly methods will improve the integrity of the dunes and help maintain a pristine appearance along the Promenade. Bi-Annual maintenance will be performed through a coordinated effort between local volunteers and Cape May City Public Works.
2020-Cape May City-017	Beachfront Public Address System	Quick moving storm systems or quickly moving beach related hazards can result in beachgoers being caught unaware. Currently, the need to evacuate the beach and seek shelter is met by beach staff but this is slow and not efficient at times. The City has begun installation of a Beachfront Public Address System to meet this need.	The City will complete installation of the Beachfront Public Address System.

The Nature Conservancy

The Nature Conservancy manages the South Cape May Meadows located on the south end of Cape May. Located at a critical point on the Atlantic Flyway, the 200-acre South Cape May Meadows preserve is a haven for native and migratory birds, and a globally renowned paradise for birders. The site's protected habitat provides foraging and resting habitat for birds traversing the Delaware Bay, and also support a wide variety of avian and terrestrial species year-round. Flat, walkable trails more than a mile long cut through meadows. The varied landscape boasts dunes, fields, freshwater wetlands, and a full mile of undeveloped, protected beach—a rarity on the heavily developed New Jersey shoreline—and wildlife viewing opportunities abound. The trail system provides visitors with wildlife viewing opportunities through the preserve's many habitats including the undeveloped protected beach, a rarity on the heavily developed Jersey shoreline.

Stockton University Coastal Research Center

Stockton University Coastal Research Center (CRC) originated in 1981 to assist local municipalities with coastal environmental issues related to recurring storm damage and shoreline retreat. The CRC has worked on shoreline monitoring and assessment programs with the State of New Jersey and several municipalities in New Jersey. The CRC has also been a resource for geotechnical data working on numerous projects with Federal, State, and municipal governments. CRC continues to work with the City of Cape May. CRC is currently completing the Cape May City Watershed Management Plan and an on-site survey designed to evaluate the salt marshes associated with Cape Island Creek which lies between the City of Cape May and the Borough of West Cape May.

Cape May City Flood Protection

Municipal Storm Water Pump Stations

There are two storm water pump stations located in the Frog Hollow area which were designed and constructed to facilitate the drainage of stormwater from the low-lying city streets. The Benton Avenue Pump Station is located near the intersection of Queen Street and Benton Avenue and was constructed in the early 1980s. This station has three pumps, one electric, and two fueled by diesel. The electric pump has a 7,000 gallons per minute (gpm) capacity and each diesel pump has a 25,000-gpm capacity. Only two of the pumps can be operating at the same time, so the maximum pumping rate would be both of the diesel pumps combined at 50,000 gpm. The Madison Avenue Pump Station is located at the intersection of Madison Avenue and Beach Avenue and was constructed in 1987. This station has two pumps, both electric, and both with individual pumping capacities of 7,000 gpm. They are designed to function in a lead/lag sequence, with the second pump operating only when the first is at maximum capacity. Both pump stations discharge storm water to the ocean.

Master Plan Reexamination Recommendation

The 2017 Master Plan Reexamination includes a Resiliency Element, and elements recommendation are as follows:

1. The City should continue to actively pursue funding on behalf of its residents to elevate buildings at least two and up to three feet above the Base Flood Elevation. This would include public structures, infrastructure and water wells that are in flood-prone areas.
2. The City should strive for a Class 4 designation in the NFIP Community Rating System. This will result in a 30 percent discount on flood insurance and will qualify the City for special grants for home elevation and mitigation. This can be accomplished by:
 - a. Actively participating in the regional Public Participation Information program and updating the City's web site with information on flood mitigation and preparedness. Encourage Flood Insurance participation within the city through education and efforts to reduce flood insurance costs through the CRS process.
 - b. Implementing living shoreline projects to enhance back bay/Harbor protection.
 - c. Continuing to develop/update the Repetitive Loss Mitigation Plan.
 - d. Sending annual mailings to FEMA-designated floodplain properties to inform property owners of the flood hazard. The cover letter clearly states that the recipient's property is subject to flooding and is located in the floodplain. The mailing also includes information on flood safety, flood warning and preparedness, flood insurance requirements, property protection measures, grants for structure elevation and other useful information.
 - e. Mailing an annual outreach geared specifically to realtors, lenders, and insurers to inform them of the local flood hazard, of flood insurance requirements and that the City provides free technical and flood proofing assistance.
 - f. Continuing to provide technical assistance to residents for map information and flood-protection assistance. These services are provided as a public service to the inquirer and are documented in a log for the CRS. The CRS encourages the community to publicize the availability of these flood hazard awareness services.
 - g. Developing and documenting programs that reduce potential damages in areas that are flood prone. While most of the points in the CRS are given for acquisition and relocation of flood-prone properties, mitigation practices, such as flood proofing or retrofitting a flood-prone building, are equally beneficial to reducing flood damages to the community. Extra credit is provided for addressing repetitive loss problems and individual properties. Credit also is awarded in this category for regularly maintaining the community's drainage systems, enforcing stream dumping regulations, and inspecting waterways after a storm.

- h. Maintaining the early warning system and enhancing its flood response plan. Informing residents of emergency and safety measures is also credited.
- i. Adopting a Watershed Management Plan which is a prerequisite for a Class 4 designation.
- j. Prohibit the use of fill to elevate buildings in regulatory flood plain including not approving conditional letters or letters of Map Revisions.
- k. Increase freeboard requirement to BFE +3 feet (from current BFE +2 feet). Maximum building height requirements should be adjusted accordingly by raising the reference elevation from which building height is measured.
- l. It is also recommended to establish a minimum first floor height for the entire town in non-flood zones and along those lines extending SFHA regulations to non-SFHA properties. Currently, the zoning regulations set this at elevation at 10.5 (1929 NGVD). This elevation should be updated to the equivalent minimum of Elevation 9.2 (1988 NAVD) and adjusted to based on any freeboard modifications.
- m. Adopt a less than 50% threshold for making a structure comply with current regulations if the building is substantially improved or substantially damaged.
- n. Prohibit new municipal critical facilities from the 500 yr. flood plain (essentially only allow them in the X-zone) or require new critical facilities be protected to at least one foot above 500-yr flood level.
- o. Adopt regulations requiring that the owner of a building sign a non-conversion agreement for enclosed space below the minimum freeboard requirement for new construction that is filed with the deed and other property records and incorporate one of the following requirements: If City will inspect at least once a year (90 pts); If the City is granted the right to inspect the enclosure area at any time (60pts); If the agreement does not mention inspections (30pts). The City may opt to enforce the enclosure limits only where the lowest floor is more than 4 feet high.
- p. It is recommended to require new streets in the floodplain to be constructed at or above BFE to provide access for emergency vehicles.
- q. Continuing to map areas not shown on the Flood Insurance Rate Map, preserving open space, and enforcing higher regulatory standards.
- r. Creating a separate zone for Wetlands that restricted uses within to open space only may create should be considered. These zones could be drawn along NJDEP approximated GIS wetland boundaries with the provision that the lines are approximate and would rely on site specific wetland delineations approved by state or federal jurisdictional requirements.

