



City of Cape May Municipal Coastal Vulnerability Assessment December 2016

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City of Cape May City Coastal Vulnerability Assessment Report

I. Introduction

Municipal Coastal Vulnerability Assessment

The Municipal Coastal Vulnerability Assessment (CVA) is both a process and tool to help communities make incisive and sound decisions on near and long-term coastal management, reconstruction, and resiliency measures. The CVA categorizes the degree to which a community's assets (e.g. built, natural, social, etc.) will be impacted by projected sea level rise and storm events, and analyzes the consequences those vulnerabilities pose to the community. By accounting for vulnerability and consequence factors associated with future flood events, local officials will be better informed to make critical decisions regarding land use planning, mitigation, adaption measures, and public investments.

The CVA was developed by the New Jersey Resilient Coastal Communities Initiative (RCCI), a post-Sandy project funded by the National Oceanic and Atmospheric Administration (NOAA), and managed by the NJ Department of Environmental Protection's Office of Coastal and Land Use Planning. The tool was created in response to the need for municipalities to be better prepared for the increasing rate of sea level rise and extreme storm events.

II. Municipal Background

Location and Demographics

Cape May City is a small peninsula community located at the southern tip of the Cape May Peninsula in Cape May County. The city encompasses more than 2.5 square miles of land and is one of the oldest vacation communities in the country. The city is uniquely positioned along the Atlantic Ocean, as most communities run north-south along the Atlantic, the city runs east-west along the ocean, making it more susceptible to direct ocean impacts that are traveling north. Cape May City has a year-round population of 3,607 residents according to the 2010 census, with a considerably higher seasonal population that increases the population more than ten-fold. Approximately half the population is 45 or older, and a median family income of \$50,846, lower than the state average.

Future Flooding

Cape May City is faced with a new set of challenges as sea level continues to rise and the intensity and frequency of storms and precipitation persist. Figure 1 shows past and future trends in monthly mean sea level rise using data from the Cape May tide gauge station in Cape May, NJ. Additional data and maps regarding future flood projections, precipitation and climate change are available at Climate Central (<http://www.climatecentral.org>); NJAdapt (<http://www.njadapt.org>); and the NJ Climate Adaptation Alliance (<http://njadapt.rutgers.edu/>)

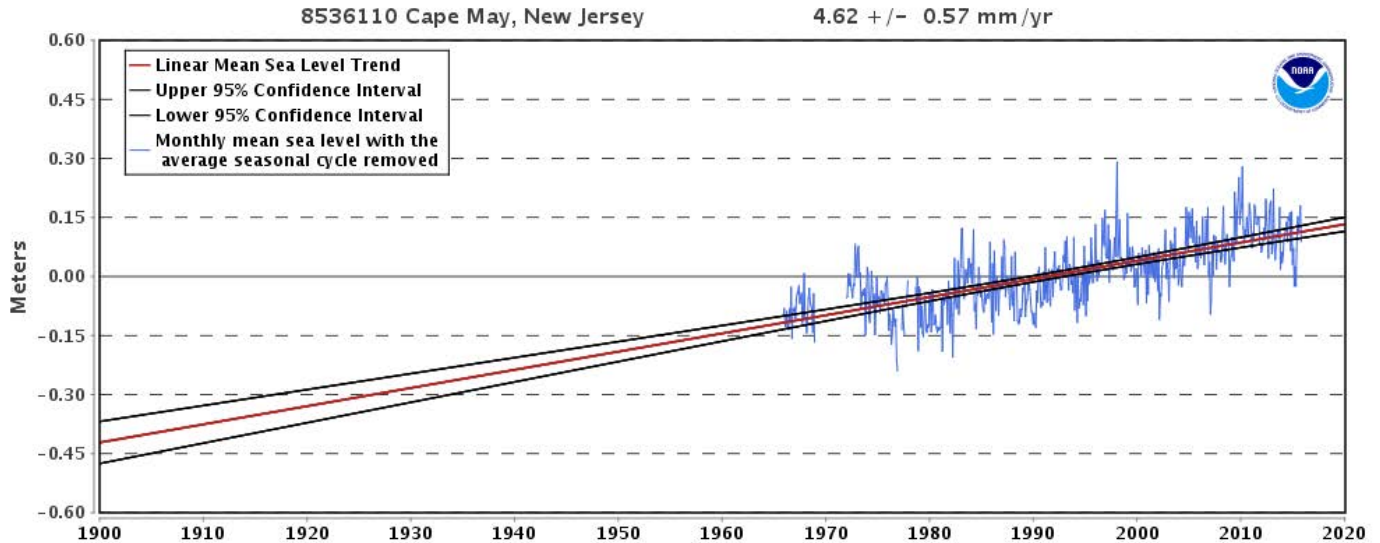


Figure 1. Mean Sea Level Trend at Cape May, NJ (NOAA, 2015)

III. Municipal Coastal Vulnerability Assessment – Methodology

The CVA process is a methodical, step-by-step approach for conducting a comprehensive vulnerability assessment of coastal flooding hazards. It identifies the vulnerability of community assets (identified by the municipality) to a series of future flood hazard scenarios, and the associated consequences to the community. The CVA goes beyond a simple analysis of flooding extent and duration by also examining how flooding will affect the functional capacity of buildings, services, infrastructure, businesses, ecological systems, and residents. The three key steps of the CVA are described below:

✓ *Identify and map community assets and selected coastal flood hazard scenario(s)*

Geographical Information Systems (GIS) maps are the most effective way of locating and analyzing community assets and flood hazards. Community assets are identified among four categories - Critical Facilities & Infrastructure Systems, Community Resources & Amenities, Natural Resources & Ecosystems, and Districts, Neighborhoods, & Population Clusters – and plotted using GIS. Flood hazard scenarios are selected and are also mapped. Communities are encouraged to use both future sea level rise (daily high tide) and storm surge levels for at least 2050, and, preferably, 2030 and 2100, if available.

✓ *Evaluate the vulnerability of community assets.*

Vulnerability is the predisposition of a community asset to be adversely affected by a hazard—in this case, coastal flooding. Vulnerability is measured by the anticipated degree of *exposure* and *sensitivity*.

Exposure is the extent to which community assets may be flooded, measured by magnitude and depth. The magnitude of exposure incorporates the frequency of occurrence (e.g. for high tide, the occurrence would be daily), and the depth of floodwater during the occurrence.

Sensitivity is measured by the extent in which the flooding will impact the following features of the asset¹:

- Durability of the structure or asset (materials, elevated structure, flood mitigation measures, etc.)

¹ Sensitivity also includes the natural coping capacity of individuals to move out of harm's way. However, contrary to some definitions, it does not include adaptive capacity since by its inherent definition adaptive capacity is a likely future condition that requires action, e.g. elevating structures. The CVA evaluates sensitivity based on the assets' current conditions.

- The ability of an asset to continue to provide its key benefits and operations in the aftermath of a storm event
- The ability to move quickly from harm's way.

Each asset is assigned a single vulnerability rating based on the adverse impacts due to exposure and sensitivity to each hazard. A Vulnerability Rating Key provides guidance in the assignment of these ratings. (See Appendix C).

✓ *Evaluate the overall consequences to the community*

Consequence is the degree of impact on the entire community if an asset will be lost or damaged, or if the assets function is impaired. The degree of impact is measured over eight topic areas that can potentially impact the community. The topic areas include: property damage, population displacement, delivery of services, typical operations / daily life, environment, emergency response, hazardous materials, and municipal budget. The Consequences Rating Key in Appendix D provides guidelines for identifying and rating consequences.

IV. Findings: Vulnerability and Consequences of Community Assets

Cape May City identified 57 assets to be included in the vulnerability and consequences assessment, but only those assets shown to be impacted by sea level rise and/or a Category 1 Hurricane in 2050 (a total of 44 assets) were included in the assessment. The assets were identified under four broad categories of potential community assets: Critical Facilities & Infrastructure Systems, Community Resources & Amenities, Natural Assets & Ecosystems, and Districts, Neighborhoods, & Population Clusters. While the majority of assets were assessed individually, some of them were assessed as part of "systems" to ensure the functionality and consequence if one component or asset failed. For example, Cape May City includes a historic district, which comprises approximately half the city and a quarter of the assessed value of all the property within the city. Substantial loss or damage to the district will have major impacts and consequences for the city.

This assessment is based upon two flood hazards scenarios - 2050 projected sea level rise and 2050 hurricane category 1 storm surge – both provided by the NJ Department of Environmental Protection. The sea level rise projection is based upon a 2013 study by New Jersey climate scientists,² and uses the 2050 mid-range projections in that study, or 1.3 feet of sea level rise. The sea level rise maps show the additive layers of the projections and the mean higher high water (MHHW) mark, determined by NOAA calculations. The storm surge maps were developed using NOAA's SLOSH (Sea, Lake, and Overland Surge from Hurricanes) model, combined with the sea level rise projections. The approximate depth of water is based on LiDAR data.³

The community assets were assessed for their vulnerability (exposure and sensitivity) to the above two hazard scenarios, and then for the consequences to the community if the asset was damaged or destroyed. The complete set of data on vulnerability and consequences are included in the CVA Matrix (Appendix A), and summarized in Table 1 below (for a full list of consequences, refer to the Appendix A Matrix.) Since sea level rise is more likely to occur than a Category 1 hurricane, the city should particularly focus its attention on the assets with high consequences in the sea level rise column. There are also other considerations for interpreting the data in the Matrix and Table 1. The flood hazard maps are based upon the latest technology and most readily available data,

² Miller et al. December 2013. "A geological perspective on sea-level rise and its impacts along the U.S. mid-Atlantic coast." http://onlinelibrary.wiley.com/doi/10.1002/2013EF00_0135/pdf

³ Note that the projected flood events used in this assessment were generated by several models prepared by state and national agencies and professionals, and are suitable for planning purposes. However, due to the uncertainty of projections and accuracy of certain types of data, the maps should not be the sole resource for conducting site specific analyses.

both of which will continue to be updated as new data is generated and technology advances. Additionally, there may be existing topographical features or mitigation measures in place that the assessment did not pick up, which could lower the vulnerability rating of an asset. For these reasons, the matrix should be used for general planning purposes and not for specific site planning or design, unless site conditions are field verified. More considerations on the use of the data and recommendations are offered in Section V.

Table 1. Cape May City Coastal Vulnerability Matrix

Asset Name	Asset Category	2050 Depth Projections (feet)		Consequences	2050 Consequences Rating	
		Sea Level Rise	CAT1 Hurricane		Sea Level Rise	CAT1 Hurricane
Beach Avenue	Critical Facilities & Infrastructure Systems	NA	1.5-5	The roadway serves the beach district of the city. When the roadway is impassable it eliminates potential evacuation for seasonal visitors, ingress and egress for emergency services, and access to small businesses.	NA	High
Beachfront/ Boardwalk/ Promenade Business District	Districts, Neighborhoods & Population Clusters	NA	1.5-5	The area contains the largest tourist attraction and destination, the beach, for the city. Substantial damage throughout the district will have major economic and financial implications for the city.	NA	High
Benton Avenue Pump Station	Critical Facilities & Infrastructure Systems	NA	5-6	Failure of the pump station results in increased flooding to nearby streets and neighborhoods. The pump will be unable to pump storm water out of the area which may increase the time flood water spends within the city, increasing potential damage.	NA	High
Broadway	Critical Facilities & Infrastructure Systems	NA	1.5-4.2	The roadway leads to one of only three ways in and out of Cape May City. When the roadway is impassable it eliminates potential evacuation routes, ingress and egress for emergency services, and affects recovery operations. The inundation would also limit access into and out of a large residential area.	NA	High
Cape Bank	Community Resources & Amenities	NA	0-0.5	None	NA	Insignificant
Cape Island Creek	Natural Assets & Ecosystems	0-4	1-10	The wetlands provide flood storage, slow waters, and a place for sediment to deposit. These flood hazard mitigation properties will be lost if converted to mudflats or open waters, leading to exacerbated flooding and flood damage throughout Cape May City.	High	High

Asset Name	Asset Category	Sea Level Rise	CAT1 Hurricane	Consequences	Sea Level Rise	CAT1 Hurricane
Cape Island Creek Sluice Gate	Critical Facilities & Infrastructure Systems	0-1.5	6-8	Daily inundation during high tide will make the streets impassable and may inundate a few homes. Without major infrastructure improvements the area will become impassable and uninhabitable.	Moderate	High
Cape May City Housing Authority	Districts, Neighborhoods , & Population Clusters	NA	0-5	The housing development offers assistance for low income families and any damage will result in the needs for repair and displacement of the families living the housing.		
Cape May City Madison Avenue Water Tank	Critical Facilities & Infrastructure Systems	NA	3.5-4.5	Damage to some of the communication equipment found at the base of the water tower may result in the loss of some of the areas communication network. There are other towers nearby.	NA	Low
Cape May City Public Works, Water, and Sewer Complex	Critical Facilities & Infrastructure Systems	NA	0-1.5	None	NA	Insignificant
Cape May Convention Hall	Community Resources & Amenities	NA	0-3	Any damage to the building may require repairs that could temporarily keep the convention hall closed. A temporary closure of the hall may result in a financial loss to the city.	NA	Low
Cape May County Library	Community Resources & Amenities	NA	0-2.5	None	NA	Insignificant
Elmira Street Bridge	Critical Facilities & Infrastructure Systems	NA	4.5-6	The bridge is one of only three ways in and out of Cape May City. When the bridge is impassable it eliminates potential evacuation routes, ingress and egress for emergency services.	NA	High
Frog Hollow Neighborhood	Districts, Neighborhoods & Population Clusters	0-1.5	3.5-7	Increasing high tide inundation throughout the neighborhood will result in the increased operations of pump stations which could become overwhelmed and fail.	Moderate	High

