



Township of Elsinboro

Municipal Coastal Vulnerability Assessment

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Prepared by Sustainable Jersey
for the Township of Elsinboro
619 Salem Fort Elfsborg Road
Elsinboro, NJ 08079



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Township of Elsinboro 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

Elsinboro is a historic Delaware Bay community located on the banks of the Delaware and Salem Rivers in western Salem County. Elsinboro is the site of the First English Settlement in New Jersey-1641. Elsinboro Township borders Lower Alloways Creek Township, Pennsville Township and the City of Salem. Elsinboro Township is comprised of over 13 square miles of land, much of which is comprised of wetlands and agriculture. Elsinboro Township has a population of 1,036 persons. The municipality's population trend over the last decade can be seen as an average -0.51% decrease in population each year (- 5.1% over ten years), according to the most recent (2010) U.S. Census data.

Future Flooding

Elsinboro 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 Philadelphia tide gauge station in Philadelphia, PA. 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/>)

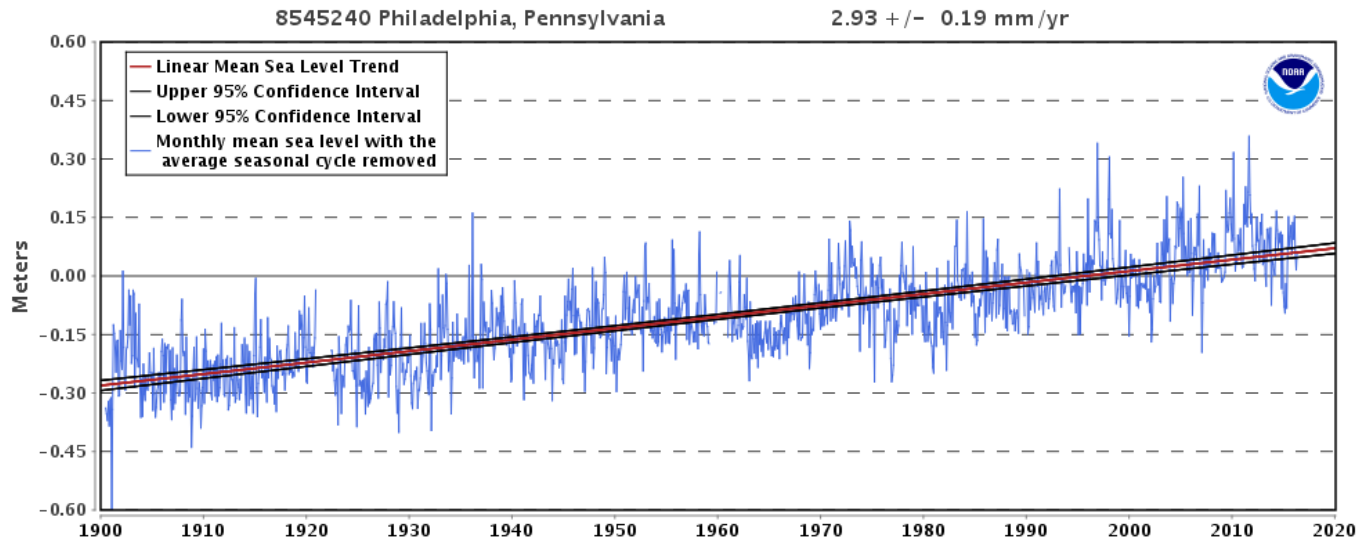


Figure 1. Mean Sea Level Trend at Philadelphia, PA (NOAA, 2015)

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

Elsinboro identified 33 assets to be included in the vulnerability and consequences assessment, only those assets shown to be impacted by sea level rise and/or a Category 1 Hurricane in 2050 (29 assets in total) 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, several of Elsinboro's neighborhoods (South Oakwood Beach, North Oakwood Beach, The Cove, and Tillbury) were assessed as a single assets. The homes throughout the neighborhoods are impacted by many of the same issues including ingress and egress, life safety, and nuisance flooding. The shared issues makes assessing all the structures individually an assessment burden.