3. The City should perform an infrastructure audit of the City's water and sewer services to determine which facilities are most vulnerable to storm damage and equipment failure. Critical facilities should be elevated, and water/sewer and other utilities with recurring damage should be mapped to indicate areas of potential failure.
4. The City should continue to be actively involved in the development of the New Jersey Coastal Storm Risk Management Study to ensure that issues that are important to the sustainability of the City are identified and analyzed and that implementable solutions are recommended and funded. It is anticipated that the implementation of back bay / harbor improvements could be funded by the Army Corps of Engineers in a similar manner to beach replenishment programs.
5. The City should continue to work with the county, the state, and adjoining municipalities to develop a plan to facilitate better emergency access/egress from the City. This route is a major accessway into and out of the City and access should be enhanced and maintained.
6. The City should consider encouraging and permitting green infrastructure to reduce the amount of impervious surface.
7. The City should continue to explore the design, development, and funding of living shorelines along the Harbor area.
8. Preservation of Environmental Sensitive Lands/Floodplain/Wetlands is recommended wherever possible. The vast majority of land not developed in Cape May is environmentally constrained by floodplain, wetlands, or both. These environmentally sensitive lands, and the wildlife habitats that they support, are very much a part of what makes Cape May an attractive area to live and vacation and are also important for environmental tourism, such as birding. Where much of these lands are unable to be developed due to State development regulations, Cape May should strive to acquire lands that are developable in environmentally sensitive areas to preserve these lands from development and enable those to be used for passive recreation areas.
9. A 79-acre tract known as "Sewell Point" is a prime example of lands suitable for preservation. There is great concern regarding the potential development of these wetlands in East Cape May. A large residential subdivision plan has been in litigation with the State over the wetlands limitations for a number of years. The City should continue in its attempt to assure its permanent protection. Acquisition is recommended if feasible.
10. The Planning and Zoning Boards through application review shall ensure regulations are enforced and the Environmental Commission should be consulted for their expertise and recommendations.

11. The Planning and Zoning Boards through application review shall continue to require and enforce current local and state regulated stormwater regulations on all development within the City. Variances and waivers from standards should only be granted where warranted.
12. Monitoring of effectiveness of current regulatory and preventive standards and program and evaluation of current programs and standards should be reviewed by the Floodplain Committee and the City's CRS Coordinator and should occur on an annual basis.
13. Beach nourishment, dune stabilization and maintenance are essential in protection of the City from coastal flooding and shall remain a priority activity. Dune enhancement with dune grass plantings and dune fence maintenance should be completed on an annual basis. Volunteer groups such as schools, civic groups, etc. with the public works department have been involved in performing this work in the past. Dune grass plantings should consider species with thickness over height to preserve views.
14. Beach Bulkheads are located parallel to the shoreline along Beach Avenue (Typical at Jackson Street and Gurney Street beaches) are essential to resiliency.
15. Nine stone groins that range in length from 150' to 786' installed along the shoreline that serve as a seawall to block erosion and flooding are located at the following beach street ends: Howard Street, Jefferson Street, Queen Street, Madison Avenue, Between Madison and Philadelphia Avenues, Philadelphia Avenue, Reading Avenue, Between Reading and Trenton Avenues and Trenton Avenue. Continued maintenance, repair or more permanent replacement should occur on an as-needed basis.
16. Seawalls consisting of bulkheads and groins identified above run on the ocean side (south) of Beach Avenue. Construction is both concrete and stone combination, concrete, and wood. Structural evaluation of existing seawall and evaluation to provide a more comprehensive seawall to protect the entire beachfront should be completed. Construction or supplementation of seawall should be made based on study recommendations. The portion of the seawall that extends from Madison Avenue to Wilmington and New Jersey Avenues is of specific concern and should be surveyed, repaired, and elevated. The seawall located between Baltimore Avenue to Wilmington Avenue is frequently breeched by astronomical high tides and minor weather events causing street flooding and filling of storm system with sand. The secondary timber seawall that extends midblock from Madison Avenue and Philadelphia Avenue to Wilmington Avenue is in disrepair and exhibits major structural failure. Replacement of the timber seawall with a continuous reinforced concrete wall is recommended. Extension of the promenade may be also possible to both reinforce the improvements and provide pedestrian and bicycle improvements. Extension, elevation and widening of the promenade and seawalls are recommended.
17. Several roadways are subject to flooding due to existing low elevation. These include Yacht Avenue and Elmira Street. When street paving improvements are proposed,

design should include raising street elevations where possible and improving stormwater collection systems.

18. Stormwater Pumping facilities have been constructed to alleviate flooding in the beachfront and Frog Hollow area. Pump stations are located at Benton Avenue, Venice Avenue (City operated) and Madison Avenue and Grant Street (County operated). Continued maintenance is required. These systems are pump systems requiring electrical power. In the event of power loss, backup power generators should be maintained to ensure continued pumping.

19. Stormwater Outfall pipes are located at the following street ends along the beach:

- Wilmington Avenue (48" County)
- Baltimore Avenue (48" County)
- Brooklyn Avenue (36" County)
- Pittsburgh Avenue (48" County)
- Trenton Avenue (48" County)
- Reading Avenue (48" County)
- Philadelphia Avenue (30" County)
- Madison Avenue (30" County Pumping Facility Outfall)
- Queen Street (Twin 30", 16" City pumping Facility Outfall)
- Grant Street (36" County Pumping Facility)

Outfalls are subject to erosion and damage from the surf and are maintenance intensive. Maintenance should be continued on an ongoing basis. Possible elimination or reduction in number of outfalls should be studied and completed if feasible.

20. Project completion is often limited by the City's available funding. Application for applicable state and federal grants should occur on an annual basis to fund structural projects.

21. It is recommended to perform repetitive loss surveys and analysis to derive specific flood prevention measures for structures subject to repetitive flooding.

22. Ensure the Warning System is maintained and provides an early warning to alert residents of forecasted flooding.

23. It is recommended that coordination with State & County & adjoining municipalities to provide safe and efficient evacuation shall be continued. Updates to this plan should also be submitted to Cape May County to coordinate activities with Cape May County's responsibility to prepare and update the County's Hazard Mitigation Plan. Revisions to this plan may be appropriate in the future to provide consistency with the county Hazard Mitigation Plan.

24. The City should work with the Army Corps to evaluate the bulkheads along the Harbor and Devil's Reach to determine the optimum height and then work to implement these improvements. Since some structures are cantilevered over the bulkhead, these improvements may need to be coordinated with the elevation of the existing structures.