Asset Name	Asset Category	Sea Level Rise	CAT1 Hurricane	Consequences	Sea Level Rise	CAT1 Hurricane
Grant Street & Beach Avenue Pump Station	Critical Facilities & Infrastructure Systems	NA	1	Failure of the pump station results in increased flooding to nearby streets and neighborhoods. The pump will be unable to pump storm water out of the area which may increase the time flood water spends within the city, increasing potential damage.	NA	High
Haborfront Beaches	Natural Assets & Ecosystems	0-4	0-10	Continuously eroding beaches and dunes will require ever increasing replenishment and maintenance, although the Army Corps project may help mitigate these impacts.	High	High
Harborview Bulkhead	Critical Facilities & Infrastructure Systems	NA	2.5-6	Inundation may require the clean-up and removal of debris from the storm event. Storm surge may damage or destroy the lighting and pavilion structure located in the park.	NA	Low
Harborview Park	Natural Assets & Ecosystems	NA	2.5-6	The city would need to repair and/or replace the pavilion, lighting, and landscaping resulting in a small financial burden to the city.	NA	Low
Historic District & Homes	Districts, Neighborhoods & Population Clusters	0-4	1-10	Substantial damage to even a quarter of the historic structures can have major impacts on the city. A quarter of the value of all properties within the city is based on the historic designation of the city and its properties.	Low	High
Kiwanis Park	Natural Assets & Ecosystems	NA	3-6	The flooding from stormwater infrastructure failure will flood Madison Avenue potentially making the roadway impassable. Minor damage to the tennis courts would be a financial burden for repair for the Cape May Tennis Club.	NA	Low

Asset Name	Asset Category	Sea Level Rise	CAT1 Hurricane	Consequences	Sea Level Rise	CAT1 Hurricane
Lafayette Street	Critical Facilities & Infrastructure Systems	NA	0-4	The roadway leads to one of only three ways in and out of Cape May City. When the roadway is impassable it eliminates potential evacuation routes, ingress and egress for emergency services, and affects recovery operations.	NA	High
Lafayette Street Park	Natural Assets & Ecosystems	NA	0-2	None	NA	Insignificant
Madison & Beach Avenue Pump Station	Critical Facilities & Infrastructure Systems	NA	0.5-4	Failure of the pump station results in increased flooding to nearby streets and neighborhoods. The pump will be unable to pump storm water out of the area which may increase the time flood water spends within the city, increasing potential damage.	NA	High
Madison & Michigan Avenues Pump Station	Critical Facilities & Infrastructure Systems	NA	3.5-4.5	None	NA	Insignificant
Madison Avenue	Critical Facilities & Infrastructure Systems	NA	0.5-4.5	The roadway serves a large residential neighborhood. When the roadway is impassable it eliminates potential evacuation, ingress and egress for emergency services, and access to individual homes.	NA	High
Nature Center of Cape May	Natural Assets & Ecosystems	NA	2-4	None	NA	Insignificant
Ocean Front Beaches & Dunes	Natural Assets & Ecosystems	0-3	0-10	Continuously eroding beaches and dunes will require ever increasing replenishment and maintenance, and the current Army Corps contract may not be able to meet the requirements of keeping the beach and dune intact to its current profile.	High	High

Asset Name	Asset Category	Sea Level Rise	CAT1 Hurricane	Consequences	Sea Level Rise	CAT1 Hurricane
Ocean Street	Critical Facilities & Infrastructure Systems	NA	0-4.3	The roadway serves a large residential neighborhood. When the roadway is impassable it eliminates potential evacuation, ingress and egress for emergency services, and access to individual homes.	NA	High
Patterson & Beach Avenues Pump Station	Critical Facilities & Infrastructure Systems	NA	2	Failure of the pump station results in increased flooding to nearby streets and neighborhoods. The pump will be unable to pump storm water out of the area which may increase the time flood water spends within the city, increasing potential damage.	NA	High
Pittsburgh Avenue	Critical Facilities & Infrastructure Systems	NA	0-4	The roadway leads to one of only three ways in and out of Cape May City. When the roadway is impassable it eliminates potential evacuation routes, ingress and egress for emergency services, and affects recovery operations. The inundation would also limit access into and out of a large residential area.	NA	High
PNC Bank	Community Resources & Amenities	NA	0-2	None	NA	Insignificant
Riggins Service Station	Community Resources & Amenities	NA	2.5-4	The gas station is the only service station within the city. Its loss or damage will inconvenience local residents, however other service stations are located nearby in other communities.	NA	Low
Rock Jetty Seawall	Critical Facilities & Infrastructure Systems	NA	1.5-5	The rock jetty can only hold back a certain storm surge height, and if waves exceed the height, the area behind the rock jetty will flood.	NA	Low
Rutgers University Aquaculture and Fisheries Center	Natural Assets & Ecosystems	NA	0-2	None	NA	Insignificant

Asset Name	Asset Category	Sea Level Rise	CAT1 Hurricane	Consequences	Sea Level Rise	CAT1 Hurricane
Schellengers Landing Bridge	Critical Facilities & Infrastructure Systems	NA	0-3	The bridge is one of only three ways in and out of Cape May City. When the bridge is impassable it eliminates potential evacuation routes, ingress and egress for emergency services, and affects recovery operations.	NA	High
Sewell Point Tract	Districts, Neighborhoods , & Population Clusters	NA	0-5	None	NA	Insignificant
Swain's ACE Hardware	Community Resources & Amenities	NA	2-4.5	The community, residents and emergency personnel, relies heavily on the hardware store during and after storm events. The store is the only nearby business with access to supplies and equipment necessary for immediate repair and recovery operations.	NA	High
Texas Avenue	Critical Facilities & Infrastructure Systems	NA	2-4.5	The roadway leads to one of only three ways in and out of Cape May City. When the roadway is impassable it eliminates potential evacuation routes, ingress and egress for emergency services, and affects recovery operations.	NA	High
Texas Avenue & Schellengers Landing Business District	Districts, Neighborhoods , & Population Clusters	0-2	1.5-6	The area is one of only three ways in and out of Cape May City. When the area is impassable it eliminates potential evacuation routes, ingress and egress for emergency services, and affects recovery operations.	Insignificant	High
U.S. Post Office	Community Resources & Amenities	NA	0-2	None	NA	Insignificant
United States Coast Guard Training Center Cape May	Critical Facilities & Infrastructure Systems	NA	0-3	Minimal damage to the piers and boats may delay the search and rescue and recovery abilities of the Coast Guard to respond to a major storm event.	NA	Low

Asset Name	Asset Category	Sea Level Rise	CAT1 Hurricane	Consequences	Sea Level Rise	CAT1 Hurricane
Washington Street	Critical Facilities & Infrastructure Systems	NA	0-5	Increasing high tides due to sea level rise may lead to increased undermining of the roadway, requiring more frequent repair and increasing maintenance costs. The roadway leads to one of only three ways in and out of Cape May City.	Moderate	High
WAWA Market	Community Resources & Amenities	NA	0-4	Minor damage may result in a temporary closure of the WAWA which would inconvenience residents and emergency personnel working on recovery.	NA	Low
Wilmington Avenue Pump Station	Critical Facilities & Infrastructure Systems	NA	0-2	Failure of the pump station results in increased flooding to nearby streets and neighborhoods. The pump will be unable to pump storm water out of the area which may increase the time flood water spends within the city, increasing potential damage.	NA	High

V. Recommendations

This section offers key steps that the township should consider following the vulnerability assessment, and discusses the long-term planning process that is integral to risk reduction and adaptation planning and implementation.

Considerations

1. *Coordinate community outreach and education on flood risks*

In order for Cape May City to better prepare for the future impacts of sea level rise and hurricane events, it is important to have an engaged and informed community. The results of this report should be shared with the community either at a public meeting or workshop, but at a minimum by posting it on the municipal website. The city should also consider special outreach to residents, business owners, and property owners in the most vulnerable areas of Cape May City. Educating these stakeholders about future flood vulnerabilities and working together to find solutions will protect Cape May City at large and keep the fabric of the neighborhoods intact and the businesses operating.

2. Share the results of the Coastal Vulnerability Assessment with owners and managers of vulnerable and at-risk non-residential properties and work together to develop mitigation and adaptation strategies. Many of Cape May City's at-risk assets are owned and managed by private businesses and industries, and public and quasi-public entities. These property owners may be aware of additional risks and vulnerabilities that were not identified in this CVA, or perhaps have already launched efforts to prepare for future risk reduction. Cape May City is encouraged to

reach out to these property owners to discuss the results of this report and future steps that may be taken individually and collectively to protect the properties from future flood hazards.

Suggestions

- Consider convening a workshop or meeting with at-risk non-residential property owners and operators to discuss opportunities to collaborate on adaptation strategies to minimize risks and potential damage to future flood hazards.
- When working with flood-risk private industries in development proposals, redevelopment or other activities, promote the importance of emergency management planning site remediation and the safe storage of toxic materials.

3. Incorporate the results of the Coastal Vulnerability Assessment into the municipal master plan with short-term and long-term strategies for protecting and adapting the community assets and vulnerable areas. As the primary planning policy document for the community, the master plan should identify areas in the community that will likely be impacted by future flood hazards, and offer measures for mitigation and adaptation strategies to protect the community's assets and properties.

Suggestions

- Include maps of projected sea level rise and future storm events in the land use plan and conservation plan elements of the municipal master plan.
- Identify natural resources that serve as protective flood mitigation measures (e.g. wetlands), and provide recommendations for maintenance and management in the conservation plan element.
- Identify planning policies for mitigation and adaptation strategies to protect properties from future flooding, including sea level rise and extreme storm events, in the land use plan element.

4. Cross-reference the Coastal Vulnerability Assessment in relevant sections of the municipal master plan, floodplain management plan, emergency operations plan and all hazards mitigation plan. Community flood risks are influenced largely by land use and development patterns that are grounded in local master plan policies. Hazard mitigation plans also provide strategies to reduce these risks, but as stand-alone documents often do not relate to the master plan policies. The same is true for flood mitigation plans and emergency plans. This disconnect can result in conflicting policies and undermine the progress in mitigation and adaptation. Integrating flood risks and hazard mitigation into all local policy documents, especially master plans and hazard mitigation plans, ensures a coordinated, complementary approach to mitigation, and avoids potential conflicts from competing goals and interests.

Resources

- *Integrating Hazard Mitigation Into Local Planning, Case Studies and Tools for Community Officials*, FEMA, 2013

5. Consider wetland education and outreach campaign on the importance of Cape May City's Cape Island Creek wetland complex. Wetlands serve an important role in flood hazard mitigation. These systems dampen wave height and energy, decreasing the destructive power of a storm surge entering Cape Island Creek. Community education and outreach will raise awareness of the benefits these systems provide to the community both daily and during a storm event. An education and outreach campaign could include brochures for the boating community or citizen scientist wetland assessment program with a local non-profit. In addition, the municipality may benefit from

a more in-depth assessment of the community wetland health, consider consulting with wetland ecologist from academia or the non-profit community.

Resource

- Paddle for the Edge, Barnegat Bay Partnership <http://bbp.ocean.edu/pages/380.asp>
- Wetlands- Frequently asked questions, municipality of Anchorage <http://www.muni.org/Departments/OCPD/Planning/Physical/EnvPlanning/Pages/WetlandFAQs.aspx>

6. Consider the use of living shorelines to protect community assets against shoreline erosion

Living shorelines are a shoreline stabilization practice that address erosion and attenuate wave energy using a hybrid approach of strategically placed plants, stone, sand fill and other structural or organic materials. Living shorelines typically have other co-benefits such as the protection of flora and fauna habitats, flood mitigation, improved water quality and attractive, natural appearances. These practices are an alternative to the traditional hard or “gray” infrastructure (e.g. bulkheads, revetment walls, etc.), which are especially vulnerable to sea level rise and extreme flood events. The Henry Hudson Trail may be a good opportunity to install a living shoreline to minimize trail erosion and the impacts of flooding and erosion at the toe of the slope of the hills and neighboring properties.

Resource

- The Nature Conservancy. [Coastal Restoration Explorer Mapping tool](#).

7. Consider revising the municipal stormwater management and sewer plans to reflect the results of the CVA. The municipal stormwater management plan provides strategies for addressing current and future stormwater-related impacts that result from land use development, and strives to minimize flooding and protect community’s water quantity & quality, groundwater recharge and aquatic habitats. Stormwater management strategies include recommended performance and design standards that are incorporated into ordinances, as well as management and maintenance requirements. Increases in the variability of weather patterns and the frequency of extreme weather events occurring in New Jersey are putting stress on municipal stormwater infrastructure systems. Cape May City’s stormwater infrastructure, including culverts, retention and detention ponds, inlets, catch basins, and stormwater pipes are all vulnerable to increases in flow of which they were not designed to handle. The City should consider updating the municipal stormwater management plan to include the potential impacts of climate change and promote design and infrastructure projects that are more resilient to climate change. In addition the City may want to review its stormwater management policies and maintenance plans for municipally-owned facilities to assess for potential climate change impacts and whether changes are desirable to make these systems more resilient.

Resource

- The City of Ottawa [Wet Weather Infrastructure Management Plan](#)
- The City of Ottawa. [Adaptive Approaches in Stormwater Management](#)

8. Recommendations for Minimizing Flood Risks in the Historic District. Due to the impending high flood risks within the city’s historic district and potential consequences identified in this report, steps should be taken now to minimize future risks. There are several options for minimizing flood risk and damage to historic structures, though not all are appropriate or even an option for every structure and district. We offer the following suggestions for the city to consider:

A. As a first step towards evaluating flood adaptation and mitigation options, the city should compile the following set of maps and documentation:

- i. Past flooding extent, and depth, should be documented and mapped for the historic district, including Hurricane Sandy and other large storm events. Data collection methods should include anecdotal information from property owners, as well as a variety of mapping sources.
- ii. The CVA maps of all flood hazard scenarios
- iii. The historic district map with contributing structures outlined, and preferably, a distinction between residential and commercial structures.

B. Using the above maps and accompanying documentation from historical flooding events, the city should consider the following options to help protect the historic structures from future flood damage:

- i. The flood maps of the historic district may reveal that only certain sections of the historic district are vulnerable to severe flooding, e.g. deep waters, frequent inundation, etc. These areas should be identified and taken into consideration when considering the adaptation and mitigation options below.
- ii. Elevating structures is a common approach to reducing the risk of flood damage. However, elevating an historic structure could permanently impair or destroy its historic integrity, as well as the visual setting of adjoining structures. The decision to elevate historic structures depends upon many issues, particularly the type, scale and location/setting of the structure, and the same characteristics, as well as the need for elevation, of historic structures within a visual proximity. For example, structures on large lots with a deep setback can generally accommodate higher elevations because they have room to provide alternative access and the elevated first floor elevation has less impact on the streetscape, though it doesn’t escape from it entirely. If elevation is chosen for an historic district, all structures should be elevated and the elevated heights should result in the same proportional heights among the structures as originally constructed.