The flood hazards scenarios used for this assessment were projected sea level rise and hurricane category 1 storm surge for 2050, both provided by the NJ Department of Environmental Protection. The sea level rise projections are based upon a 2013 study by New Jersey climate scientists,² and use 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. Since sea level rise is more likely to occur than a Category 1 hurricane, the Township 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

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.

latest technology and most readily available data, 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. Elsinboro Coastal Vulnerability Assessment Matrix Summary						
Asset Name	Asset Category	Asset Function	Vulnerability Rating		Consequences Rating	
			Sea Level Rise	CAT1 Hurricane	Sea Level Rise	CAT1 Hurricane
Abbott's Farm Dyke	Critical Facilities & Infrastructure Systems	A dyke system used to control water levels and protect properties in the wetlands complex to the North of the dyke.	Moderate	High	High	High
Abel Nicholson House	Community Resources & Amenities	A historic farm house, currently unoccupied, and placed on the National Historic Register.	NA	Low	NA	Moderate
Beaches	Natural Resources & Ecosystems	The beach along the Delaware River extending from the Southern end of South Oakwood Neighborhood and running north to the mouth of the Salem River.	High	High	High	High
Drenk Behavioral Center	Community Resources & Amenities	A treatment center that primarily focuses on mental health and substance abuse services.	High	High	Insignificant	Insignificant
Elsinboro Fire Company	Critical Facilities & Infrastructure Systems	The Fire Company provides emergency services, both firefighting and EMS, for the Township.	NA	High	NA	High
Elsinboro Municipal Building	Critical Facilities & Infrastructure Systems	The Elsinboro Municipal Building operates as the Elsinboro Township administrative building.	NA	Low	NA	Low
Elsinboro Point	Natural Resources & Ecosystems	A small public access area owned and operated by PSE&G.	Insignificant	Insignificant	NA	NA
Elsinboro School	Community Resources & Amenities	A public elementary school that serves students from Kindergarten through the 8th Grade.	NA	NA	NA	NA

Table 1. Elsinboro Coastal Vulnerability Assessment Matrix Summary Continued						
Asset Name	Asset Category	Asset Function	Vulnerability Rating		Consequences Rating	
			Sea Level Rise	CAT1 Hurricane	Sea Level Rise	CAT1 Hurricane
Fort Elfsborg-Salem Culvert	Critical Facilities & Infrastructure Systems	A county-owned and operated culvert located along Fort Elfsborg-Salem Road which helps control water levels in the wetlands complex to the South of Fort Elfsborg-Salem Road.	Moderate	High	Moderate	High
Fort Elfsborg-Salem Road (County Route 625)	Critical Facilities & Infrastructure Systems	A County-owned and maintained road that serves as one the major ingress and egress routes in Elsinboro.	High	High	High	High
Fort Elfsborg-Salem Road Bend	Critical Facilities & Infrastructure Systems	County road section that serves as the only ingress and egress for the South Oak Beach Neighborhood.	Low	Low	High	High
His & Hers Hair Salon	Community Resources & Amenities	A locally-owned hair salon operated out of a private residence.	High	High	Moderate	Moderate
Holladay's Auto Used Parts	Community Resources & Amenities	Holladay's is a locally-owned junk yard and auto salvage.	NA	Low	NA	Low
Kurt's Package Store	Community Resources & Amenities	A small, locally-owned business. Kurt's is the only liquor store and market located within Elsinboro.	High	High	Low	Low
Mason Point Dyke (Breached)	Critical Facilities & Infrastructure Systems	A breached dyke system. In the past it was used to control water levels and protect properties in the wetlands complex to the North of the dyke	Moderate	High	High	High
Money Island Observation Area	Natural Resources & Ecosystems	A small public access area owned and operated by PSE&G.	Moderate	High	Low	Low
North Oakwood Beach	Districts, Neighborhoods, & Population Clusters	A residential neighborhood running along Shad Roe Lane, Yerkes Lane, South Locust Avenue, and Bender Drive, and affronting the Delaware River.	Low	High	Low	High
Table 1. Elsinboro Coastal Vulnerability Assessment Matrix Summary Continued						