25. Implement Building Ecological Solutions to Community Coastal Hazards (BESSHC) Recommendations:

Oceanfront at Wilmington Avenue

The seawall and dunes near the intersection of Beach Avenue and Wilmington Avenue are periodically breached and the ocean waters flow downhill along Beach Avenue and flood the historic district and Frog Hollow neighborhood. The breach is primarily due to two reasons: first, the alignment of Beach Avenue in this area juts out towards the ocean, creating a narrow beach that increases the exposure of the dunes. In addition, the sea wall in this constrained area is relatively short and the waves can easily overtop the wall.

The city has been working with the US Army Corps of Engineers to help address the problem through periodical beach replenishments. However, any sand that is placed in front of the seawall, or covering it, is quickly eroded, because the narrow beach cannot efficiently supply sediment to the dune or protect the dune toe from wave action. It appears by the straight nature of the shoreline that the beach is not eroding at an excessively high rate in this area, but rather that the angle of the seawall (and the development behind it) is encroaching on the beach.

A pumping station had been installed in the Frog Hollow neighborhood, but the volume of water from the breached dune and sea wall normally exceeds the pumping capacity of the system. The dunes have also been periodically planted to increase stability; however, the vegetation is trampled by beach visitors. This occurs despite the signs prohibiting access and an elevated public walkway nearby.

While a continuous beach nourishment and dune enhancement program may help reduce the overtopping and erosion of this dune, widening this section of the coast to accommodate the angle in the seawall without the use of structures will be difficult. Nature will want to straighten the coastline, so creating a bump out in the shoreline will only be a temporary solution.

The following recommendations should be considered:

- Raise the seawall - Elevating the low or missing section of the seawall would help reduce the flooding if the dune breaches. It also could provide the foundation for an extension of the promenade which would provide enhanced recreation, pedestrian access, and bicycle access.

- Build a groin - An effectively designed groin might widen the beach in front of the problem area. As discussed above, the dune at the site is unstable due to the narrow beach fronting it and the beach is narrow because the seawall angles seaward. A groin would cause a local reorientation of the shoreline. A modification of the existing outfall pipe at this location may be as effective as a groin.
- Extend dune into roadway.

Increase the width of the beach and dune by building a dune into the roadway (Beach and Wilmington Avenues). This would involve terminating both roads at the driveways of the residences nearest the corner. This may or may not necessitate relocating the existing seawall or building a new seawall to serve as a structural core to the dune. This would provide the space required to connect the more stable dunes to the east and west of the site, and a wider beach to sustain it. Information that would be useful when considering the above options:

- o Elevation of the sea wall at this location.
- o An analysis of the historical data on the performance of past beach nourishment projects to determine if they have made difference at this location.
- o An evaluation of the wave climate. The natural forces at this location may not be adequately ameliorated by the hybrid seawall and dune. Should structural solutions be pursued, a detailed physical modeling study should be performed to optimize the design.
- Prevent dune trampling by pedestrian traffic. The recommendations below will limit the number of pedestrians choosing to cross the dune and improve the chance that dune vegetation thrives, which will help to trap additional sand and minimize erosion. These recommendations include:
 - o Install dune fencing more aggressively with the aim of preventing anyone from taking a route other than the wooden walkway.
 - o Install signage with both a warning and education about the importance of the dune.
 - o Target residents and seasonal visitors of this beach area for education and outreach regarding the importance of this dune to Cape May City. There is an opportunity here to teach residents and visitors about the importance of dunes and dune vegetation. This may result in better maintenance of the dunes at beach access points and better retention of sand. One way to do this would be collaborating with local surf shops, fishing shops, and realtors and providing informational material for them to distribute to those who might use the area.
 - o Heavily plant the dune with native dune grasses, forbs, and shrubs. Community involvement in a planting project at the location would make this more effective by helping to build interest in preserving the plantings and the dune. Coordination with the USACE would be needed during beach replenishment projects so that sand does not bury the plants during replenishment activities.

- o Construct a second walkway with a viewing platform at the foot of Wilmington Ave. The walkway would roughly parallel the exiting walkway but would provide a more direct path to the beach and a platform for viewing the surf.

26. Building Ecological Solutions to Community Coastal Hazards (BESSHC) Recommendations:

Harborfront beaches along Delaware Avenue

Delaware Avenue is an important access road to the Coast Guard Station but incurs repeated flooding and erosion. Although the road has been repaired and riprap placed along the shoreline, the flooding and erosion problems have, and will continue to, persist, and intensify. The City is considering a project that includes living shorelines along the water's edge. This hybrid shoreline design could be constructed by the USACE in partnership with either the State or the City, although details have yet to be worked out.

The following recommendations should be considered:

Build a vegetated berm with a living shoreline. The city may want to consider a living shoreline in this area backed with a vegetated berm. The berm is necessitated by the desire to limit flooding of the roadway. The berm could contain a structural core constructed of rocks, geo-tubes, gabions, or even a bulkhead. Consider constructing a living shoreline in front of the berm. The living shoreline would be both aesthetically pleasing as well as ecologically beneficial. As part of a living shoreline, it is likely that an offshore sill or breakwater would be needed. A sill or breakwater can be constructed of a variety of materials; however, rock is most common. For this option, the site analyses described in the NJ Living Shorelines Engineering Design Guidelines should be conducted.

27. BESSHC Recommendations: Cape Island Creek / Perry Street area - Cape Island Creek is routed underground through pipes between West Perry Street and Broadway. The creek is controlled by sluice gates, a pumping station, and a piping system. Flooding occurs on the streets where the creek should flow aboveground. This is a result of inadequate conveyance piping infrastructure and collection systems which are at low elevations and back up during more severe storm and flood events

The following recommendations should be considered:

Daylight (uncover) the creek

The predicted effects of climate change are likely to exacerbate the flooding problem, disrupting the community on a more frequent basis. We encourage the City to work with the county to ensure the existing gate is functioning and that a well-vetted operational plan is in place. In addition, the city should take a long-term view of this issue and the affected neighborhood and consider options that might include participating in a buy-out program that would enable the stream to be daylighted and allow for more flood storage.

Increase storm water infiltration

Because the stream and storm water share the same pipes, storm-water-reduction practices and green infrastructure could help mitigate the problems in the near term. While more information is needed to understand the issue, we recommend the City consider:

- o Swales on properties to slow storm water runoff.
- o Rain barrels to capture roof runoff, which would otherwise enter into the storm-drain system.
- o Rain gardens, on both public and private properties, to increase water infiltration into the soils and recharging ground water.

The City should investigate other green infrastructure options as well. Rutgers University's Water Resources Program (www.water.rutgers.edu) may offer free consultation for green infrastructure projects. Another useful reference is the Homeowner's Stormwater Handbook.