Elevating a structure a foot or less may have little to no impact on the visual and historic integrity of the structure, given the correct use of construction materials, landscaping and standards recommended by the Secretary of the Interior’s Guidelines for Rehabilitating Historic Structures. However, as the elevated height of the structure increases, the design of the front access and the foundation becomes critically more important, and challenging. See the “Elevation Design Guidelines for Historic Homes in the Mississippi Gulf Coast Region” for more guidance and sample photographs. The document may be accessed here:

http://www.nj.gov/dep/hpo/hrrcn_sandy_pdf%20files/mississippi.pdf.

- iii. Depending upon the magnitude and spatial extent of predicted flooding in the district, the installation of a permanent flood control system may minimize flood risks in portions of the district. The system

may include levees, flood pumps, sea walls, or other similar structures. While this would be a costly project, the costs of losing historic structures and potentially the entire district to flooding is far too great not to consider the option. The city should consult an engineer and floodplain manager to evaluate this option further.

- iv. For commercial historic structures, the interior can be raised, leaving the outside of the structure untouched. The design concept is to elevate the first floor level, or simply abandon the original first floor level and install wet flood proofing or flood damage-resistant materials inside. This option was implemented by Darlington, Wisconsin for its downtown district. The details of this retrofit can be accessed here:

http://emergencymanagement.wi.gov/mitigation/docs/Stories/Darlington_Downtown_Retrofit_WEM.pdf.

C. Depending upon the spatial extent and depth of predicted flooding, the city may have the option of constructing a permanent flood protection system to reduce flood risks to portions or all of the district. The system may include levees, sea walls, pump stations and other similar mitigation features. While such a project may be costly, the costs of losing historic structures and the integrity of the historic district are too great to not consider the option.

D. The city is encouraged to include recommended flood control measures into its hazard mitigation plan. The flood control measures can include both planning studies and construction projects to reduce flood risks in the district. Note that the municipal appendix to the plan can be updated at any time and does not have to wait until the next five-year plan.

E. Once Cape May has agreed upon a plan to minimize flood risks in the historic district, the city should revisit its flood plain regulations to assure that the relief provided to historic structures, as authorized by the NFIP regulations, accurately reflects the city's plan.

F. The city may also want to consult with these and other resources on this subject*:

Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning
State and Local Mitigation Planning How-To Guide, FEMA 386-6 / May 2005
https://www.fema.gov/pdf/fima/386-6_Book.pdf

Information Booklet No. 82, Treatment of Flood-Damaged Older and Historic Buildings,
National Trust for Historic Preservation. 1993
<https://www.ncptt.nps.gov/wp-content/uploads/NTHP-Information-Booklet-82-Flood-Damage-and-Older-Homes.pdf>

Looking to the Future: Alternatives for Reducing Flood-Related Damage in Historic Communities, 2002, Milton, PA.
<http://www.phmc.pa.gov/Preservation/About/Documents/Looking-Future-Milton-study-2002.pdf>

City of Annapolis – Weather It Together: Revising Floodplain Regulations for the Increased Protection of Historic Structures from Flooding, Jennifer Sparenberg, CFM, Maryland Historical Trust, April 30, 2016
<http://www.annapolis.gov/docs/default-source/planning-and-zoning-documents/revising-floodplain-regulations-for-the-increased-protection-of-historic.pdf?sfvrsn=0>

National Flood Insurance Program (NFIP), Floodplain Management Bulletin, Historic Structures
FEMA P-467-2, May 2008

http://www.nj.gov/dep/hpo/Index_HomePage_images_links/FEMA/FEMA%20historic_structures.pdf

Disaster Planning for Historic Properties Initiative. This is a current project administered by the Pennsylvania State Historic Preservation Office and funded by the National Park Service to develop strategies to protect local historic assets during, and in the aftermath of, future natural and man-made disasters, and integrating those strategies into FEMA-approved Hazard Mitigation Plans. The project is expected to be completed at the end of 2017. For more information, contact the PA Historic Preservation office at 717-783-8946.

** Links to webpages are invariably updated or broken due to unforeseen circumstances. All of the above resources can be found through a simple Internet search if the URL link is not working. (Also, some of the links do not function on Apple web browsers.)*

Adaptation: A Long-Term Planning Process⁴

Planning for the predicted increase in the frequency and severity of flood hazards is a complex and challenging task. Adaptation to these flood hazards requires a longer planning timeframe for which most municipalities are not accustomed. Incremental steps are key to ensuring progress and minimizing public investments on projects that may be compromised by flooding in the near to distant future. This vulnerability assessment is an important first step in planning for these future hazards. The above recommendations provide key steps immediately following the vulnerability assessment to further identify and confirm vulnerabilities and consequences, and to begin thinking about adaptation. This section frames a strategic approach to identifying, assessing, and implementing long-term solutions to reducing flood risks. The process will need to be repeated periodically to respond to new data, changes in the physical environment and the long-term horizon.

Identify plans, studies and activities that are needed prior to identifying adaptation strategies

The City should re-convene the CVA committee or any other local flood management committee that includes a similar representation of multiple disciplines, e.g. municipal engineer, floodplain manager, planner, public works official, governing body representative, planning board representative, conservation planner, floodplain manager and emergency management official. This group should determine if there are data gaps or ambiguities in the CVA that need to be addressed to get a complete picture of vulnerability. For example, the community may want to field-verify certain sites or assets to determine if topography or adaptation measures may exacerbate or attenuate the projected flood impacts. If studies or plans are deemed necessary, the committee should identify who might take the lead. Also, the vulnerability and consequence ratings in this assessment should be compared with other current mitigation and planning documents to determine if there are any conflicts that should be addressed. Finally, the committee should determine which of the CVA recommendations will be implemented, if not all, and who should take the lead.

⁴ The term "adaptation" in this document refers to all measures to minimize flood risks, including "mitigation" projects and strategies, a term which is traditionally used by emergency managers and engineers.

Identify adaptation strategies

Given that the CVA's purpose is to identify vulnerabilities, not pose solutions, the critical next step is to identify and evaluate potential solutions. Using the vulnerability assessment of community assets and other pertinent data and reports (e.g. the hazard mitigation plan, beach nourishment program, flood management reports) identify the broadest range of possible solutions to reduce flood risks. Depending upon the magnitude of the vulnerabilities and consequences, the community may need to consult with coastal engineers outside of the community to fully realize the range of adaptation measures. DEP and other agencies and organizations may be available to provide workshops or host consultation meetings. This process of identifying adaptation strategies could take several months or more to fully understand the options available to the community.

The City should also determine whether a regional approach to an adaptation project is appropriate, and, if so, arrange for multi-jurisdictional meetings. The county or NJDEP Office of Coastal and Land Use Planning may be able to assist in scheduling or facilitating these meetings.

Once the broad list of adaptation options is created, the committee should select the most desirable projects and strategies to pursue, along with associated timeframes, funding options and project/task leads. The community may also want to conduct a cost-benefit analysis to prioritize adaptation strategies. Most adaptation projects will need to be reviewed the NJ Department of Environmental Protection to ensure they meet permitting requirements. Projects that cannot be approved or funded at this time should be noted and discussed in future iterations of this process.

Engage the Community

Host community meetings to discuss and solicit feedback on the recommended adaptation strategies while also educating the participants about flood risk.

Seek funding opportunities for adaptation planning and mitigation projects. Below is a short list of potential grant programs:

- [NJ Department of Community Affairs \(DCA\) planning assistance grants](#)
- [NJDEP Office of Coastal and Land Use Planning](#)
- [NJDEP Office of Flood Hazard Risk Reduction Measures](#)
- [FEMA Hazard Mitigation grants](#)
- [FEMA Pre-Disaster Mitigation grants](#)
- [FEMA Flood Mitigation Assistance grants](#)
- [US Army Corps of Engineers](#)
- Other Federal grant programs – see the Appendix of the [NOAA Adaptation Guide](#)

Develop an implementation strategy

Adaptation strategies should be integrated into the local hazards mitigation plan, capital improvement plan, master plan and ordinances to coordinate all related land use and adaptation policies and projects in the community. Key individuals and municipal departments should be assigned to lead and/or implement each of the adaptation strategies, along with proposed timeframes and funding options.

Schedule annual meetings

Unfortunately, there may not currently be sufficient resources and assistance available to address all of the community's identified vulnerabilities. Federal and State programs for coastal resiliency are still evolving, and grants, technical assistance, best practices and models, will inevitable become available. The committee should flag the issues for which solutions cannot be found and revisit them in the next adaptation planning process. Key staff should be charged with signing up for state and federal email lists that share grant and program information. The committee should continue to meet at least once a year, even after all current options for making progress have been exhausted, to consider if new programs or solutions have become available.