Asset Name	Asset Category	Asset Function	Vulnerability Rating		Consequences Rating	
			Sea Level Rise	CAT1 Hurricane	Sea Level Rise	CAT1 Hurricane
PSE&G Transmission Lines	Critical Facilities & Infrastructure Systems	Electrical power transmission lines.	Insignificant	Insignificant	NA	NA
Ross Fogg & Son's Oil Company	Community Resources & Amenities	A local oil company who provides home heating oil, gasoline, and kerosene within the Tri-County Area.	NA	NA	NA	NA
Salem Hancocks Bridge Road (County Route 658)	Critical Facilities & Infrastructure Systems	A County-owned and maintained road that serves as a local access road for area residents and businesses.	NA	Low	NA	Low
Seagraves's Steak & Submarine Shop	Community Resources & Amenities	A small, locally-owned business. Seagrave's is a subshop which serves mainly local residents.	NA	NA	NA	NA
Sinnickson Landing Boat Ramp	Natural Resources & Ecosystems	A small public access area owned and operated by PSE&G.	Insignificant	Low	NA	Low
Sinnickson Landing Road & Dyke	Critical Facilities & Infrastructure Systems	A County-owned and operated roadway. The roadway also operates as a dyke which helps control water levels in the wetlands complex to the East of Sinnickson Landing Road.	Moderate	High	Moderate	High
Sinnickson Landing Sluice Gate	Critical Facilities & Infrastructure Systems	A County-owned and operated sluice gate that helps maintain and control water levels entering the wetlands complex.	Moderate	High	Moderate	High
South Oakwood Beach	Districts, Neighborhoods, & Population Clusters	A residential neighborhood running along Fort Elfsborg-Salem Road and River Lane and affronting the Delaware River.	Low	High	Low	High
The Cove	Districts, Neighborhoods, & Population Clusters	A residential neighborhood running along Slape Avenue and affronting the Delaware River.	Low	High	Low	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 Elsinboro 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 township should also consider special outreach to residents, business owners, and property owners in the most vulnerable areas of Elsinboro. Educating these stakeholders about future flood vulnerabilities and working together to find solutions will protect Elsinboro 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 Elsinboro'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. Elsinboro 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 Elsinboro's Bay Shore 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 the wetlands of the Bay Shore. 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](#).

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 Township 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.

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 township 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

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.

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 inevitably 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: Elsinboro Township Coastal Vulnerability Matrix