Information that would be useful when considering the preceding recommendations:

- A detailed hydrologic study of the drainage infrastructure system, which should include a flow study of the Cape Island Creek to understand the flow rate into and out of the sluice gates, the average amount of rain going into the system, and the options to reduce impervious ground cover in the area.
- Verification that all existing pipes are obstruction free and that all drainage structures (culverts, sluice gates, etc.) are operating as intended.

28. BESSHC Recommendations: Other Ecological Recommendations for Coastal Resiliency

Below are more general ecological recommendations for coastal resiliency that the City may want to consider in all future projects. A comprehensive list of these best practices may be found in the document entitled Building Ecological Solutions to Coastal Community Hazards - A Guide for New Jersey Coastal Communities, which is a product of this NFWF-funded project.

Beachfront Areas

- Incorporate sea level rise and coastal dynamics into beach management plans.
- Survey beach and dune complexes to identify points of vulnerability, such as:
 - o Sediment depletion
 - o Gaps in dunes
 - o Low dunes
 - o Footpaths cutting through dunes
 - o Absence of vegetation

- Replace cut-through footpaths with elevated dune walkovers wherever possible to reduce dune erosion and vulnerabilities to storm surge.
- Conserve, restore, and protect native dune vegetation. Consider ways to restore, create, and strengthen dune complexes that incorporate native, dune-building vegetation and plugs gaps in existing dune formations. Detailed guidance is provided on dune design, plant selection, and planting methods in the NJ Sea Grant Dune Manual *Dune It Right*. Promote the use of native dune vegetation in local landscaping.
- Use native dune vegetation as protective hedgerows around properties to capture sand and storm deposits.
- Establish and enforce local ordinances that protect dunes, including native dune plants and beach-dwelling wildlife.
- Participate in coastal community networks to share lessons from beach and dune management
- Provide educational signage and outdoor learning opportunities to advance understanding of beach and dune benefits

Harborfront & Creek Areas

Instead of stabilizing shorelines with rigid armoring such as bulkheads, coastal communities should consider and prioritize “living shorelines” practices.

Living shorelines are a broad suite of erosion control practices that, unlike rigid armoring, are designed to prevent erosion by absorbing wave energy while still maintaining some of the natural processes and ecological integrity of the shore zone. Certain types of living shorelines have been shown to survive a Category 1 hurricane better than bulkheads. Some of the design considerations include fetch, boat wakes, near shore gradient, substrate consistency, tide range, and sun exposure. Both materials and configurations vary widely based on site conditions, but can include coconut-fiber logs, rock sills and breakwaters, sandy fill, plants, and shellfish. Engineering and ecological expertise are necessary to plan and execute this technology. Stevens Institute has developed useful Living Shorelines Engineering Guidelines. NOAA has developed Guidance for Considering the Use of Living Shorelines. Partnership for the Delaware Estuary has developed a host of resources, including practitioner’s guidance for living shorelines using shellfish and other site-appropriate biological materials. In addition, VIMS has online teaching modules about living shorelines.

Planning Coordination

Public outreach was undertaken for the Repetitive Loss Area Analysis. In addition to public meetings, the planning team engaged a number of agencies and institutions that work in Cape May. Feedback from these agencies were incorporated into this repetitive loss area analysis. Contact was made to several agencies and institutions on April 26, 2021 and a summary of the contacts and responses are provided in the Appendices.

Figure 17: Planning Contacts

Agency	Contact
<i>American Littoral Society</i>	Tim Dillingham, Executive Director 732-291-0055; tim@littoralsociety.org
<i>American Red Cross- South Jersey</i>	Carol Cohen, Executive Director 609-646-8330; carol.cohen@redcross.org
<i>Atlantic City Electric Company</i>	Ronnie Town, Public Affairs Manager 609.463.3805; veronica.town@atlanticcityelectric.com
<i>Cape May County Department of Planning</i>	Leslie Gimeno, Director 609.465.6575; lgimeno@co.cape-may.nj.us
<i>Cape May County-OEM</i>	Marty Pagliughi, Director 609.463.6570; mpagliughi@co.cape-may.nj.us
<i>Cape May Green Team</i>	Heather Bruno, Secretary 609.884.3398; hacb@comcast.net
<i>Builders League of South Jersey</i>	Richard S. Van Osten, Executive Vice President 856. 616.8460; rick@blsj.com
<i>Cape Atlantic Conservation District</i>	David Reilly, District Manager (609) 625-3144; davidreilly@capeatlantic.org
<i>Comcast</i>	Robert Clifton, Director Government and Comm. Affairs robert.clifton@comcast.net
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In addition to these public agencies, information was collected via email from residents and property owners. This correspondence is not attached in order to protect the privacy of those who have contacted the Planning Team.

Conclusion – Planning Coordination & Review

The purpose of this review is to present the findings of a review of the City’s planning reports and appropriate development ordinances to identify Cape May’s existing regulatory capacity to address flooding. Table 9.3-3 of the County’s 2021 Hazard Mitigation Plan Update is incorporated into this table by reference. A copy of the jurisdictional annex for Cape May City, including the City’s Capability Assessment, is included in the Appendices.

Cape May City has a Flood Damage Prevention Ordinance that regulates all construction in the City’s Special Flood Hazard Area. The ordinance exceeds the minimum requirements of the National Flood Insurance Program and contributes to the City’s Community Rating System rating. All new construction and substantial improvement must be elevated to the base flood elevation plus two feet of freeboard. Substantial improvements are calculated over the course of ten years, but do not include alterations to historic structures.

Steps 3-5: Documentation and Results

RLA-1: West Side

Existing Conditions

The West Side repetitive loss area is a low-lying area in the western section of Cape May along Cape Island Creek. It is bordered to the north by Cape May Point and to the west by the South Cape May Meadows in Cape May, Cape May Point, and Lower Township. The neighborhood consists predominantly of mid-century and early-twentieth century single family houses along Mount Vernon Avenue, First Avenue, and Second Avenue. There are four repetitive loss properties in the neighborhood and 20 properties in the repetitive loss area in total.

Flooding in this Repetitive Loss Area is predominantly caused by tidal inundation of Cape Island Creek, located northwest of the RLA. Low-lying topography contributes to poor drainage in the area.

Proposed Mitigation Projects

Preventive actions: The undeveloped areas adjacent to RLA-1 are preserved as part of the South Cape May Meadows managed by the New Jersey Department of Environmental Protection and The Nature Conservancy. By preventing development in these areas, future flood damages are prevented. Additional acquisitions in this area are not yet feasible.

Property protection: Property elevation is feasible and recommended for all properties with habitable areas below the base flood elevation. The City will encourage owners of vulnerable properties to undertake mitigation measures and provide details about potential funding sources and technical assistance on an annual basis. City support of property protection is addressed by HMP Mitigation Initiative 15.