Appendix A. Cape May City Coastal Vulnerability Matrix

Asset Name	Asset Category	Asset Description	Asset Function	2050 Depth		Exposure	Sensitivity	2050 Vulnerability Rating		Consequences	2050 Consequences	
				Sea Level Rise	CAT1 Hurricane			Sea Level Rise	CAT1 Hurricane		Sea Level Rise	CAT1 Hurricane
ACME Market	Community Resources & Amenities	Supermarket	The ACME market is the only supermarket in the area. The market is important during emergencies, as the market provides food and supplies to emergency service providers.	NA	NA	No impact from sea level rise. No impact from a CAT1 event.	None	NA	NA	None	NA	NA
Beach Avenue	Critical Facilities & Infrastructure Systems	Local Evacuation Route (County)	This County-owned highway (with the exception of the three most westerly blocks which are City-owned) is the main east/west thoroughfare along the entire 2.3 mile City beachfront. This roadway intersects with four primary north-south vehicular arteries: Broadway, Ocean Street, Madison Avenue, and Pittsburgh Avenue.	NA	1.5-5	No impact from sea level rise. May see several feet of inundation during a CAT1 event.	The roadway would be inundated making the road impassable. The roadway is protected by the seawall that runs the length of the roadway. The roadway itself would suffer little to no damage.	NA	Low	The roadway serves the beach district of the city. When the roadway is impassable it eliminates potential evacuation for seasonal visitors, ingress and egress for emergency services, and access to small businesses.	NA	High
Beachfront/Boardwalk/Promenade Business District	Districts, Neighborhoods, & Population Clusters	Business & Recreation District	On Beach Avenue from Pittsburgh Avenue to Third Avenue (approximately 2 miles in length). The area is zoned commercial with 8 hotels open year round. The area also includes the beaches, a number of businesses, shops, restaurants, and the Cape May Convention Hall. The district is the main attraction and tourist destination for tourists visiting the city.	NA	1.5-5	No impact from sea level rise. May see several feet of inundation during a CAT1 event.	The area is protected by the rock jetty seawall on the ocean side. Three pumps work continuously to keep water out of the area on the city side and Frog Hollow Neighborhood which is the lowest lying area in the city. If pumps fail the area will experience major inundation pushing water and sand into ground level restaurants, stores, and motels and hotels located along Ocean Avenue. The extreme ends of the seawall are susceptible to erosion and if those areas are breached flooding will be exacerbated throughout the district.	NA	High	The area contains the largest tourist attraction and destination, the beach, for the city. Substantial damage throughout the district will have major economic and financial implications for the city. Inundation from water and sand will require long term recovery and clean up. Many businesses may not be able to recover and may leave permanently. Other businesses may return but will take some time to recover. Tourists may go to other communities in the mean time and the area will suffer an economic depression.	NA	High
Benton Avenue Pump Station	Critical Facilities & Infrastructure Systems	Stormwater Pump (City)	Elevated control and have back flow prevention on all the structures.	NA	5-6	No impact from sea level rise. May see several feet of inundation around the pump during a CAT 1 event.	Inundation from a major storm event can overwhelm the pump causing to malfunction and quit working. The pump also does not have a backup generator and if power fails, the pump will also fail.	NA	High	Failure of the pump station results in increased flooding to nearby streets and neighborhoods. The pump will be unable to pump storm water out of the area which may increase the time flood water spends within the city, increasing potential damage. The control panel may need to be replaced and the generator elevated, which will cause a financial burden on the city, especially if multiple pump stations need to be replaced and elevated.	NA	High
Broadway	Critical Facilities & Infrastructure Systems	Local Evacuation Route (County)	This County-owned highway runs north-south directionally and is the primary artery for inbound/outbound vehicles frequenting the western sector of the City. At its southern terminus, this road intersects with Beach Avenue which is the main east/west thoroughfare along the entire 2.3 miles City beachfront. The northern terminus enters West Cape May and serves as the second means of entering/leaving the City.	NA	1.5-4.2	No impact from sea level rise. May see several feet of inundation during a CAT1 event.	The roadway would be inundated making the road impassable. The roadway itself would suffer little to no damage.	NA	Low	The roadway leads to one of only three ways in and out of Cape May City. When the roadway is impassable it eliminates potential evacuation routes, ingress and egress for emergency services, and affects recovery operations. The inundation would also limit access into and out of a large residential area.	NA	High
Cape Bank	Community Resources & Amenities	Bank	One of three banks located in the City of Cape May. The banks are important during emergency events because they stay open and provide access to cash for residents and visitors that may not otherwise have any access to money during emergencies when having cash is important to immediate and long-term recovery.	NA	0-0.5	No impact from sea level rise. May see minor inundation on Jackson Street, but no inundation to building.	Only the parking area would be inundated. The building is elevated and could still be accessed.	NA	Insignificant	None	NA	Insignificant
Cape Island Creek	Natural Assets & Ecosystems	Open Space, Tidal Waterway, Wetlands, and Recreation	This saltwater waterway basically runs parallel with the entire northernmost boundary of Cape May from Schellengers Landing Bridge and Cape May Harbor on the eastern terminus to Third Avenue on the westerly terminus. This creek traverses through wetlands but also runs underground in the western sector of the City. The underground portion of this tidal waterway is controlled by County-owned sluice gates located at the intersection of Perry and West Perry Streets as well as the intersection of Broadway and Grant Street. Malfunctioning or excessive storm water flows in the sluice gate areas can cause street flooding in the western sector of Cape May.	0-4	1-10	May see several feet of inundation during high tide due to sea level rise. May see major inundation during a CAT1 event.	The Cape Island Creek wetlands systems with continued daily inundation may convert to open water or mudflats limiting their flood hazard mitigation function to the community. In addition when converted to open water or mudflats all water purification functions are lost limiting ability of the creek to bounce back after flooding event.	High	High	The wetlands provide flood storage, slow waters, and a place for sediment to deposit. These flood hazard mitigation properties will be lost if converted to mudflats or open waters, leading to exacerbated flooding and flood damage throughout Cape May City.	High	High
Cape Island Creek Sluice Gate	Critical Facilities & Infrastructure Systems	Hazard Mitigation	Owned and operated by the County of Cape May in conjunction with the Borough of West Cape May, this device is located under the County-owned bridge at Perry and West Perry Streets in the City of Cape May. This device was fully rebuilt following Superstorm Sandy in 2012, and its primary function is to control water flow and volume running underground in the Cape Island Creek in the western sector of Cape May to prevent flooding, especially during weather/storm emergencies.	0-1.5	6-8	May see minimal inundation during high tide. May see several feet of inundation during a CAT1 event.	The sluice gate may become overwhelmed during high tide due to sea level rise and will definitely be overwhelmed by a major storm event which will result in flooding in the surrounding area and roadways (Perry Street, Congress Street, and Broad Street).	Moderate	High	Daily inundation during high tide will make the streets impassable and may inundate a few homes. Without major infrastructure improvements the area will become impassable and uninhabitable. A major storm event would overwhelm the sluice gate and the area would see major inundation which will substantially damage or destroy nearby homes and businesses. The damage will result in displacement of families and loss of community businesses.	Moderate	High
Cape May City Elementary School & Warming Shelter	Community Resources & Amenities	Public School	The elementary school serves approximately 160 students with approximately 30 staff. The school mostly provides education to the children of U.S. Coast Guard service members stationed at the USCG Training Center. The school also serves as a designated warming shelter and the city is considering the placement of a microgrid at the school.	NA	NA	No impact from sea level rise. No impact from a CAT1 event.	None	NA	NA	None	NA	NA
Cape May City Fire Department & Office of Emergency Management	Critical Facilities & Infrastructure Systems	Emergency Services	Situated in the City's Municipal Complex, these public safety entities serve as the command post for all planning efforts, training and drills, and City operational services during emergency situations/incidents/events.	NA	NA	No impact from sea level rise. No impact from a CAT1 event.	None	NA	NA	None	NA	NA
Cape May City Hall & Police Department	Critical Facilities & Infrastructure Systems	Civic	This municipal complex is headquarters for all City governance, administrative, public safety, and basic services. This complex serves as the command post for all planning efforts, training and drills, and City operational services during emergency situations/incidents/events.	NA	NA	No impact from sea level rise. No impact from a CAT1 event.	None	NA	NA	None	NA	NA
Cape May City Housing Authority	Districts, Neighborhoods, & Population Clusters	Vulnerable Population (Seniors and Low Income)	A HUD housing complex consisting of 85 units with three different campuses. The three campuses serve seniors living alone, couples and families with low incomes.	NA	0-5	No impact from sea level rise. May see several feet of inundation to the buildings located nearest the wetland on the north side of Broad Street. Buildings located south of Broad Street appear unimpacted.	The housing consists of 1960s construction which is not elevated and in need of repair and/or complete renovation. The families located within the housing have limited resources to meet the needs of recovery following a major storm event and disaster. The housing authority experiences budgetary cuts every year.	NA	Moderate	The housing development offers assistance for low income families and any damage will result in the needs for repair and displacement of the families living the housing. Low income families will have more difficulty finding temporary housing or having the resources to live without assistance. The city will have the financial burden of rebuilding and/or repairing the housing. The area is in a highly desirable development area and destruction of the housing could put pressure on the city to sell the area for development.	NA	Low
Cape May City Madison Avenue Water Tank	Critical Facilities & Infrastructure Systems	Public Works	Built in 1933, this 700,000 gallon water tank was fully restored for operational purposes in 2013. This tank is electronically connected and operated through a SCADA system at the City's Water and Sewer Utility Plant on Canning House Lane. Water supply to this tank is furnished by a direct distribution pipe running from the City's Water/Desalination Plant on Canning House Lane. The 700,000 gallon capacity in this tank is utilized to maintain water pressure throughout the City (especially the eastern sector), to serve as a reserve supply in case of a water system failure, and also as a reserve in the case of a major fire/emergency.	NA	3.5-4.5	No impact from sea level rise. May see several feet of inundation around the pump during a CAT 1 event.	The water tower itself will experience little to no damage from a major storm event. However, there is communication equipment and generators at the base of water tower that may be inundated and destroyed.	NA	Low	Damage to some of the communication equipment found at the base of the water tower may result in the loss of some of the areas communication network. There are other towers nearby.	NA	Low
Cape May City Police Department Substation	Critical Facilities & Infrastructure Systems	Public Safety	Located in the Borough of West Cape May Municipal Complex on Broadway, this substation is the day-to-day operational command post for the City Police Department's Patrol Division which services Cape May, West Cape May, and Cape May Point. During emergency operations, this command post moves to the City's Municipal Complex in Cape May.	NA	NA	732 Broadway, West Cape May	None	NA	NA	None	NA	NA
Cape May City Public Works, Water, and Sewer Complex	Critical Facilities & Infrastructure Systems	Public Works	The Public Works Complex includes six wells, water treatment plant, desalination plant with a 2 mgd capacity currently, and one million gallon standpipe. City is 100% on public water services. The City of Cape May is a potable water supplier to the Boroughs of West Cape May and Cape May Point as well as the United States Coast Guard Center Cape May.	NA	0-1.5	No impact from sea level rise. May see minimal inundation on the edges of the complex during a CAT1 event.	The facility is largely protected from inundation from Cape Island Creek via raised railroad track bed which runs North and South along the back of the facility. The facility does have backup generators for the water and desalination facilities in case of the loss of power.	NA	Insignificant	None	NA	Insignificant
Cape May Convention Hall	Community Resources & Amenities	Civic	Cape May's new Convention Hall is a 20,000 square foot facility located on Cape May's beachfront which is home to performing arts concerts for up to 1,000 people; and seminars, weddings, and banquets for up to 600 people. Cape May's new Convention Hall features state-of-the-art audio and video equipment, sound proofing in the main hall, and high-speed internet access.	NA	0-3	No impact from sea level rise. May see a couple feet of inundation on the Beach Avenue side and on the Ocean front side during a CAT1 event.	The Convention Hall was constructed to withstand major storm events, including storm surge and high winds. The city also recently put a berm around the structure to combat storm surge. The building would experience little to no damage from a major storm event.	NA	Insignificant	Any damage to the building may require repairs that could temporarily keep the convention hall closed. A temporary closure of the hall may result in a financial loss to the city.	NA	Low
Cape May County Library	Community Resources & Amenities	Civic	Located in the downtown historic district at the intersection of Ocean and Hughes Streets, this City-owned building is operated by the Cape May County Library System for the benefit of Cape May residents and visitors. The exterior and interior of this facility was completely renovated in 2010 to provide state-of-the-art electronic/digital services in addition to the traditional library services. This library serves as a vital communication hub for visitors and foreign workers who need to stay in electronic/digital contact with family, friends, business associates, and universities/colleges year round (especially during the Spring, Summer, and Fall seasons).	NA	0-2.5	No impact from sea level rise. May see minimal inundation on the road ways and parking lot surrounding the building during a CAT1 event.	Only the parking area would be inundated. The library itself is elevated on top of small hill. Library could still be accessed.	NA	Insignificant	None	NA	Insignificant
Cape May County MUA Sewer Treatment Plant	Critical Facilities & Infrastructure Systems	Sewer Treatment Plant	City is 100% on public water and sewer services. Cape May County MUA controls sanitary sewer system countywide, but City Water and Sewer Utility services the public and private services. The County-operated Sewer Treatment Plant for the City of Cape May service area is located at Sunset Beach on the Delaware Bay in Lower Township.	NA	NA	No impact from sea level rise. No impact from a CAT1 event.	None	NA	NA	None	NA	NA
Cape May United Methodist Church Complex	Community Resources & Amenities	Church	Read more: http://www.capemay.com/cape-may-convention-hall.html#xzz44CmaDVar	NA	NA	No impact from sea level rise. No impact from a CAT1 event.	None	NA	NA	None	NA	NA
City of Cape May Welcome Center	Community Resources & Amenities	Civic	The Welcome Center is the former train station for the region. It serves as an intermodal transit site for all trains, buses, and other visitors to Cape May. At the height of the summer tourism season as many as 70 buses stop at the Welcome Center. The Chamber of Commerce also maintains an information and welcome desk inside the building.	NA	NA	No impact from sea level rise. No impact from a CAT1 event.	None	NA	NA	None	NA	NA