Asset Name	Asset Category	Asset Function	2050 Depth Projections (feet)		Exposure	Sensitivity	2050 Vulnerability Rating		2050 Consequences Rating	
			Sea Level Rise	CAT1 Hurricane			Sea Level Rise	CAT1 Hurricane	Sea Level Rise	CAT1 Hurricane
Abbott's Farm Dyke	Critical Facilities & Infrastructure Systems	A dyke system used to control water levels and protect properties in the wetlands complex to the North of the dyke. The dyke has recently been repaired.	0-3	2-6.5	May see a couple feet of inundation during high tide due to sea level rise. May see major inundation during a CAT1 event.	Increasing high tides in the future will contribute to erosion of the dyke structure. Major storm events will increase erosion and major damage to the dyke structure.	Moderate	High	High	High
Abel Nicholson House	Community Resources & Amenities	A historic farm house, currently unoccupied, and placed on the National Historic Register.	NA	2-4	No impact from sea level rise. May see several feet of inundation during a CAT1 event.	The historic structure may suffer some structural damage during a major storm event and will remain standing. The historic society that maintains the home has limited funding and might be unable to even make minor repairs needed.	NA	Low	NA	Moderate
Beaches	Natural Resources & Ecosystems	The beach along the Delaware River extending from the Southern end of South Oakwood Neighborhood and running north to the mouth of the Salem River. The beach provides active and passive recreation for local residents, as well as mitigation from storm surge and flooding events. The beach was recently replenished by the US Army Corps, after nearly being eroded away completely through the years.	0-4.5	0-9	May see major inundation during high tide due to sea level rise. May see major inundation during a CAT1 event.	Sea level rise will continue to erode the beach and major storm events will continue to erode and completely wash out the beaches.	High	High	High	High
Drenk Behavioral Center	Community Resources & Amenities	Drenk Behavioral Center is a treatment center that primarily focuses on mental health and substance abuse services.	0-5	5-9	May see several feet of inundation during high tide due to sea level rise. May see major inundation during a CAT1 event.	The building is not elevated and will see inundation during high tide and major storm events. Daily inundation or storm events will substantially damage or completely destroy the building.	High	High	Insignificant	Insignificant
Elsinboro Fire Company	Critical Facilities & Infrastructure Systems	The Fire Company provides emergency services, both firefighting and EMS, for the Township. During times of emergency the building can serve as an emergency shelter. The building is used as a community hall, with kitchen, for community events.	NA	0-3	No impact from sea level rise. May see a couple feet of inundation during a CAT1 event.	The main building is a cinder block building that would likely survive the inundation; however, the other building is a pole barn and would be destroyed or substantially damaged. Equipment is currently left on site during storm events, including: 11 pieces of apparatus, 6 vehicles, 1 boat, 1 container, and a Salem County Mass Causality Trailer.	NA	High	NA	High
Elsinboro Municipal Building	Critical Facilities & Infrastructure Systems	The Elsinboro Municipal Building operates as the Elsinboro Township administrative building and during times of emergency the building operates as the Emergency Operations Center (EOC) for the Township.	NA	0-1.5	No impact from sea level rise. May see minimal inundation in the parking lot, building not impacted, during a CAT1 event.	During a major storm event the building will be completely surrounded by flood inundation; however, the building itself will be fine.	NA	Low	NA	Low
Elsinboro Point	Natural Resources & Ecosystems	A small public access area owned and operated by PSE&G.	0-3	3-7	May see a couple feet of Inundation during high tide along the edges of the property due to sea level rise. May see major inundation during a CAT1 event.	The area would be inundated with little to no damage and water would recede.	Insignificant	Insignificant	NA	NA
Elsinboro School	Community Resources & Amenities	A public elementary school that serves students from Kindergarten through the 8th Grade. During times of emergency the school can serve as an emergency shelter. The school as an emergency generator.	NA	0-1	No impact from sea level rise. May see minimal inundation on the roadway, building not impacted, during a CAT1 event.	None	NA	NA	NA	NA
Fort Elfsborg-Salem Culvert	Critical Facilities & Infrastructure Systems	A county-owned and operated culvert located along Fort Elfsborg-Salem Road which helps control water levels in the wetlands complex to the South of Fort Elfsborg-Salem Road.	2.5-5	6.5-9	May see several feet of inundation during high tide due to sea level rise. May see major inundation during a CAT1 event.	The culvert is only maintained occasionally, and without proper maintenance the culvert may not function during future high tides or a major storm event. The culvert is even more susceptible to damage and malfunction if the Sinnickson Landing Road and sluice gate are destroyed.	Moderate	High	Moderate	High
Fort Elfsborg-Salem Road (County Route 625)	Critical Facilities & Infrastructure Systems	A County-owned and maintained road that serves as one the major ingress and egress routes in Elsinboro. Fort Elfsborg-Salem Road is the only state designated evacuation route.	0-4	0-9	May see several feet of inundation during high tide due to sea level rise. May see major inundation during a CAT1 event.	The roadway may become impassable during high tide and major storm events. Increasing high tides and major storm events will also increase erosion along the roadway, which could undermine the road structure.	High	High	High	High
Fort Elfsborg-Salem Road Bend	Critical Facilities & Infrastructure Systems	County road section that serves as the only ingress and egress for the South Oak Beach Neighborhood.	0-0.5	3-4.5	May see minimal inundation during high tide due to sea level rise. May see several feet of inundation during a CAT1 event.	The roadway is the only access into and out of South Oakwood Beach. The roadway itself will not suffer any damage, but access to neighborhood may be cut off at high tide daily due to sea level rise.	Low	Low	High	High
His & Hers Hair Salon	Community Resources & Amenities	A locally-owned hair salon operated out of a private residence.	0.5-3	4.5-7	May see a couple feet of inundation during high tide due to sea level rise. May see major inundation during a CAT1 event.	The building is not elevated and will see inundation during high tide and major storm events. Daily inundation or storm events will substantially damage or completely destroy the building.	High	High	Moderate	Moderate