Natural resource protection: The South Cape May Meadows provides critical habitat for endangered and threatened species. Additionally, the conservation area provides natural floodplain open space benefits, including wave attenuation and flood storage. Ongoing efforts to provide ecological enhancements to this area will be continued by The Nature Conservancy/NJDEP.

Emergency Services: This neighborhood is and will remain covered by city-wide emergency service activities.

Structural Projects: The area may be protected by Alternative 5D in the US Army Corps Back Bay project. Structural projects will be addressed by HMP Mitigation Initiatives 11 and 12.

Public Information: This neighborhood is and will remain covered by city-wide public information activities.

RLA-2: Cape Island Creek Culvert

Existing Conditions

The Cape Island Creek Culvert repetitive loss area is a low-lying area in the western section of Cape May along the underground culvert carrying Cape Island Creek between the South Cape May Meadows and the wetlands area to the north. The area is surrounded by residential properties of varying densities and ages and is comprised of properties on Windsor Avenue, Congress Street, and Claghorn Place. There are two repetitive loss properties in the neighborhood and 16 properties in the repetitive loss area in total.

Flooding in this Repetitive Loss Area is predominantly caused by tidal inundation of Cape Island Creek. Low-lying topography contributes to poor drainage in the area.

Proposed Mitigation Projects

Preventive actions: The RLA is heavily developed. Existing floodplain development regulations will ensure the development of structures that can better withstand flooding.

Property protection: Property elevation is feasible and recommended for all properties with habitable areas below the base flood elevation. The City will encourage owners of vulnerable properties to undertake mitigation measures and provide details about potential funding sources and technical assistance on an annual basis. City support of property protection is addressed by HMP Mitigation Initiative 15.

Natural resource protection: The wetland areas on either end of the culvert are preserved and provide natural floodplain benefits.

Emergency Services: This neighborhood is and will remain covered by city-wide emergency service activities.

Structural Projects: The area may be protected by Alternative 5D in the US Army Corps Back Bay project. Structural projects will be addressed by HMP mitigation initiatives 11 and 12. Additionally, targeted stormwater detention may reduce nuisance stormwater flooding in the area.

Public Information: This neighborhood is and will remain covered by city-wide public information activities.

RLA-3: Jackson Street at Beach Avenue

Existing Conditions

RLA-3 comprises seven properties near the intersection of Beach Avenue and Jackson Street. The buildings are commercial structures and include a beachfront building located atop the sand dune. There is one repetitive loss property in the RLA.

Flooding is predominantly caused by storm surge and wave action from the Atlantic Ocean.

Proposed Mitigation Projects

Preventive actions: The RLA is heavily developed. Existing floodplain development regulations will ensure the development of structures that can better withstand flooding.

Property protection: Property elevation is feasible and recommended for all properties with habitable areas below the base flood elevation. The City will encourage owners of vulnerable properties to undertake mitigation measures and provide details about potential funding sources and technical assistance on an annual basis. City support of property protection is addressed by HMP Mitigation Initiative 15.

Natural resource protection: The dune system within the RLA provides habitat area and wave attenuation benefits.

Emergency Services: This neighborhood is and will remain covered by city-wide emergency service activities.

Structural Projects: The area may be protected by Alternative 5D in the US Army Corps Back Bay project. Additionally, targeted stormwater detention may reduce nuisance stormwater

flooding in the area. A seawall retrofit is proposed by HMP Mitigation Initiative 8 and a dune enhancement is proposed by HMP Mitigation Initiative 16.

Public Information: This neighborhood is and will remain covered by city-wide public information activities.

RLA-4: Frog Hollow

Existing Conditions

RLA-4 is the largest repetitive loss area in Cape May. It comprises 325 properties near the heart of the City and its historic district, and is generally bounded by Columbia Avenue, Madison Avenue, Gurney Street, and Beach Avenue. The RLA is the location of 27, or one-half, of the City's repetitive loss properties. More than half of the properties in this RLA were built prior to 1945, and 46 were built prior to 1900.

Frog Hollow is located in a low-lying area between natural high ground along Washington and Lafayette Avenue and the beach. Flooding in the neighborhood is caused by stormwater flooding and storm surge/overwash from the Atlantic Ocean. Flooding has largely been mitigated since the re-creation of the City's dune system.

Proposed Mitigation Projects

Preventive actions: The RLA is heavily developed. Existing floodplain development regulations will ensure the development of structures that can better withstand flooding.

Property protection: Property elevation is feasible and recommended for all properties with habitable areas below the base flood elevation. The City will encourage owners of vulnerable properties to undertake mitigation measures and provide details about potential funding sources and technical assistance on an annual basis. City support of property protection is addressed by HMP Mitigation Initiative 15.

Natural resource protection: The dune system within the RLA provides habitat area and wave attenuation benefits.

Emergency Services: This neighborhood is and will remain covered by city-wide emergency service activities.

Structural Projects: The area may be protected by Alternative 5D in the US Army Corps Back Bay project. Additionally, targeted stormwater detention may reduce nuisance stormwater flooding in the area and HMP Mitigation Initiative 9 will enhance the resilience of existing pump stations. A seawall retrofit is proposed by HMP Mitigation Initiative 8 and a dune enhancement is proposed by HMP Mitigation Initiative 16.

Public Information: This neighborhood is and will remain covered by city-wide public information activities.

RLA-5: Philadelphia Avenue

Existing Conditions

RLA-5 consists of beachfront blocks and inland properties between Frog Hollow and Sewell Point. The RLA consists of 42 properties and six repetitive loss properties. The buildings in

the RLA are predominantly residential, though some commercial/hotel properties are included.

The Philadelphia Avenue RLA experiences flooding from storm surge that overtops dunes or inundates along Beach Avenue or New Jersey Avenue. Flooding has been partially mitigated through the construction of a beachfront dune system.

Proposed Mitigation Projects

Preventive actions: The RLA is developed. Existing floodplain development regulations will ensure the development of structures that can better withstand flooding.

Property protection: Property elevation is feasible and recommended for all properties with habitable areas below the base flood elevation. The City will encourage owners of vulnerable properties to undertake mitigation measures and provide details about potential funding sources and technical assistance on an annual basis. City support of property protection is addressed by HMP Mitigation Initiative 15.

Natural resource protection: The dune system within the RLA provides habitat area and wave attenuation benefits.

Emergency Services: This neighborhood is and will remain covered by city-wide emergency service activities.

Structural Projects: The area may be protected by Alternative 5D in the US Army Corps Back Bay project. Additionally, targeted stormwater detention may reduce nuisance stormwater flooding in the area and HMP Mitigation Initiative 9 will enhance the resilience of existing pump stations. A seawall retrofit is proposed by HMP Mitigation Initiative 8 and a dune enhancement is proposed by HMP Mitigation Initiative 16.

Public Information: This neighborhood is and will remain covered by city-wide public information activities.