Elmira Street Bridge	Critical Facilities & Infrastructure Systems	Bridge	Elmira Street Bridge is the connector bridge between the downtown Cape May City and the Borough of West Cape May. This is the third means of entering/leaving the City of Cape May.	NA	4.5-6	No impact from sea level rise. May see several feet of inundation on either side of the bridge during a CAT1 event.	The bridge is low-lying and would be inundated making the bridge impassable. The bridge would likely suffer little to no damage during a major storm event.	NA	Low	The bridge is one of only three ways in and out of Cape May City. When the bridge is impassable it eliminates potential evacuation routes, ingress and egress for emergency services, and affects recovery operations.	NA	High
Franklin Street Civic Center	Community Resources & Amenities	Civic	This City-owned facility is on the National Historic Register and serves multiple purposes including an array of City-sponsored recreational programming for residents of all ages in the gym, and also after-school and summer educational/social programming for youth which is presented by the Center for Community Arts (CCA). CCA is a local non-profit organization which leases a portion of the Franklin Street Civic Center under a long-term special agreement with the City.	NA	NA	No impact from sea level rise. No impact from a CAT1 event.	None	NA	NA	None	NA	NA
Frog Hollow Neighborhood	Districts, Neighborhoods, & Population Clusters	Residential & Commercial Neighborhood	Historic neighborhood consisting of xx homes, and hotels and businesses located along beach front.	0-1.5	3.5-7	No impact from sea level rise. May see major inundation during a CAT1 event.	The area is the lowest lying location in the city. During high tide there is nuisance flooding throughout the area. A number of pump stations work continuously to keep the area clear of water. The area consists mostly of historic structures, some which have been elevated, but majority have not. The residential neighborhood would experience substantial damage to a majority of the historic structures and residents. The area may also experience sand inundation through the streets and properties.	Low	High	Increasing high tide inundation throughout the neighborhood will result in the increased operations of pump stations which could become overwhelmed and fail. Continuous nuisance flooding could result in the loss of residents and properties unwilling to deal with the daily inundation. Substantial damage to the area after a major storm event will result in the loss of many historic structures. Reconstruction requirements and financial burden may lead many residents to leave the area and walk away from their homes permanently. Long term recovery and clean up may result in long term absence of rental properties and second home owners, which will impact the seasonal and year round tourist economy.	Moderate	High
Grant Street & Beach Avenue Pump Station	Critical Facilities & Infrastructure Systems	Stormwater Pump (County)	Elevated control and have back flow prevention on all the structures.	NA	1	No impact from sea level rise. May see a couple feet of inundation around the pump during a CAT 1 event.	Inundation from a major storm event can overwhelm the pump causing to malfunction and quit working. The pump also does not have a backup generator and if power fails, the pump will also fail. The pumps location to the beach also makes it susceptible to sand inundation, causing failure as well.	NA	High	Failure of the pump station results in increased flooding to nearby streets and neighborhoods. The pump will be unable to pump storm water out of the area which may increase the time flood water spends within the city, increasing potential damage. Sand clean out may delay the pumps ability to work again, leaving the city vulnerable to further immediate inundation from new storm events. The control panel may need to be replaced and the generator elevated, which will cause a financial burden on the city, especially if multiple pump stations need to be replaced and elevated.	NA	High
Harborfront Beaches	Natural Assets & Ecosystems	Shoreline Protection, Open Space, and Recreation	Running .5 linear miles from the 1400 block of Missouri Avenue on the westerly terminus to the eastern terminus at the Corinthian Yacht Club of Cape May (1819 Delaware Avenue, this City-owned strand is parallel to Delaware Avenue and currently has no hazard mitigation assets. The beachfront and roadway foundation of Delaware Avenue are severely eroded. Delaware Avenue is the secondary means of ingress/egress for the U.S. Coast Guard Training Center Cape May. This military base is under the jurisdiction of the U.S. Department of Homeland Security.	0-4	0-10	May several feet of inundation during high tide due to sea level rise. May see major inundation during a CAT1 event.	Sea level rise and major storm events will continue to erode the already eroding beach. The beach is currently under an Army Corps feasibility study to replenish and stabilize the beach, while also putting in a living shoreline along the entire length of the beach. However, without the implementation of the proposed projects the beach will continue to erode and destabilize the Delaware Avenue and the immediate area.	High	High	Continuously eroding beaches and dunes will require ever increasing replenishment and maintenance. Although, the Army Corps project may mitigate these impacts. A continuous loss of the beaches will leave Delaware Avenue, and the immediate area vulnerable and continuously destabilized, which will limit access into and out of the area for residents, research facilities, and the USGC base.	High	High
Harborview Bulkhead	Critical Facilities & Infrastructure Systems	Hazard Mitigation	Recently replaced bulkhead on Harborview between Harbor Lane and Texas Avenue.	NA	2.5-6	No impact from sea level rise. May see major inundation during a CAT1 event.	Surrounding bulkheads are higher than the Harborview bulkhead, which creates an opening for storm surge and debris to wash into Harborview Park. The bulkhead itself will experience little to no damage.	NA	Low	Inundation may require the clean up and removal of debris from the storm event. Storm surge may damage or destroy the lighting and pavilion structure located in the park. The landscaping in the park may also be damaged and have to be replaced.	NA	Low
Harborview Park	Natural Assets & Ecosystems	Open Space and Recreation	This triangular Harborfront park is owned and maintained by the City as a passive recreational site. It is located in the northeastern quadrant of the City just off Pittsburgh Avenue. This park is bounded by Harbor Lane, Texas Avenue, and Cape May harbor.	NA	2.5-6	No impact from sea level rise. May see major inundation during a CAT1 event.	The park contains a pavilion, lighting, and landscaping which may be damaged or destroyed.	NA	Low	The city would need to repair and/or replace the pavilion, lighting, and landscaping resulting in a small financial burden to the city.	NA	Low
Historic District & Homes	Districts, Neighborhoods, & Population Clusters	Historic District	There are over 600 operational historic structures dating from the Victorian Era in the City of Cape May which represent the foundation of our entire City's designation as a "National Historic Landmark" by the National Park Service in the United States Department of the Interior in 1976. (The City will provide a map outlining and detailing the defined and approved historic district, per the NJ State Historic Preservation Office (SHPO) in NJDEP, the National Park Service in the U. S. Department of the Interior, and the City's Historic Preservation Commission, which holds Certified Local Government (CLG) status with the SHPO. Cape May whole city was designated as a historic city.	0-4	1-10	Historic homes may see several feet of inundation during high tide due to sea level rise. Historic homes may see major inundation during a major storm event.	Designated historic properties cover nearly half the city and are impacted by many levels of inundation due to sea level rise and a major storm event. Many of the historic properties sit at higher elevation throughout the town and are not impacted by the scenarios presented. Major homes would suffer moderate to substantial damage. The homeowners are often under insured to cover the true costs of repairs for a historic structure following a disaster. Historic structures, per historic preservation code, are required to be restored to the original look and construction, using original materials. Few manufactures of original materials exist and only manufacture small quantities. In addition, not all the small craftsman manufacture all the types of historic materials (moldings, sidings, windows, etc.) that an individual historic structure may require. In addition to the material requirements, the number of contractors who can do renovation and major repairs to historic homes is also limited.	Low	High	Substantial damage to even a quarter of the historic structures can have major impacts on the city. A quarter of the value of all properties within the city is based on the historic designation of the city and its properties. Even new homes and developed properties carry the historic value. A loss of too many historic homes will result in the city losing its historic designation which would drastically reduce properties values across the entire city. The property value devaluation will mean a major financial loss to the city and its ability to offer its current levels of service, let alone, increasing services that may be required in the future to keep the town safe and operational. Historic home renovation and renovation could take years following a major storm event as craftsman and contractors will be overwhelmed across the region and materials will become scarce and maybe even completely unavailable for years. Under-insured home owners may be unable to meet the requirements and cost to rebuild and/or renovate their homes and may walk away from properties. Potential home buyers may be unwilling to take on the financial burden of renovating historic structures, and properties may be left abandoned and to deteriorate.	Low	High
Kiwanis Park	Natural Assets & Ecosystems	Open Space and Recreation	This niche park is located on Madison Avenue between Washington Street and Columbia Avenue and provides active and passive recreational activities. This park is part of 40+ acre, City-owned tract that also contains the Emlen Physick Estate and Cape May Tennis Club to comprise a cultural, historical, environmental, and recreational complex in the mid-point of Cape May.	NA	3-6	No impact from sea level rise. May see major inundation during a CAT1 event.	The pond located on the property ties into the county stormwater infrastructure. During storm events and pump failure the area backs up and floods onto Madison Avenue and the surrounding property, especially the tennis courts. The tennis courts could see minor to no damage.	NA	Low	The flooding from stormwater infrastructure failure will flood Madison Avenue potentially making the roadway impassable. Minor damage to the tennis courts would be a financial burden for repair for the Cape May Tennis Club.	NA	Low
Lafayette Street	Critical Facilities & Infrastructure Systems	Local Evacuation Route (County)	Primary highway for entering/leaving the City of Cape May. This County-owned road runs the entire length of the City (approximately 2miles) along the northern boundary. This highway starts on the eastern end at the base of the Schellengers Landing Bridge and its western terminus is at the boundary line of West Cape May and Cape May Point.	NA	0-4	No impact from sea level rise. May see several feet of inundation on the roadway in northeast area of the street.	Lafayette Street is the street leading to Schellengers Landing Bridge. The roadway would be inundated making the road impassable. The roadway itself would suffer little to no damage.	NA	Low	The roadway leads to one of only three ways in and out of Cape May City. When the roadway is impassable it eliminates potential evacuation routes, ingress and egress for emergency services, and affects recovery operations.	NA	High
Lafayette Street Park	Natural Assets & Ecosystems	Open Space, Recreation, Evacuation Support Area	This 38-acre active and passive recreational park with environmental and educational amenities fronts along the 700 to 900 blocks of Lafayette Street (Bounded by St. John Street, Madison Avenue, Lafayette Street, and the Cape Island Creek. This site provides a medevac helicopter landing zone, remote parking on higher ground during major storms and flooding, and is adjacent to Cape May City Elementary School which is being qualified as a "warming center" during storms/emergencies.	NA	0-2	No impact from sea level rise. May see minor inundation on the edges of the park along the wetlands during a CAT1 event.	Little to no impacts to the park.	NA	Insignificant	None	NA	Insignificant
Madison & Beach Avenue Pump Station	Critical Facilities & Infrastructure Systems	Stormwater Pump (County)	Elevated control and have back flow prevention on all the structures.	NA	0.5-4	No impact from sea level rise. May see several feet of inundation around the pump during a CAT 1 event.	Inundation from a major storm event can overwhelm the pump causing to malfunction and quit working. The pump also does not have a backup generator and if power fails, the pump will also fail. The pumps location to the beach also makes it susceptible to sand inundation, causing failure as well.	NA	High	Failure of the pump station results in increased flooding to nearby streets and neighborhoods. The pump will be unable to pump storm water out of the area which may increase the time flood water spends within the city, increasing potential damage. Sand clean out may delay the pumps ability to work again, leaving the city vulnerable to further immediate inundation from new storm events. The control panel may need to be replaced and the generator elevated, which will cause a financial burden on the city, especially if multiple pump stations need to be replaced and elevated.	NA	High
Madison & Michigan Avenues Pump Station	Critical Facilities & Infrastructure Systems	Stormwater Pump (County)	Elevated control and have back flow prevention on all the structures.	NA	3.5-4.5	No impact from sea level rise. May see several feet of inundation around the pump during a CAT 1 event.	The pump station is elevated and has a backup generated. Little to no damage expected to the pump station.	NA	Insignificant	None	NA	Insignificant
Madison Avenue	Critical Facilities & Infrastructure Systems	Local Evacuation Route (County)	This County-owned highway runs north-south directionally and is situated at the mid-point of Cape May to connect Beach Avenue at its southern terminus with Washington and Lafayette Streets at its northern terminus.	NA	0.5-4.5	No impact from sea level rise. May see several feet of inundation during a CAT1 event.	The roadway would be inundated making the road impassable. The roadway itself would suffer little to no damage.	NA	Low	The roadway serves a large residential neighborhood. When the roadway is impassable it eliminates potential evacuation, ingress and egress for emergency services, and access to individual homes.	NA	High
Nature Center of Cape May	Natural Assets & Ecosystems	Marine and Environmental Education	This marine and environmental education center (with labs, access to the harbor waters, and a kayaking concession) is a City-owned facility which is leased on a long-term basis to the New Jersey Audubon Society for public programming purposes. Located on the Harborfront in the 1600 block of Delaware Avenue, this facility represents Cape May's commitment to sustaining the City's wide array of pristine environmental assets through public engagement, involvement, and education.	NA	2-4	No impacts from sea level rise. May see several feet of inundation during a CAT1 event.	The structure is elevated and would see little to no damages from a major storm event.	NA	Insignificant	None	NA	Insignificant
Ocean Front Beaches & Dunes	Natural Assets & Ecosystems	Shoreline Protection, Open Space, and Recreation	Stretching for 2.3 linear miles between the U.S. Coast Guard Base on the eastern boundary to westerly terminus at 9th Avenue (paper street), this strand is engineered and replenished periodically by means of a 50-year funding agreement among the USACE, NJDEP, and the City. Dunes run the entire distance of these beaches. This beachfront, along with the 2.0 linear miles of parallel rock jetty/promenade and intermittent perpendicular rock groins, constitutes a primary shoreline protection/hazard mitigation program for the City. The accompanying recreational bathing feature is the foundation of Cape May's international status as a premier tourist destination.	0-3	0-10	May several feet of inundation during high tide due to sea level rise. May see major inundation during a CAT1 event.	The ocean front beaches are under a management system and are being replenished under an Army Corps 50 year contract. The dunes are also under a management plan and are being planted and raised and allowing the city to build up the dune system. Sea level rise will continue to erode the beach and major storm events will continue to erode the beaches and cut into the dunes.	High	High	Continuously eroding beaches and dunes will require ever increasing replenishment and maintenance. The current Army Corps contract may not be able to meet the requirements of keeping the beach and dune intact to its current profile. A continuous loss of the beaches and dunes will leave the city to open to greater vulnerability from any storm event, the values of properties in the city may drop significantly, the tourism industry may decline, and the city will face major financial burdens.	High	High
Ocean Street	Critical Facilities & Infrastructure Systems	Local Evacuation Route (City)	Running parallel to Pittsburgh Avenue, Madison Avenue, and Broadway in a north-south directionality, this street is the main connector in the historic downtown area between Beach Avenue at its southern terminus and Washington and Lafayette Streets at its northern terminus. This is a City-owned street which is the eastern border of the three-block long Washington Street Mall which is a pedestrian-friendly commercial shopping district.	NA	0-4.3	No impact from sea level rise. May see several feet of inundation on roadway within southern sections of the street.	The roadway would be inundated making the road impassable. The roadway itself would suffer little to no damage.	NA	Low	The roadway serves a large residential neighborhood. When the roadway is impassable it eliminates potential evacuation, ingress and egress for emergency services, and access to individual homes.	NA	High
Patterson & Beach Avenues Pump Station	Critical Facilities & Infrastructure Systems	Stormwater Pump (County)	Elevated control and have back flow prevention on all the structures.	NA	2	No impact from sea level rise. May see a couple feet of inundation around the pump during a CAT 1 event.	Inundation from a major storm event can overwhelm the pump causing to malfunction and quit working. The pump also does not have a backup generator and if power fails, the pump will also fail. The pumps location to the beach also makes it susceptible to sand inundation, causing failure as well.	NA	High	Failure of the pump station results in increased flooding to nearby streets and neighborhoods. The pump will be unable to pump storm water out of the area which may increase the time flood water spends within the city, increasing potential damage. Sand clean out may delay the pumps ability to work again, leaving the city vulnerable to further immediate inundation from new storm events. The control panel may need to be replaced and the generator elevated, which will cause a financial burden on the city, especially if multiple pump stations need to be replaced and elevated.	NA	High
Pittsburgh Avenue	Critical Facilities & Infrastructure Systems	Local Evacuation Route (County)	This County-owned highway runs north-south directionally and is the primary artery for inbound/outbound vehicles frequenting the eastern sector of the city. At its southern terminus, this road intersects with Beach Avenue which is the main east/west therefore along the entire 2.3 mile City beachfront. The northern terminus ends at Texas Avenue.	NA	0-4	No impact from sea level rise. May see several feet of inundation during a CAT1 event.	Pittsburgh Avenue is a street leading to Schellengers Landing Bridge, and serves a large number of residential homes. The roadway would be inundated making the road impassable. The roadway itself would suffer little to no damage.	NA	Low	The roadway leads to one of only three ways in and out of Cape May City. When the roadway is impassable it eliminates potential evacuation routes, ingress and egress for emergency services, and affects recovery operations. The inundation would also limit access into and out of a large residential area.	NA	High
PNC Bank	Community Resources & Amenities	Bank	One of three banks located in the City of Cape May. The banks are important during emergency events because they stay open and provide access to cash for residents and visitors that may not otherwise have any access to money during emergencies when having cash is important to immediate and long-term recovery.	NA	0-2	No impact from sea level rise. May see minimal inundation during a CAT1 event.	Only the parking area would be inundated. The building is elevated and could still be accessed.	NA	Insignificant	None	NA	Insignificant