Asset Name	Asset Category	Asset Function	2050 Depth Projections (feet)		Exposure	Sensitivity	2050 Vulnerability Rating		2050 Consequences Rating	
			Sea Level Rise	CAT1 Hurricane			Sea Level Rise	CAT1 Hurricane	Sea Level Rise	CAT1 Hurricane
Holladay's Auto Used Parts	Community Resources & Amenities	Holladay's is a locally-owned junk yard and auto salvage, which sells used auto parts and scrap iron.	NA	0-3	No impact from sea level rise. May see a couple feet of inundation during a CAT1 event.	The salvaged automobiles will likely not move. The buildings are constructed of cinder block and may not suffer any damage. Any storage of gasoline, oil, and other potentially hazardous material may be unsecure and could leak into the surrounding area.	NA	Low	NA	Low
Kurt's Package Store	Community Resources & Amenities	A small, locally-owned business. Kurt's is the only liquor store and market located within Elsinboro, which sells some essential good and liquor.	2-5	6-9	May see several feet of inundation during high tide due to sea level rise. May see major inundation during a CAT1 event.	The building is not elevated and will see inundation during high tide and major storm events. Daily inundation or storm events will substantially damage or completely destroy the building.	High	High	Low	Low
Mason Point Dyke (Breached)	Critical Facilities & Infrastructure Systems	A breached dyke system. In the past it was used to control water levels and protect properties in the wetlands complex to the North of the dyke. The dyke is currently breached and continues to erode away.	0-5	3-12	May see major inundation during high tide due to sea level rise. May see major inundation during a CAT1 event.	If the structure is not repaired and reestablished the dyke will not be an asset; however, if it is repaired the following discusses the vulnerability it will still face. Increasing high tides in the future will contribute to erosion of the dyke structure. Major storm events will increase erosion and major damage to the dyke structure.	Moderate	High	High	High
Money Island Observation Area	Natural Resources & Ecosystems	A small public access area owned and operated by PSE&G. The immediate area of the observation point also includes recreational trails running through wetlands complex.	0-1	3.5-5.5	May see minimal inundation during high tide due to sea level rise. May see several feet of inundation during a CAT1 event.	The roadway to the area is a primitive road and may be completely destroyed in a major storm event, or become impassable at high tide. A wood walk located through out the recreation area may also be destroyed.	Moderate	High	Low	Low
North Oakwood Beach	Districts, Neighborhoods, & Population Clusters	A residential neighborhood running along Shad Roe Lane, Yerkes Lane, South Locust Avenue, and Bender Drive, and affronting the Delaware River. The neighborhood consists of approximately 100 single-family residences.	0-4.5	0-9	May see several feet of inundation during high tide due to sea level rise. May see major inundation during a CAT1 event.	The neighborhood is protected by a beach and bulkheads; however, the bulkheads are of varying heights. The beach is also susceptible to erosion due to sea level rise and major storm events. Only a limited number of homes are elevated above base flood elevation. A majority of the homes could be substantially damaged or destroyed during a major storm event.	Low	High	Low	High
PSE&G Transmission Lines	Critical Facilities & Infrastructure Systems	Electrical power transmission lines running from the Hope Creek Generating Station, nuclear power plant, providing power to the larger region.	0-6	0-11	May see major inundation during high tide due to sea level rise. May see major inundation during a CAT1 event.	The transmission towers are of a strong steel construction with thick, solid, concrete bases that are anchored deep below the ground and water levels. Sea level rise and major storm events will have limited to no impact to the towers and transmission lines.	Insignificant	Insignificant	NA	NA