RLA-6: Pittsburgh Avenue

Existing Conditions

RLA-6 is substantially similar to RLA-5 and also consists of beachfront blocks and inland properties between Frog Hollow and Sewell Point. The RLA consists of twelve properties and nine repetitive loss properties. The buildings in the RLA are predominantly residential, though some commercial/hotel properties are included.

The Pittsburgh Avenue RLA experiences flooding from storm surge that overtops dunes or inundates along Beach Avenue or New Jersey Avenue. Flooding has been partially mitigated through the construction of a beachfront dune system.

Proposed Mitigation Projects

Preventive actions: The RLA is developed. Existing floodplain development regulations will ensure the development of structures that can better withstand flooding.

Property protection: Property elevation is feasible and recommended for all properties with habitable areas below the base flood elevation. The City will encourage owners of vulnerable properties to undertake mitigation measures and provide details about potential funding

sources and technical assistance on an annual basis. City support of property protection is addressed by HMP Mitigation Initiative 15.

Natural resource protection: The dune system within the RLA provides habitat area and wave attenuation benefits.

Emergency Services: This neighborhood is and will remain covered by city-wide emergency service activities.

Structural Projects: The area may be protected by Alternative 5D in the US Army Corps Back Bay project. Additionally, targeted stormwater detention may reduce nuisance stormwater flooding in the area and HMP Mitigation Initiative 9 will enhance the resilience of existing pump stations. A seawall retrofit is proposed by HMP Mitigation Initiative 8 and a dune enhancement is proposed by HMP Mitigation Initiative 16.

Public Information: This neighborhood is and will remain covered by city-wide public information activities.

RLA-7: Sewell Point

Existing Conditions

RLA-7 includes a narrow band of beach block residential structures along Beach Avenue and New Jersey Avenue. RLA-7 is surrounded to the north by undeveloped woodland and wetland and to the east by the Atlantic Ocean. The adjacency of the RLA to the ocean shoreline makes the neighborhood particularly vulnerable to wave overtopping of the dunes and erosion. The neighborhood is also vulnerable to flooding from surge inundation from Cape May Harbor to the north. The RLA includes 26 properties and three repetitive loss properties.

Proposed Mitigation Projects

Preventive actions: The RLA is substantially developed. Existing floodplain development regulations will ensure the development of structures that can better withstand flooding.

Property protection: Property elevation is feasible and recommended for all properties with habitable areas below the base flood elevation. However, most homes in this neighborhood are newer and have been built to minimum NFIP requirements. The City will encourage owners of vulnerable properties to undertake mitigation measures and provide details about potential funding sources and technical assistance on an annual basis. City support of property protection is addressed by HMP Mitigation Initiative 15.

Natural resource protection: The dune system within the RLA provides habitat area and wave attenuation benefits. The wetlands and woods to the north of the properties are proposed for acquisition and are included in HMP Mitigation Initiative 14.

Emergency Services: This neighborhood is and will remain covered by city-wide emergency service activities.

Structural Projects: The area may be protected by Alternative 5D in the US Army Corps Back Bay project. A seawall retrofit is proposed by HMP Mitigation Initiative 8 and a dune enhancement is proposed by HMP Mitigation Initiative 16. The extension of the promenade seawall is an ongoing project in design and is addressed by HMP Mitigation Initiative 7.

Public Information: This neighborhood is and will remain covered by city-wide public information activities.

RLA-8: Buck Landing

Existing Conditions

RLA-8 includes a small area in the vicinity of the City's marina facilities along Cape Island Creek near Buck Landing. The area is low-lying and vulnerable to storm surge and tidal flooding from Cape May Harbor and Cape Island Creek. There are two repetitive loss properties of the 35 total properties in the RLA.

Proposed Mitigation Projects

Preventive actions: The RLA is substantially developed. Existing floodplain development regulations will ensure the development of structures that can better withstand flooding.

Property protection: Property elevation is feasible and recommended for all properties with habitable areas below the base flood elevation. The City will encourage owners of vulnerable properties to undertake mitigation measures and provide details about potential funding sources and technical assistance on an annual basis. City support of property protection is addressed by HMP Mitigation Initiative 15.

Natural resource protection: No natural resource protection mitigation actions are currently feasible for this RLA.

Emergency Services: This neighborhood is and will remain covered by city-wide emergency service activities.

Structural Projects: The area may be protected by Alternative 5D in the US Army Corps Back Bay project. Structural projects will be addressed by HMP Mitigation Initiatives 11 and 12.

Public Information: This neighborhood is and will remain covered by city-wide public information activities.

RLA-9: Devil's Reach

Existing Conditions

RLA-9 includes properties in the vicinity of a small harbor off Schellenger Creek. The RLA is surrounded to the north by Schellenger Creek, to the south by Texas Avenue, to the west by Washington Street, and to the east by Texas Avenue and Harborview Park. The RLA is comprised of 40 properties, of which three are repetitive loss properties. Though many of the homes are relatively new, older structures built before Cape May's flood damage prevention ordinance was enacted are more vulnerable to flood damage. The area is low-lying and vulnerable to storm surge and tidal flooding from Cape May Harbor and Schellenger Creek.

Proposed Mitigation Projects

Preventive actions: The RLA is substantially developed. Existing floodplain development regulations will ensure the development of structures that can better withstand flooding.

Property protection: Property elevation is feasible and recommended for all properties with habitable areas below the base flood elevation. The City will encourage owners of vulnerable properties to undertake mitigation measures and provide details about potential funding sources and technical assistance on an annual basis. City support of property protection is addressed by HMP Mitigation Initiative 15.

Natural resource protection: No natural resource protection mitigation actions are currently feasible for this RLA.

Emergency Services: This neighborhood is and will remain covered by city-wide emergency service activities.

Structural Projects: The area may be protected by Alternative 5D in the US Army Corps Back Bay project. Structural projects will be addressed by HMP Mitigation Initiatives 11 and 12.

Public Information: This neighborhood is and will remain covered by city-wide public information activities.

Repetitive Loss Area Summary

Figure 18: Mitigation Initiative Summary

RLA Area	# of RLs	# of Properties	Flooding Cause	HMP Mitigation Initiatives
1	1	20	Cape Island Creek	11, 12, 15
2	2	16	Cape Island Creek	11, 12, 15
3	1	7	Atlantic Ocean	8, 9, 15, 16
4	27	325	Atlantic Ocean	15, 16
5	6	42	Atlantic Ocean	8, 9, 15, 16
6	9	12	Atlantic Ocean	8, 9, 15, 16
7	3	26	Atlantic Ocean	7, 8, 9, 14, 15, 16
8	2	35	Cape Island Creek	11, 12, 15
9	3	40	Cape May Harbor	11, 12, 15

All initiatives, excepting private property retrofits and elevations, are proposed to be accomplished through a mixture of City capital spending and grant funding such as the Community Development Block Grant, USDA-Rural Development, or FEMA Hazard Mitigation Assistance grants. Retrofits of private property are expected to be funded through private capital and Flood Mitigation Assistance grants. The timeline for all projects listed anticipates a completion between five and ten years.