Riggins Service Station	Community Resources & Amenities	Gas Station	Riggins Service Station is the only gas station located within the city. The gas station is important as it's the only nearby source of fuel during and emergency event.	NA	2.5-4	No impact from sea level rise. May see several feet of inundation during a CAT1 event.	The structures and fuel infrastructure would experience substantial damage or even complete destruction. The fuel tanks underground were recently replaced and would remain sealed.	NA	High	The gas station is the only service station within the city. Its loss or damage will inconvenience local residents, however other service stations are located nearby in other communities.	NA	Low
Rock Jetty Seawall	Critical Facilities & Infrastructure Systems	Hazard Mitigation	2 miles of rock jetty seawall on beachfront along Beach Avenue: From New Jersey and Wilmington Avenue on the east to Beach and Third Avenues on the west.	NA	1.5-5	No impact from sea level rise. May see several feet of inundation during a CAT1 event. Impacts from CAT1 may be seen from both the ocean front side and the Beach Avenue side of the seawall.	The rock jetty sea wall will experience little to no damage to the rock jetty itself. The structure is further bolstered by the dunes that are building up in front of the rock jetty.	NA	Low	The rock jetty can only hold back a certain storm surge height, but if waves exceed the height, the area behind the rock jetty will flood.	NA	Low
Rotary Park	Natural Assets & Ecosystems	Open Space, Recreation, and Economic Development	This newly-renovated, multi-purpose, Center City niche park is bounded by Lafayette Street, Jackson Street, Lyle Lane, and Decatur Street. This passive recreation/entertainment plaza provides cultural, artistic, historical, musical, recreational, and community events on a year round basis for residents and visitors alike. This park provides a seamless transition from the adjacent commercial shopping district on the Washington Street Mall to the secondary commercial, dining, artistic, and remote parking district north of Lafayette Street.	NA	NA	No impact from sea level rise. No impact from a CAT1 event.	None	NA	NA	None	NA	NA
Rutgers University Aquaculture and Fisheries Center	Natural Assets & Ecosystems	Marine Research and Education	This research and educational center (with labs and dormitories) is a City-owned facility which is leased on a long-term basis to Rutgers University to support aquaculture and fisheries studies. Located on the Harborfront at 1600 Delaware Avenue, the facility provides a strong working relationship with the commercial fishing industry which is the third prong in Cape May's economy.	NA	0-2	No impacts from sea level rise. May see minor inundation surrounding the building and the roadways. No impact seen to the building itself.	The structure is elevated and would see little to no damages from a major storm event.	NA	Insignificant	None	NA	Insignificant
Schellengers Landing Bridge	Critical Facilities & Infrastructure Systems	Bridge (County)	Schellengers Landing Bridge on NJ Route 109 serves as the main (and northern) means of ingress and egress for the City of Cape May. This is the main connector to NJ Route 109 and Exit 0 (southern terminus) of the Garden State Parkway. This bridge is owned by Cape May County.	NA	0-3	No impact from sea level rise. May see a couple feet of inundation on either side of the bridge during a CAT1 event.	The roadway on either side of the bridge would be inundated making the bridge impassable. The pilings on the bridge were recently restored and the bridge would likely suffer little to no damage during a major storm event.	NA	Low	The bridge is one of only three ways in and out of Cape May City. When the bridge is impassable it eliminates potential evacuation routes, ingress and egress for emergency services, and affects recovery operations.	NA	High
Sewell Point Tract	Districts, Neighborhoods, & Population Clusters	Open Space & Development Site	The Sewell Point Tract consists of approximately 100 acres of wildlife habitat which is primarily wetlands. The site is currently under several decades of litigation regarding habitat and wetlands designation, should the litigation ever come to a settlement, the site could be developed for new residents.	NA	0-5	No impact from sea level rise. May see several feet of inundation during a CAT1 event.	The area currently a wildlife tract and would see little to no damage from inundation. However, if the certain areas of the tract were developed in the future the area may see inundation and any building would need to built above base flood elevation.	NA	Insignificant	None	NA	Insignificant
Sturdy Savings Bank	Community Resources & Amenities	Bank	One of three banks located in the City of Cape May. The banks are important during emergency events because they stay open and provide access to cash for residents and visitors that may not otherwise have any access to money during emergencies when having cash is important to immediate and long-term recovery.	NA	NA	No impact from sea level rise. No impact from a CAT1 event.	None	NA	NA	None	NA	NA
Swain's ACE Hardware	Community Resources & Amenities	Retail Store	Family run and operated hardware store. The store is an important business during emergencies, as the store can readily provide supplies and equipment for recovery operations for both the city and the residents.	NA	2-4.5	No impact from sea level rise. May see several feet of inundation during a CAT1 event.	The building is not elevated and in a low-lying area. Prior to a storm event they try to remove inventory either upstairs or other locations. The building may experience substantial damage from a major storm event and may even lose inventory if not moved prior to.	NA	Moderate	The community, residents and emergency personnel, relies heavily on the hardware store during and after storm events. The store is the only nearby business with access to supplies and equipment necessary for immediate repair and recovery operations. Damage to the building and loss of inventory could delay recovery operations for an extended period of time. A temporary closure will also harm the small, family business who will suffer major financial setback.	NA	High
Texas Avenue	Critical Facilities & Infrastructure Systems	Local Evacuation Route (County)	This County-owned, three-block, commercially-oriented avenue is the connector between Washington Street and Pittsburgh Avenue to provide access inbound/outbound for vehicles frequenting the Easter sector of the City.	NA	2-4.5	No impact from sea level rise. May see several feet of inundation during a CAT1 event.	Texas Avenue ties into Washington street which leads to Schellengers Landing Bridge. The roadway would be inundated making the road impassable. The roadway itself would suffer little to no damage. Tied right into Washington street. 3 blocks long and two blocks are the link between the beach and bridge. 2ndary commercial area, Wawa, dry cleaners and pizza place. Gas station in this area.	NA	Low	The roadway leads to one of only three ways in and out of Cape May City. When the roadway is impassable it eliminates potential evacuation routes, ingress and egress for emergency services, and affects recovery operations. The inundation would also limit access to the only gas station in the city and few businesses.	NA	High
Texas Avenue & Schellengers Landing Business District	Districts, Neighborhoods, & Population Clusters	Business District	A strip mall with a Wawa market, and a few other businesses.	0-2	1.5-6	May see minor inundation during high tide along the low-lying areas of the waterfront due to sea level rise. May see major inundation during a CAT1 event.	The area consists of many older businesses and homes which are not elevated and may experience substantial damage during a major storm event. A few structures are elevated and would not experience damage. Businesses inventories would be destroyed, and would not be able to operate. The entire district is the area leading up to Schellengers Landing Bridge and would inundated making the area impassable. Unbulked areas behind WAWA may experience minor and continued erosion at high tide due to sea level rise.	Insignificant	High	The area is one of only three ways in and out of Cape May City. When the area is impassable it eliminates potential evacuation routes, ingress and egress for emergency services, and affects recovery operations. Loss of businesses and structures may mean a permanent loss to the community or long term recovery requirements. Substantial damage may deter business owners from rebuilding or returning to the area. The same is true of home owners found within the district.	Insignificant	High
U.S. Post Office	Community Resources & Amenities	Civic	This Federal facility was constructed in 1938 in the downtown historic district at the intersection of Washington and Franklin Streets (just across the street from the City's Municipal Complex). This property is not and is not required to be ADA compliant, but it does provide full postal services for all residents, businesses, and visitors in Cape May, West Cape May, and portions of Lower Township. Most of these geographic areas receive foot or vehicular mail delivery six days per week by USPS letter carriers based at the Cape May Post Office.	NA	0-2	No impact from sea level rise. May see minimal inundation on the road ways and parking lot surrounding the building during a CAT1 event.	Only the parking area would be inundated. The building is elevated and could still be accessed.	NA	Insignificant	None	NA	Insignificant
United States Coast Guard Training Center Cape May	Critical Facilities & Infrastructure Systems	Federal Facility	This facility has a 500,000 gallon water tank.	NA	0-3	No impact from sea level rise. May see a couple of feet of inundation during a CAT1 event. Inundation includes a few building areas in the northern area and open space to east.	A few buildings may see inundation but little to no damage is expected. There may be minor damage to piers and boats. The Coast Guard are building and reinforcing a berm along the coast line of the base. The Coast Guard personnel on the base are evacuated prior to major storm events.	NA	Low	Minimal damage to the piers and boats may delay the search and rescue and recovery abilities of the Coast Guard to respond to a major storm event.	NA	Low
Victorian Towers Senior Citizens Apartment Complex	Districts, Neighborhoods, & Population Clusters	Vulnerable Population (Seniors)	A senior citizen apartment complex with a capacity to house 280 residents. The apartments are currently half full, housing approximately 175 residents.	NA	NA	No impact from sea level rise. No impact from a CAT1 event.	None	NA	NA	None	NA	NA
Washington Street	Critical Facilities & Infrastructure Systems	Local Evacuation Route (City)	Running parallel to Lafayette Street and one block south, this City-owned road is the second busiest means of entering/leaving the City. Secondary City streets intersect with/feed into this road's western terminus in the downtown area and its eastern terminus is at the base of the Schellengers Landing Bridge.	NA	0-5	No impact from sea level rise. May see several feet of inundation on the roadway in northeast area of the street.	Washington Street is one of the streets leading to Schellengers Landing Bridge. The roadway currently experiences inundation during high tide where it runs through the lower elevation areas of the city and where stormwater infrastructure back flows onto the roadway. The inundation during high tides and the combination of the stormwater issues are causing the land underneath the roadway to be undermined. During a major storm event the roadway would be inundated making the road impassable.	Moderate	Moderate	Increasing high tides due to sea level rise may lead to increased undermining of the roadway, requiring more frequent repair and increasing maintenance costs. The roadway leads to one of only three ways in and out of Cape May City. When the roadway is impassable it eliminates potential evacuation routes, ingress and egress for emergency services, and affects recovery operations.	Moderate	High
Washington Street Mall Business District	Districts, Neighborhoods, & Population Clusters	Business District	Three blocks on Washington Street converted from vehicular streets to a pedestrian walking mall. The walking mall includes boutique shops and restaurants open year round. Apartments are located above the stores and restaurants providing living space for store owners and staff. The area has become a hot spot for the younger generation's night life.	NA	NA	No impact from sea level rise. No impact from a CAT1 event.	None	NA	NA	None	NA	NA
WAWA Market	Community Resources & Amenities	Foodmart	A standard Wawa market, does not provide fuel. The market is important during emergencies, as the market provides food and supplies to emergency service providers.	NA	0-4	No impact from sea level rise. May see several feet of inundation during a CAT1 event.	The WAWA is elevated and would suffer little to no damage during a major storm event. The market is one of the few places in the city which remains open during and immediately after storm events.	NA	Insignificant	Minor damage may result in a temporary closure of the WAWA which would inconvenience residents and emergency personnel working on recovery.	NA	Low
Wilmington Avenue Pump Station	Critical Facilities & Infrastructure Systems	Stormwater Pump (County)	Elevated control and have back flow prevention on all the structures.	NA	0-2	No impact from sea level rise. May see a couple feet of inundation around the pump during a CAT 1 event.	Inundation from a major storm event can overwhelm the pump causing to malfunction and quit working. The pump also does not have a backup generator and if power fails, the pump will also fail.	NA	Moderate	Failure of the pump station results in increased flooding to nearby streets and neighborhoods. The pump will be unable to pump storm water out of the area which may increase the time flood water spends within the city, increasing potential damage. The control panel may need to be replaced and the generator elevated, which will cause a financial burden on the city, especially if multiple pump stations need to be replaced and elevated.	NA	High

Appendix B – Vulnerability Rating Key

Vulnerability Rating Key	
Level	Vulnerability Rating Given Hazard Exposure and Sensitivity
Insignificant	<p><i>Exposure to Flooding:</i> This community asset is located out of harm's way.</p> <p><i>Physical/Structural Damage:</i> No physical/structural damages expected.</p> <p><i>Disruption/Impairment:</i> No disruption in function, accessibility, or development and delivery of basic services and supplies. No apparent impacts to services provided by, typical operations, routine or daily life.</p> <p><i>Accessibility:</i> Key staff able to access facilities or locations without interruption.</p>
Low	<p><i>Exposure to Flooding:</i> The majority of this community asset is located out of harm's way.</p> <p><i>Physical/Structural Damage:</i> Minor physical/structural damages expected.</p> <p><i>Disruption/Impairment:</i> Limited disruption in function, accessibility, or development and delivery of basic services and supplies. Limited impacts to typical operations, routine or daily life, if any.</p> <p><i>Accessibility:</i> Key staff able to access facilities or locations with minimal interruption.</p>
Moderate	<p><i>Exposure to Flooding:</i> A significant portion of this community asset is located in harm's way.</p> <p><i>Physical/Structural Damage:</i> Moderate physical/structural damages sustained.</p> <p><i>Disruption/Impairment:</i> Moderate level of disruption to accessibility or mobility of asset, amenity or population. Moderate level of interruptions to development and delivery of basic services and supplies. Typical operations, routine or daily life moderately affected by flood hazard scenario.</p> <p><i>Accessibility:</i> Secondary evacuation and access routes available for use if/when primary systems fail.</p>
High	<p><i>Exposure to Flooding:</i> The majority of this community asset is located in harm's way.</p> <p><i>Physical/Structural Damage:</i> Severe level of harm (destruction on property or degradation of function and/or injury) is expected, resulting in a high degree of loss. Asset, amenity or population is unable to withstand flood impacts.</p> <p><i>Disruption/Impairment:</i> Severe, potentially irreparable challenges faced requiring significant changes to asset functioning, community's daily life or "new normal." Production, provision of services or daily routine expected to sustain high degree of disruption. Significantly reduced operational capacity of community assets and amenities; long term or permanent relocation of asset, amenity or population.</p> <p><i>Accessibility:</i> Severe disruptions to accessibility of asset, amenity or population or the disruption of this assets causes accessibility issues to other community assets. Key individuals, material supplies, core operating systems and functioning interrupted or unavailable.</p>

Appendix C – Consequences Rating Key

Consequences Rating Key	
Level	Given Vulnerability of Assets, Rate the Magnitude or Severity of Consequences
1	<p style="margin: 0;"><i>Property Damages:</i> Only minor property damage.</p> <p style="margin: 0;"><i>Typical Operations/Daily Life:</i> No impacts or disruptions to typical operations, routine or daily life.</p> <p style="margin: 0;"><i>Environment:</i> No lasting environmental degradation.</p> <p style="margin: 0;"><i>Emergency Response:</i> No adverse effects to emergency response.</p> <p style="margin: 0;"><i>Hazardous Materials:</i> No increase or change in community/ecosystem exposure to toxics or hazardous materials.</p> <p style="margin: 0;"><i>Municipal Budget:</i> Negligible operational costs.</p>
2	<p style="margin: 0;"><i>Property Damages:</i> Limited property in narrow affected area damaged or destroyed.</p> <p style="margin: 0;"><i>Typical Operations/Daily Life:</i> Limited disruption to typical operations, routine or daily life.</p> <p style="margin: 0;"><i>Environment:</i> Minor damage or loss to habitat and species or functioning of the systems as a component of “coastal green infrastructure” of the community. Small loss of natural resource base. Increased, but tolerable stress on ecosystem.</p> <p style="margin: 0;"><i>Emergency Response:</i> Slight decrease in emergency response times and effectiveness</p> <p style="margin: 0;"><i>Hazardous Materials:</i> Limited hazardous materials spill, manageable clean-up and remediation.</p> <p style="margin: 0;"><i>Municipal Budget:</i> Additional but tolerable operational costs.</p>
3	<p style="margin: 0;"><i>Property Damages:</i> Substantial property in affected area damaged or destroyed.</p> <p style="margin: 0;"><i>Population Displacement:</i> Long-term population displacement over a broader segment of the population.</p> <p style="margin: 0;"><i>Typical Operations/Daily Life:</i> Daily life is affected such that only redundant systems can be used for an extended duration.</p> <p style="margin: 0;"><i>Environment:</i> Major damage or loss of habitat or functioning of the systems as a component of “coastal green infrastructure” of the community that may be permanent with adverse impacts.</p> <p style="margin: 0;"><i>Emergency Response:</i> Emergency response is strained resulting in significant degradation of response effectiveness and times.</p> <p style="margin: 0;"><i>Hazardous Materials:</i> Large hazardous material spill with significant risk to humans and ecosystems.</p> <p style="margin: 0;"><i>Municipal Budget:</i> High operational costs straining local budgets</p>
4	<p style="margin: 0;"><i>Property Damages:</i> Majority of property in affected area damaged or destroyed</p> <p style="margin: 0;"><i>Population Displacement:</i> Permanent and widespread population displacement.</p> <p style="margin: 0;"><i>Delivery of Services:</i> Long-term interruption of supply and services.</p> <p style="margin: 0;"><i>Typical Operations/Daily Life:</i> Majority of community operations, daily life patterns intensely impacted for an extended period.</p> <p style="margin: 0;"><i>Environment:</i> Permanent degradation of habitat or functioning of the systems as a component of “coastal green infrastructure” of the community.</p> <p style="margin: 0;"><i>Emergency Response:</i> Need for emergency services exceeds full capacity and/or services are degraded and not functioning.</p> <p style="margin: 0;"><i>Hazardous Materials:</i> Hazardous material spill that requires multi-year clean-up and poses significant health or ecosystem risk.</p>

Appendix D – Municipal CVA Committee

Municipal CVA Committee

Cape May City convened a diverse group of municipal representatives and community leaders to participate in the CVA process facilitated by Sustainable Jersey. The meetings were held on March 16th, April 13th, and April 27th, 2016 at the Cape May Convention Center. The meeting attendees are shown below.