Salem County Women's Services	Community Resources & Amenities	A women's shelter which provides support and services for women and children suffering from domestic violence.	NA	NA	No impact from sea level rise. No impact from a CAT1 event.	None	NA	NA	NA	NA
Ross Fogg & Son's Oil Company	Community Resources & Amenities	A local oil company who provides home heating oil, gasoline, and kerosene within the Tri-County Area.	NA	0-1.5	No impact from sea level rise. May see minimal inundation during a CAT1 event.	Inundation will only reach parking areas where nothing is stored.	NA	NA	NA	NA
Salem Hancocks Bridge Road (County Route 658)	Critical Facilities & Infrastructure Systems	A County-owned and maintained road that serves as a local access road for area residents and businesses. The road serves as the designated evacuation route for the Hope Creek Generating Station, a nuclear power plant.	NA	0-1	No impact from sea level rise. May see minimal inundation during a CAT1 event.	The roadway may have limited to no access during a major storm event. The road structure would suffer little to no damage.	NA	Low	NA	Low
Seagraves's Steak & Submarine Shop	Community Resources & Amenities	A small, locally-owned business. Seagrave's is a subshop which serves mainly local residents.	NA	0-0.5	No impact from sea level rise. May see minimal inundation surrounding the building during a CAT1 event.	None	NA	NA	NA	NA
Sinnickson Landing Boat Ramp	Natural Resources & Ecosystems	A small public access area owned and operated by PSE&G. The boat ramp is used by area residents and its use is free of charge.	0-4	3-7	May see a couple feet of Inundation during high tide along the edges of the property due to sea level rise. May see major inundation during a CAT1 event.	During a major storm event the floating docks at the boat ramp may be damaged or be washed away. Little to no damage expected at the boat ramp.	Insignificant	Low	NA	Low
Sinnickson Landing Road & Dyke	Critical Facilities & Infrastructure Systems	A County-owned and operated roadway. The roadway also operates as a dyke which helps control water levels in the wetlands complex to the East of Sinnickson Landing Road.	0-4	0-7	May see a couple feet of inundation during high tide due to sea level rise. May see major inundation during a CAT1 event.	Sinnickson Landing Road is a county road which is maintained occasionally. As the roadway also functions as a dyke, without proper maintenance the road may not function during future high tides or major storm events, leaving the roadway susceptible to erosion and even washout.	Moderate	High	Moderate	High
Sinnickson Landing Sluice Gate	Critical Facilities & Infrastructure Systems	A County-owned and operated sluice gate that helps maintain and control water levels entering the wetlands complex and the East side of Sinnickson Landing Road.	0-3	0-6	May see a couple feet of inundation during high tide due to sea level rise. May see major inundation during a CAT1 event.	The sluice gate is only maintained occasionally, and without proper maintenance the sluice gate may not function during future high tides or a major storm event.	Moderate	High	Moderate	High
South Oakwood Beach	Districts, Neighborhoods, & Population Clusters	A residential neighborhood running along Fort Elfsborg-Salem Road and River Lane and affronting the Delaware River. The neighborhood consists of approximately 36 single-family residences.	0-4.5	0-9	May see several feet of inundation during high tide due to sea level rise. May see major inundation during a CAT1 event.	The neighborhood is protected by a beach and bulkheads; however, the bulkheads are of varying heights. The beach is also susceptible to erosion due to sea level rise and major storm events. Only a limited number of homes are elevated above base flood elevation. A majority of the homes could be substantially damaged or destroyed during a major storm event.	Low	High	Low	High