Mitigating flood damage in the repetitive loss areas can be most cost-effectively accomplished in the short term through structural interventions to private properties through the elevation of existing homes, construction of new ones to higher standards, and through selective land preservation.

Larger-scale projects such as those identified in the Hazard Mitigation Plan will reduce damage to infrastructure and provide ancillary benefits to private properties. The City's ongoing efforts to bolster resilience and anticipate higher sea levels and more extreme climatic conditions in the future will further protect the City from flooding threats for years to come.

Current Private Mitigation Projects

Private property owners have undertaken property mitigation measures that enhance the ability of structures to withstand flooding. Cape May's floodplain development ordinance has one of the highest standards for development at the Jersey Shore and requires each new and substantially improved structure to be floodproofed and elevated to at least two feet above the base flood elevation. These standards help ensure that developments in Cape May will be floodproofed to a high degree of protection for the years to come.

This Repetitive Loss Area Analysis examined the extent to which structural floodproofing has taken place in the City. The results are described in this section. Please note that due to the small size of some repetitive loss areas, these figures are being presented for the totality of the City's repetitive loss areas and are not broken down by neighborhood.

Flood Vents

Flood vents are an important aspect of floodproofing to their ability to equalize hydrostatic pressure for foundation walls, thereby protecting the structural integrity of the house during a flood. Of the structures surveyed, approximately one-quarter could not be identified as having flood vents.

Foundation

Building foundations are a crucial aspect of building safety, particularly for flooding. Foundations that are not designed and built to withstand flooding can face failure when flooding conditions do occur. A properly designed foundation can withstand the hydrostatic pressure of water or allow floodwaters to freely flow underneath of a building and reduce flood losses. Slab homes feature several issues that make them dangerous for flooding. Differential settlement can occur in areas with soft soil, and erosion can scour and undermine concrete foundations. Hydrostatic pressure can crack slab foundations and threaten the structural integrity of the house. Structures that are built on piles and on concrete columns can generally better withstand flooding conditions.

Structure Elevations

Structures that are properly elevated and floodproofed offer some of the best protection against flood damage. By locating habitable living areas and appurtenant equipment out of the flood zone, major flood damage to the building and contents can be mitigated. Structure elevations are often done with reference to a "base flood elevation", or the height to which waters are expected to rise during a base flood or design storm.

In Cape May, the base flood elevation varies depending on topographic factors. Base flood elevations of 8 and 9 feet NAVD88 are most common, particularly in the eastern section of the City. Cape May incorporates a freeboard standard into its ordinance, which adds an additional two feet of flood water height to which structures must be designed in order to account future flooding conditions and changes to FEMA flood insurance rate maps.

Figure 19: Recently Elevated Structure at the Corner of Kearney Avenue and Jefferson Street in Frog Hollow



Recommendations, Alternatives, and Updates

Mitigating future flood losses in Cape May's repetitive loss areas will require a comprehensive suite of improvements that address both individual structures' risk as well as systemic flood protection systems that increase the level of protection for City assets and private property.

The following measures are proposed for Cape May's Repetitive Loss Areas:

Preventive Activities

- Examine the potential for targeted open space acquisitions in low-lying areas that cannot be feasibly protected through structural flood protection measures.
- Continually examine and revise the floodplain management ordinance to account for sea level changes, new flood maps, and other changes.
- Continue drainage improvements and maintenance.
- Develop a Natural Resources Plan that addresses drainage and green infrastructure.
- Examine ordinance improvements governing stormwater management and impervious surface coverage to reduce the amount of runoff that flows into neighborhoods with poor drainage.

Property Protection Measures

- Elevate remaining buildings and utilities above the base flood elevation;
- Install flood vents in elevated homes on stem-wall foundations
- Close existing oceanfront bulkhead gaps
- Install sewer backup preventers;

Natural Resource Protection

- Install and maintain stormwater inlets and debris collectors
- Identify locations where living shorelines can be installed

Emergency Services

- Elevate evacuation routes
- Facilitate city-wide emergency response communications through IPAWS

Structural Projects

- Undertake selective road elevations and drainage improvements and examine the potential for streets to act as flood berms
- Work with the Army Corps and partners on comprehensive flood control improvements that minimize disruption to property and prolong mitigation benefits in the face of future flooding conditions

Public Information

- Map elevation certificates and flood data to monitor plan progress

This Repetitive Loss Area Analysis will be evaluated on an annual basis along with the Floodplain Management Plan, and more thoroughly re-examined and reviewed every three years, or prior to a Community Rating System verification visit. The annual evaluation will consist of an analysis evaluation for progress on recommended actions and to what extent mitigation or building demolition activities have occurred and be publicly available. The re-analysis will occur prior to a CRS cycle visit and entail a thorough re-analysis and survey of conditions in the neighborhood.

Implementation

The City should continue to seek funding opportunities for adaptation planning and mitigation projects. Many federal, state, and nonprofit funding opportunities are available. Below is a list of potential grant programs:

National Flood Insurance Program – Increased Cost of Compliance Coverage

Increased Cost of Compliance Coverage (ICC) funding is not a loan and does not have to be repaid. It is managed by the National Flood Insurance Program (NFIP) and is available to property owners who carry new and renewed standard flood insurance policies. It helps homeowners meet the costs of repairing or rebuilding their property to comply with building requirements of their community and reduce future flood damage. The maximum amount a homeowner can receive is \$30,000 and is based on a proof of loss, a detailed repair estimate and a substantial damage declaration from the community. ICC funding can be used to pay for:

- The elevation of a home above the flood elevation level adopted by the community
- The relocation of a home out of harm's way
- The demolition and removal of a damaged home

Eligibility requirements include:

- Location in a flood plain
- Property has suffered substantial damage from a flood
- Property has had repeated damage by floods

New Jersey Blue Acres Buyout Program (BAB)

The New Jersey Department of Environmental Protection uses Community Development Block Grant Disaster Recovery (CDBG-DR) funds for the Superstorm Sandy Blue Acres Program to purchase properties from willing sellers at the pre-storm value in areas that repeatedly sustain significant flood loss. The goal of the Blue Acres Program, which has historically served as part of NJDEP's Green Acres Program that purchases flood-prone properties, is to dramatically reduce the risk of future catastrophic flood damage and to help families move out of harm's way. Once acquired by the State, these homes will be demolished and the land will be permanently preserved as open space, accessible to the public, for recreation or conservation. The preserved land will serve as natural buffers against future storms and floods.