Participant	Title	Affiliation
Ed Mahaney	Mayor	City of Cape May
Richard Lundholm	Deputy Fire Chief	Cape May Fire Department
Joseph Picard	Public Works Superintendent	Cape May Public Works
Terri Swain	Council Member / Business Owner	Swain Hardware Store
Louis Belasco	Tax Assessor	City of Cape May
Edie Kopsitz	Technical Assistant	Cape May Construction Office
Craig Hurless	Engineer / Planner	Cape May Planning Board
Len Benstead	Public Works	Cape May Public Works
Tom Heist	Insurance Agent	Tom Heist Insurance Agency
Jenna Gato	Community Resiliency Specialist	JCNERR
Bill Purdie	Planner	NJ DEP
Rick Brown	Planner	NJ DEP
Jack Heide	Resiliency Manager	Sustainable Jersey
Emma Melvin	Green Infrastructure Coordinator	Sustainable Jersey

Appendix E – Cape May City Coastal Vulnerability Assessment Maps

Table of Maps

Map 1. City of Cape May City Community Assets

Map 2. City of Cape May City (North) Community Assets

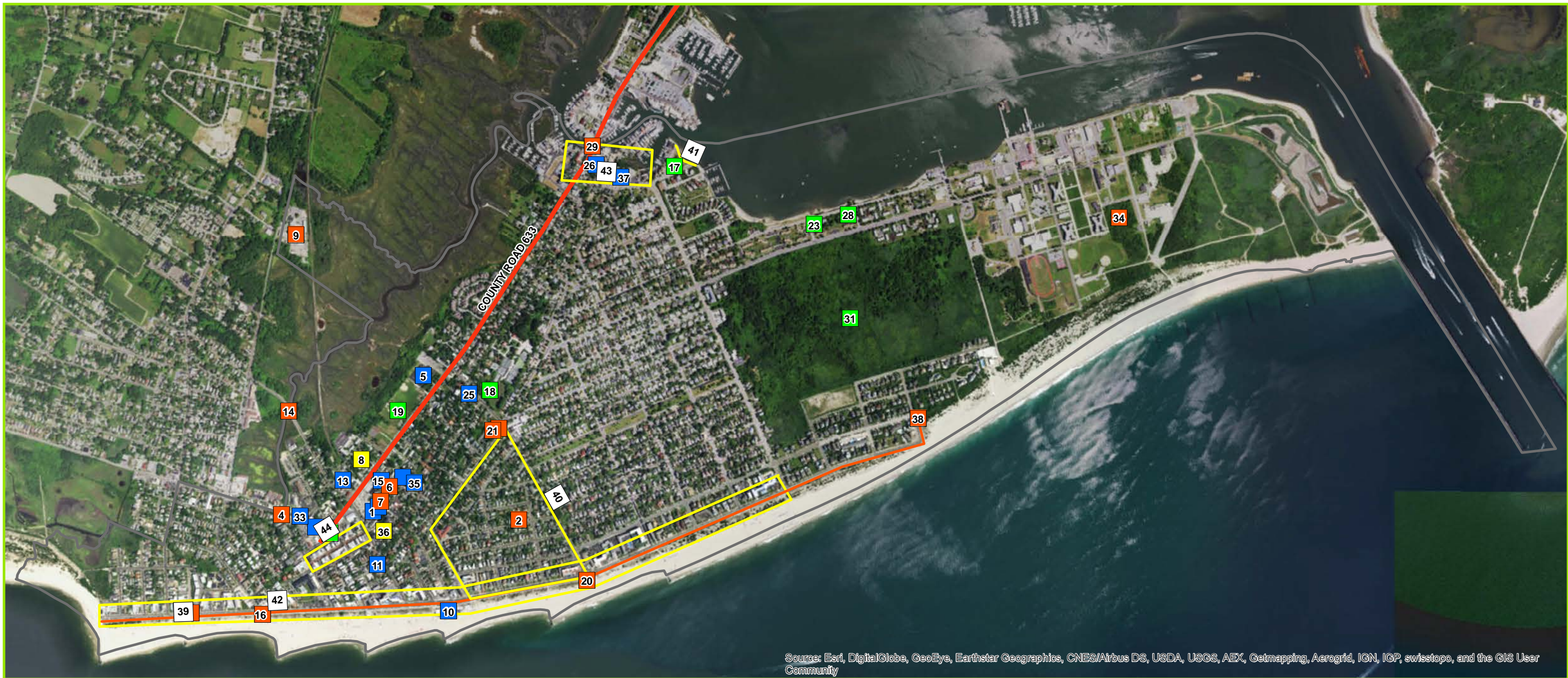
Map 3. City of Cape May City (South) Community Assets

Map 4. City of Cape May City (North) 2050 Sea Level Rise

Map 5. City of Cape May City (South) 2050 Sea Level Rise

Map 6. City of Cape May City (North) 2050 CAT1 Hurricane

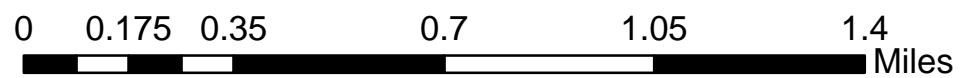
Map 7. City of Cape May City (South) 2050 CAT1 Hurricane



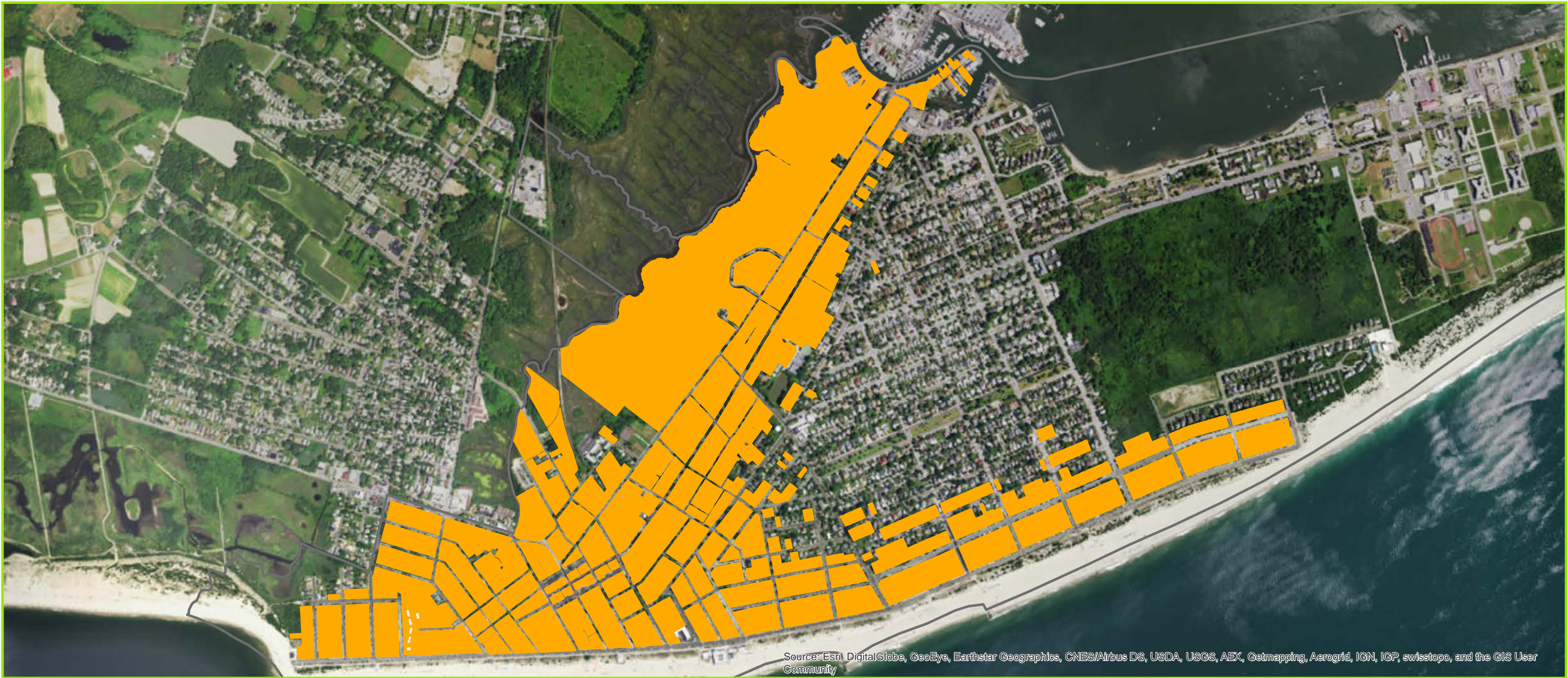
City of Cape May Coastal Vulnerability Assessment

Community Assets

- Municipal Boundary
 - Evacuation Route
- Asset Categories**
- Community Resources & Amenities
 - Critical Facilities & Infrastructure Systems
 - Districts, Neighborhoods, & Population Clusters
 - Natural Resources & Ecosystems
- Community Assets**
- | | | | |
|---|---|--------------------------------------|--|
| 1, ACME Market | 15, Franklin Steet Civic Center | 29, Schellengers Landing Bridge | 35, U.S. Post Office |
| 2, Benton Avenue Pump Station | 16, Grant Street & Beach Avenue Pump Station | 30, Schellengers Landing Bridge | 36, Victorian Towers Senior Citizens Apartment Complex |
| 3, Cape Bank | 17, Harborview Park | 31, Sewell Point Tract | 37, Wawa Market |
| 4, Cape Island Creek Slouse Gate | 18, Kiwanis Park | 32, Sturdy Savings Bank | 38, Wilmington Avenue Pump Station |
| 5, Cape May City Elementary School | 19, Lafayette Street Park | 33, Swain's ACE Hardware | District Assets |
| 6, Cape May City Fire Department & OEM | 20, Madison & Beach Avenue Pump Station | 34, U.S. Coast Guard Training Center | 39, Beachfront District |
| 7, Cape May City Hall & Police Department | 21, Madison & Michigan Avenue Pump Station | | 40, Froggy Hollow |
| 8, Cape May City Housing Authority | 22, Madison Avenue Water Tank | | 41, Harborview Bulkhead |
| 9, Cape May City Public Works Complex | 23, Nature Center of Cape May | | 42, Rock Jetty Seawall |
| 10, Cape May Convention Center | 24, Patterson & Beach Avenue Pump Station | | 43, Schellengers Landing Business District |
| 11, Cape May County Library | 25, PNC Bank | | 44, Washington Street Mall Business District |
| 12, Cape May United Methodist Church | 26, Riggins Service Station | | |
| 13, City of Cape May Welcome Center | 27, Rotary Park | | |
| 14, Elmir Street Bridge | 28, Rutgers University Aquaculture & Fisheries Center | | |





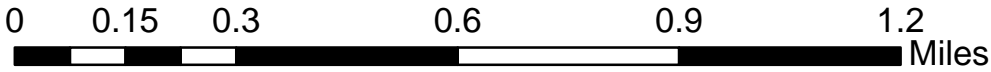
Prepared by Sustainable Jersey
for the City of Cape May, August 2016



City of Cape May Coastal Vulnerability Assessment

Historic Properties

-  Municipal Boundary
-  Historic Properties



Prepared by Sustainable Jersey
for the City of Cape May, August 2016



City of Cape May (Central) Coastal Vulnerability Assessment

Community Assets

- Municipal Boundary
- Local Roads
- Evacuation Route

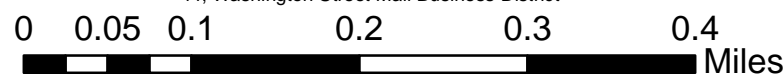
- Asset Categories**
- Community Resources & Amenities
 - Critical Facilities & Infrastructure Systems
 - Districts, Neighborhoods, & Population Clusters
 - Natural Resources & Ecosystems

- Community Assets**
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 - 3, Cape Bank
 - 4, Cape Island Creek Slouse Gate
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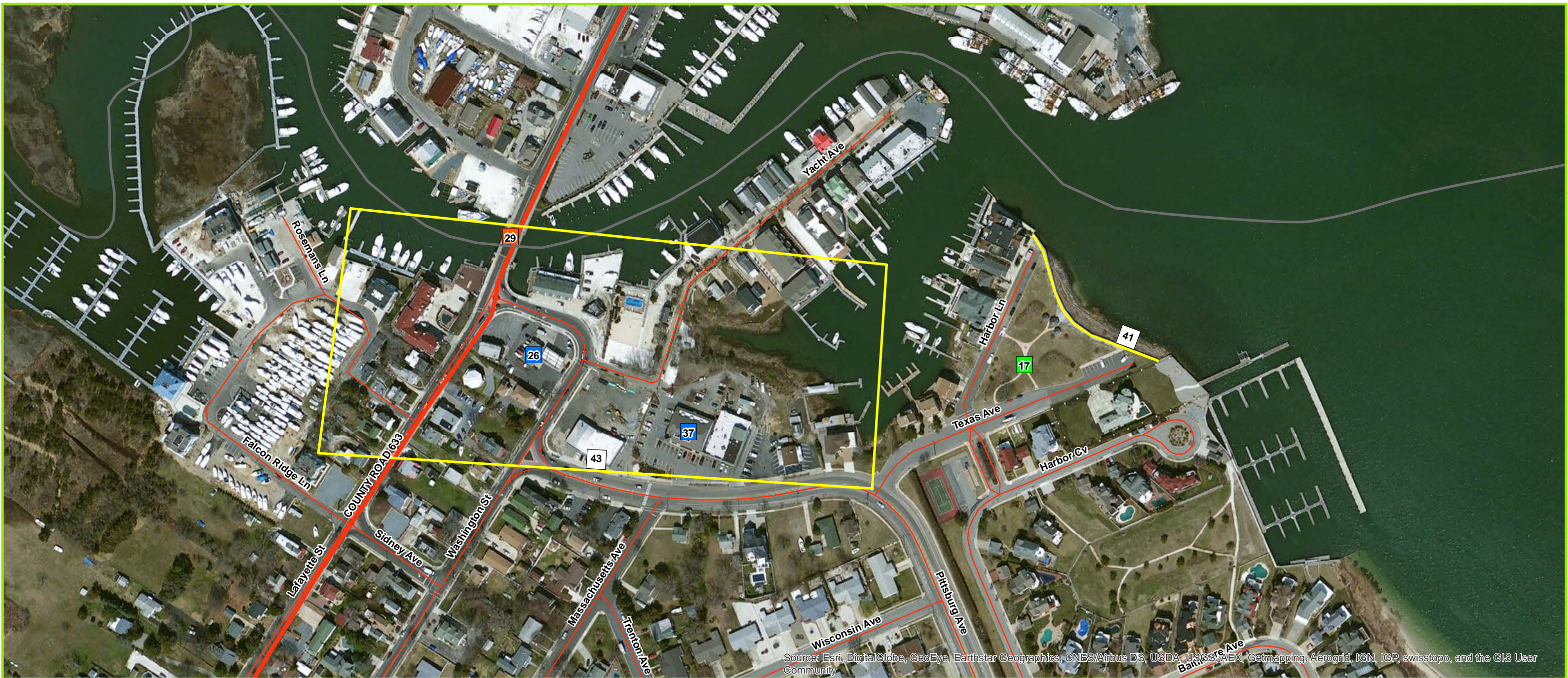
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- District Assets**
- 39, Beachfront District
 - 40, Froggy Hollow
 - 41, Harborview Bulkhead
 - 42, Rock Jetty Seawall
 - 43, Schellengers Landing Business District
 - 44, Washington Street Mall Business District