Asset Name	Asset Category	Asset Function	2050 Depth Projections (feet)		Exposure		2050 Vulnerability Rating		2050 Consequences Rating	
			Sea Level Rise	CAT1 Hurricane		Sensitivity	Sea Level Rise	CAT1 Hurricane	Sea Level Rise	CAT1 Hurricane
The Cove	Districts, Neighborhoods, & Population Clusters	A residential neighborhood running along Slake Avenue and affronting the Delaware River. The neighborhood consists of approximately 35 single-family residences.	0-4.5	0-9	May see several feet of inundation during high tide due to sea level rise. May see major inundation during a CAT1 event.	The neighborhood is protected by a beach and bulkheads; however, the bulkheads are of varying heights. The beach is also susceptible to erosion due to sea level rise and major storm events. Only a limited number of homes are elevated above base flood elevation. A majority of the homes could be substantially damaged or destroyed during a major storm event.	Low	High	Low	High
Tillbury	Districts, Neighborhoods, & Population Clusters	A residential neighborhood located in the North tip of the Township and affronting the Salem River. The neighborhood consists of approximately 200 single-family residences, Seagraves Steak & Submarine, local VFW, a park, and boat ramp.	0-3	0-9	May see several feet of inundation during high tide due to sea level rise. May see major inundation during a CAT1 event.	Only a limited number of homes are elevated above base flood elevation. A majority of the homes could be substantially damaged or destroyed during a major storm event. A few homes in the west side of the neighborhood along the Salem River may see daily inundation during high tide due to sea level rise, which could limit access and substantially damage the structures.	Moderate	High	Moderate	High
VFW & Park	Community Resources & Amenities	The building serves as the location for the local post of the Veterans of Foreign Wars organization. The VFW here also owns and operates a small park used by local residents.	NA	0-1	No impact from sea level rise. May see minimal inundation surrounding the building during a CAT1 event.	None	NA	NA	NA	NA
Wetlands Complex	Natural Resources & Ecosystems	A wetlands complex associated with the Delaware Bay and River, and other rivers and creeks that run throughout Elsinboro. Wetlands, both fresh and saltwater, are the dominant vegetation in Elsinboro Township, covering nearly two-thirds of the township's land area. A majority of the wetlands are owned by PSE&G and several state agencies.	0-6	0-11	May see major inundation during high tide due to sea level rise. May see major inundation during a CAT1 event.	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 river to bounce back after flooding event.	High	High	High	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	Insignificant	<p><i>Property Damages:</i> Only minor property damage.</p> <p><i>Typical Operations/Daily Life:</i> No impacts or disruptions to typical operations, routine or daily life.</p> <p><i>Environment:</i> No lasting environmental degradation.</p> <p><i>Emergency Response:</i> No adverse effects to emergency response.</p> <p><i>Hazardous Materials:</i> No increase or change in community/ecosystem exposure to toxics or hazardous materials.</p> <p><i>Municipal Budget:</i> Negligible operational costs.</p>
2	Minor	<p><i>Property Damages:</i> Limited property in narrow affected area damaged or destroyed.</p> <p><i>Typical Operations/Daily Life:</i> Limited disruption to typical operations, routine or daily life.</p> <p><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><i>Emergency Response:</i> Slight decrease in emergency response times and effectiveness</p> <p><i>Hazardous Materials:</i> Limited hazardous materials spill, manageable clean-up and remediation.</p> <p><i>Municipal Budget:</i> Additional but tolerable operational costs.</p>
3	Moderate	<p><i>Property Damages:</i> Substantial property in affected area damaged or destroyed.</p> <p><i>Population Displacement:</i> Long-term population displacement over a broader segment of the population.</p> <p><i>Typical Operations/Daily Life:</i> Daily life is affected such that only redundant systems can be used for an extended duration.</p> <p><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><i>Emergency Response:</i> Emergency response is strained resulting in significant degradation of response effectiveness and times.</p> <p><i>Hazardous Materials:</i> Large hazardous material spill with significant risk to humans and ecosystems.</p> <p><i>Municipal Budget:</i> High operational costs straining local budgets</p>
4	High	<p><i>Property Damages:</i> Majority of property in affected area damaged or destroyed</p> <p><i>Population Displacement:</i> Permanent and widespread population displacement.</p> <p><i>Delivery of Services:</i> Long-term interruption of supply and services.</p> <p><i>Typical Operations/Daily Life:</i> Majority of community operations, daily life patterns intensely impacted for an extended period.</p> <p><i>Environment:</i> Permanent degradation of habitat or functioning of the systems as a component of “coastal green infrastructure” of the community.</p> <p><i>Emergency Response:</i> Need for emergency services exceeds full capacity and/or services are degraded and not functioning.</p> <p><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