NJEDA Neighborhood and Community Revitalization Program

Using Community Development Block Grant Disaster Recovery (CDBG-DR) loans, the New Jersey Economic Development Authority (NJEDA) administers the Neighborhood and Community Revitalization program, which supports the long-term recovery of municipalities by funding economic revitalization projects. The program will assist in public facilities improvements, provide loans, loan guarantees and technical assistance to small businesses; and help towards façade and code-related improvements. Eligible grantees include redevelopment agencies, municipalities, businesses, and non-profit organizations.

New Jersey Energy Resiliency Bank Program

Using Community Development Block Grant Disaster Recovery (CDBG-DR) funds, the New Jersey Economic Development Authority (NJEDA) administers the New Jersey Energy Resilience Bank Program, which builds energy resilience by providing technical and financial support, including grants and low-interest loans, to critical facilities for energy resilience projects or enhancements to existing energy infrastructure.

NJDEP Flood Risk Reduction Program (FHRRP)

Using Community Development Block Grant Disaster Recovery (CDBG-DR) funds, the New Jersey Department of Environmental Protection (NJDEP) will support Army Corps' efforts to implement flood risk reduction measures with an easement acquisition program. NJDEP will also use funds for competitive grants to local government entities for eligible flood hazard risk reduction and resiliency infrastructure measure improvements or projects.

NJDEP Shore Protection Grants & Loans

The NJDEP's Shore Protection Fund was established to protect public and private property and infrastructure from coastal storm damage, erosion and shoreline migration, and sea-level rise. Projects include beach replenishment and construction and maintenance of

bulkheads, jetties, and seawalls. Recent legislation has set the annual appropriation at \$45,000,000 for eligible municipalities & counties. Priority is given to funding necessary to match federal appropriations to the US Army Corps of Engineers (USACE) for congressionally supported shore protection projects. Eligible projects must be associated with the protection, stabilization, restoration, or maintenance of the shore, including monitoring studies and land acquisition, and must be consistent with the current New Jersey Shore Protection Master Plan and Coastal Zone Management Program. Project areas must be affected by normal tidal cycles and be located on public or private property which has legal, perpetual easements assigned to the state for public access and use. Projects are prioritized, based on: Need to maintain or repair an existing state shore protection feature or structure; Relative potential storm damage risk to public and private property and infrastructure; this priority consideration includes the direct exposure to coastal storms and the relative values of the at-risk property and infrastructure; Public access and use enhancements provided by the project.

FEMA Hazard Mitigation Grant Program (HMGP)

HMGP is only offered during a presidentially declared disaster. This reimbursement program provides up to \$30,000 to assist homeowners with the elevation of their primary single-family residences in line with the Flood Insurance Risk Maps in affected communities. The HMGP provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act.

FEMA Flood Mitigation Assistance (FMA) Program

The Flood Mitigation Assistance (FMA) program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FEMA provides FMA funds to help states and communities implement measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes and other structures insured under NFIP. Eligible properties must maintain flood insurance for the life of the structure. To receive an increased federal cost share, properties must be a severe repetitive-loss property or a repetitive-loss property.

Cost-share availability under the FMA program depends on the type of properties included in the grant. For example, severe repetitive-loss properties may receive up to 100 percent federal funding and repetitive-loss properties may receive up to 90 percent.

- In the case of mitigation activities to severe repetitive-loss structures:
 - o FEMA may contribute up to 100 percent federal funding of all eligible costs, if the activities are technically feasible and cost-effective; or
 - o FEMA may contribute an amount equaling the expected savings to the NFIP from expected avoided damages through acquisition or relocation activities if the activities will eliminate future payments from the NFIP for severe repetitive-loss structures through an acquisition or relocation activity.

- In the case of mitigation activities to repetitive-loss structures, FEMA may contribute up to 90 percent federal funding of all eligible costs.
- In the case of all other mitigation activities, FEMA may contribute up to 75 percent federal funding of all eligible costs.

Structures with varying cost-share requirements can be submitted in one application. Applicants must provide documentation in the project application showing how the final cost share was derived. FEMA will identify applications for further review based on several criteria, including but not limited to: savings to the NFIP, applicant rank and property status (e.g., repetitive-loss property, severe repetitive-loss property). FEMA also may identify an application for further review out of rank order based on considerations such as program priorities, available funds, and other factors.

FEMA BRIC Grant Program

Building Resilient Infrastructure and Communities (BRIC) will support states and local communities as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. BRIC is a new FEMA pre-disaster hazard mitigation program that replaces the existing Pre-Disaster Mitigation (PDM) program. The BRIC program guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency.

United States Army Corps of Engineers (USACE)

The USACE helps under the Continuing Authorities Program (CAP). The USACE will evaluate various projects to determine if there is a Federal Interest. If a Federal interest exists, the USACE will complete engineering and construction with a non-Federal sponsor who agrees to cost share the feasibility study and construction.

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Appendix

Appendix 1: Letter to Property Owners

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Appendix 2: Copy of Adopted Resolution

TBD

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Appendix 3: Map of Cape May's Flood Zones

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Appendix 5: Survey Results

NOT TO BE INCLUDED FOR PUBLIC REPORT
Documents attached separately.

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Appendix 6: Site Visit Photos

NOT TO BE INCLUDED FOR PUBLIC REPORT
Documents attached separately.

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Appendix 7: Floodplain Management Activities

1. **Preventive** activities keep flood problems from getting worse. The use and development of flood-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.
 - Floodplain mapping and data
 - Open space preservation
 - Floodplain regulations
 - Erosion setbacks
 - Planning and zoning
 - Stormwater management
 - Drainage system maintenance
 - Building codes
2. **Property protection** activities are usually undertaken by property owners on a building-by-building or parcel basis.
 - Relocation
 - Acquisition
 - Building elevation
 - Retrofitting
 - Sewer backup protection
 - Insurance
3. **Natural resource protection** activities preserve or restore natural areas or the natural functions of floodplain and watershed areas. They are implemented by a variety of agencies, primarily parks, recreation, or conservation agencies or organizations.
 - Wetlands protection
 - Erosion and sediment control
 - Natural area preservation
 - Natural area restoration
 - Water quality improvement
 - Coastal barrier protection
 - Environmental corridors
 - Natural functions protection
4. **Emergency services** measures are taken during an emergency to minimize its impact. These measures are usually the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.
 - Hazard threat recognition
 - Hazard warning
 - Hazard response operations
 - Critical facilities protection
 - Health and safety maintenance
 - Post-disaster mitigation actions
5. **Structural projects** keep flood waters away from an area with a levee, reservoir, or other flood control measure. They are usually designed by engineers and managed or maintained by public works staff.
 - Reservoirs
 - Levees/floodwalls
 - Diversions
 - Channel modifications
 - Storm drain improvements
6. **Public information** activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains. They are usually implemented by a public information office.
 - Map information
 - Outreach projects
 - Real estate disclosure
 - Library
 - Technical assistance
 - Environmental education

From the CRS Coordinators Manual 2017, Figure 510-4