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for the City of Cape May, August 2016



City of Cape May (North) Coastal Vulnerability Assessment

Community Assets

- Municipal Boundary
- Local Roads
- Evacuation Route

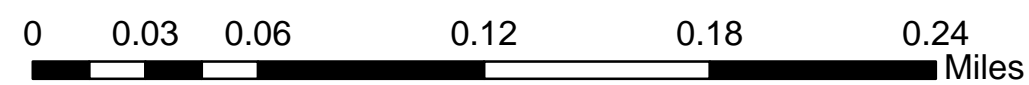
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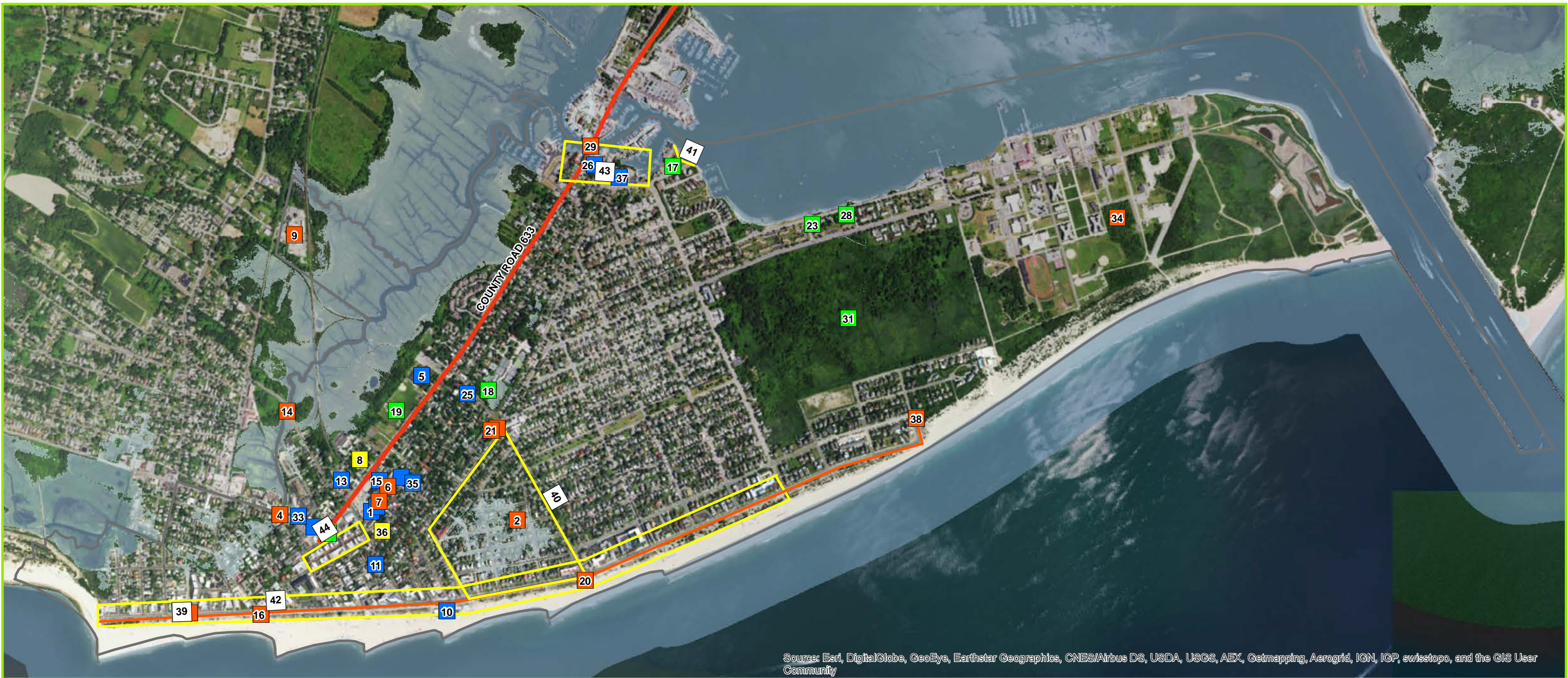
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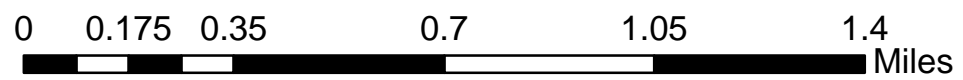
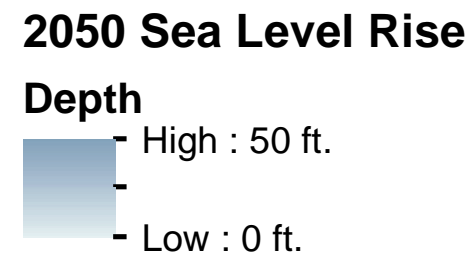


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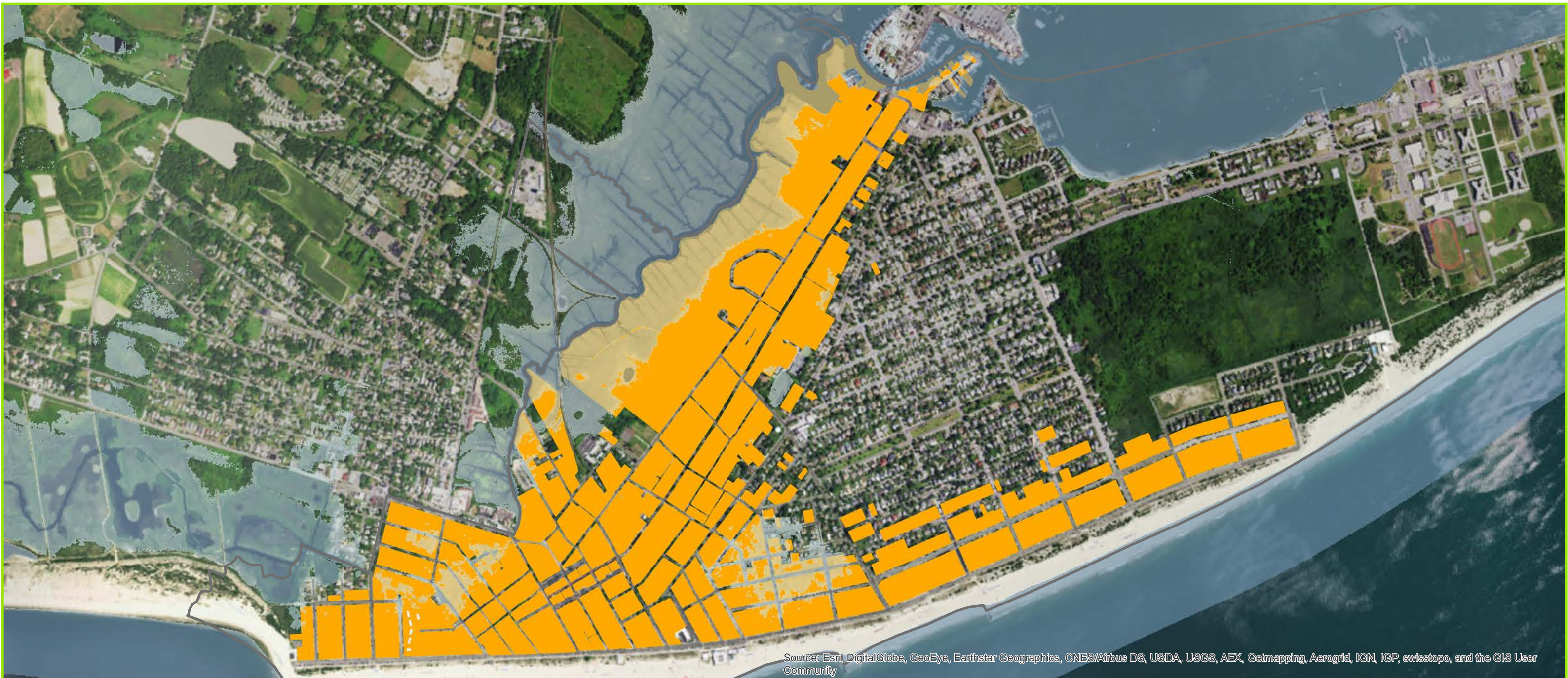


City of Cape May Coastal Vulnerability Assessment 2050 Sea Level Rise

- | | | | | |
|--|--|---|---|---|
| Municipal Boundary | Evacuation Route | Asset Categories | Community Assets | District Assets |
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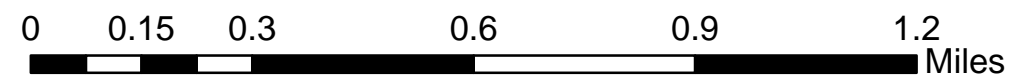
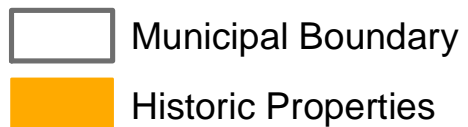
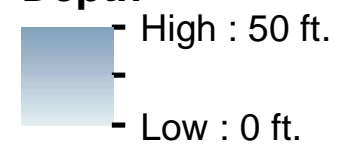
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

City of Cape May Coastal Vulnerability Assessment

Historic Properties w/ 2050 Sea Level Rise

2050 Sea Level Rise

Depth



Prepared by Sustainable Jersey
for the City of Cape May, August 2016



City of Cape May (Central) Coastal Vulnerability Assessment 2050 Sea Level Rise

- Municipal Boundary
- Local Roads
- Evacuation Route
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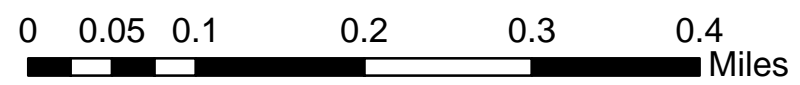
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2050 Sea Level Rise
Depth

 High : 50 ft.
 Low : 0 ft.

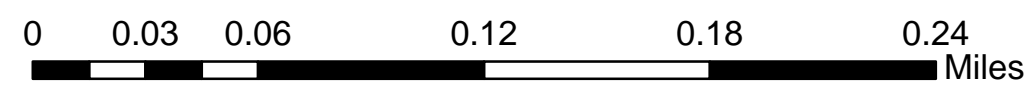
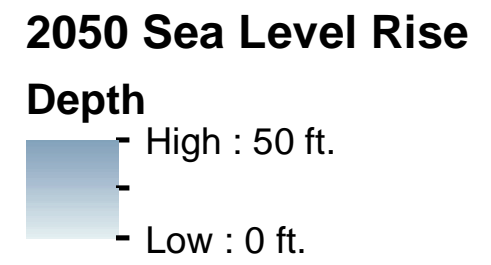


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City of Cape May (North) Coastal Vulnerability Assessment 2050 Sea Level Rise

- | | | | |
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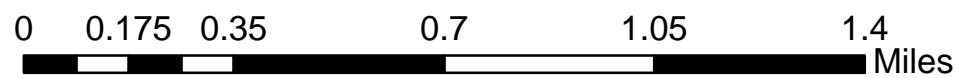
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for the City of Cape May, August 2016**



City of Cape May Coastal Vulnerability Assessment 2050 CAT1 Hurricane

- | | | | | |
|--|--|---|---|--|
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2050 CAT1 Hurricane
Depth
High : 60 ft.
Low : 0 ft.



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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

City of Cape May Coastal Vulnerability Assessment

Historic Properties w/ 2050 CAT1 Hurricane

2050 CAT1 Hurricane

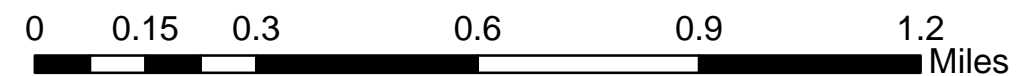
Depth

- High : 60 ft.

- Low : 0 ft.

 Municipal Boundary

 Historic Properties



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City of Cape May (Central) Coastal Vulnerability Assessment

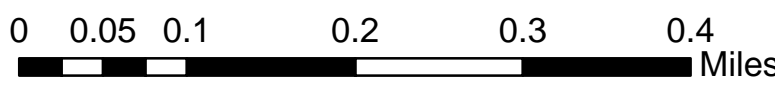
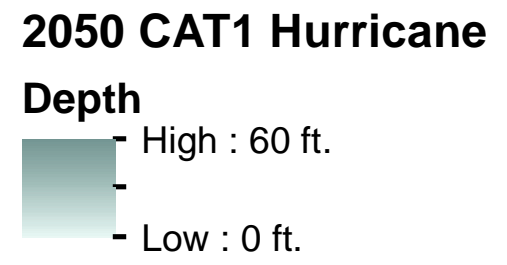
2050 CAT1 Hurricane

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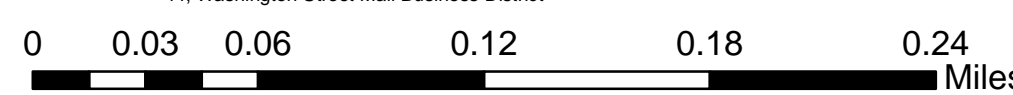
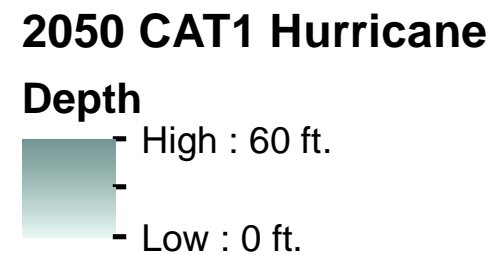


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City of Cape May (North) Coastal Vulnerability Assessment 2050 CAT1 Hurricane

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