Elsinboro 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 May 24th and July 14th, 2016 at the Elsinboro Municipal Building. The meeting attendees are shown below.

Participant	Title	Affiliation
Sean Elwell	Mayor / Fire Chief	Township of Elsinboro
Jack Elk	Deputy Mayor	Township of Elsinboro
Douglas Hogate	Township Committeeman	Township of Elsinboro
George Parris	Emergency Management Coord.	Township of Elsinboro
Robert Klein	Deputy OEM	Township of Elsinboro
Bill Purdie	Planner	NJ DEP
Rick Brown	Planner	NJ DEP
Jack Heide	Resiliency Manager	Sustainable Jersey

Appendix E – Elsinboro Coastal Vulnerability Assessment Maps

Table of Maps

- Map 1. Township of Elsinboro Community Assets
- Map 2. Township of Elsinboro (North) Community Assets
- Map 3. Township of Elsinboro (South) Community Assets
- Map 4. Township of Elsinboro (North) 2050 Sea Level Rise
- Map 5. Township of Elsinboro (South) 2050 Sea Level Rise
- Map 6. Township of Elsinboro (North) 2050 CAT1 Hurricane
- Map 7. Township of Elsinboro (South) 2050 CAT1 Hurricane



N

Municipal Boundary

Local Roads

Evacuation Route

PSE&G Transmission Lines

Community Resources & Amenities

Critical Facilities & Infrastructure Systems

Natural Resources & Ecosystems

Community Assets

1, Abbott's Farm Dyke

2, Abel Nicholson House

3, Drenk Behavioral Center

4, Elsinboro Fire Company

5, Elsinboro Municipal Building

6, Elsinboro Point

7, Elsinboro School

8, Fort Elfsborg-Salem Culvert

9, Fort Elfsborg Salem Road Bend

10, His & Hers Hairsalon

11, Holladay's Used Auto Parts

12, Kurt's Package Store

13, Mason Point Dyke

14, Money Island Observation Area

15, Ross Fogg & Son's Oil Company

16, Seagrave's Steak & Submarine Shop

17, Sinnickson Landing Boat Ramp

18, Sinnickson Landing Dyke Road

19, Sinnickson Landing Sluice Gate

20, The Little Brown Derby

21, VFW & Park

District Assets

22, Tillbury

23, The Cove

24, North Oakwood Beach

25, South Oakwood Beach

00.250.511.52

Miles

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for the Township of Elsinboro
August 2016


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A Better Tomorrow, One Community at a Time




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




Elsinboro (West) Community Vulnerability Assessment


Community Assets




Municipal Boundary




Local Roads




Evacuation Route



Community Resources & Amenities




Critical Facilities & Infrastructure Systems




Natural Resources & Ecosystems


Community Assets




4, Elsinboro Fire Company




5, Elsinboro Municipal Building



6, Elsinboro Point




7, Elsinboro School




9, Fort Elfsborg Salem Road Bend


District Assets



23, The Cove




24, North Oakwood Beach




25, South Oakwood Beach

0 0.075 0.15 0.3 0.45 0.6 Miles



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August 2016





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

Elsinboro (Tillbury) Community Vulnerability Assessment

Community Assets

- Municipal Boundary

Local Roads

Community Resources & Amenities

Critical Facilities & Infrastructure Systems

Natural Resources & Ecosystems
- Community Assets

16, Seagrave's Steak & Submarine Shop

17, Sinnickson Landing Boat Ramp

18, Sinnickson Landing Dyke Road

21, VFW & Park

District Assets

22, Tillbury
-
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August 2016
-




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

Elsinboro Community Vulnerability Assessment

2050 Sea Level Rise











Elsinboro (West) Community Vulnerability Assessment


2050 Sea Level Rise


Municipal Boundary


Local Roads


Evacuation Route


Community Resources & Amenities


Critical Facilities & Infrastructure Systems


Natural Resources & Ecosystems


4, Elsinboro Fire Company


5, Elsinboro Municipal Building


6, Elsinboro Point


7, Elsinboro School

9, Fort Elfsborg Salem Road Bend

23, The Cove

24, North Oakwood Beach

25, South Oakwood Beach


High : 50 ft.

Low : 0 ft.

00.0750.150.30.450.6

Miles

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Elsinboro (Tillbury) Community Vulnerability Assessment

2050 Sea Level Rise

Municipal Boundary

Local Roads

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16, Seagrave's Steak & Submarine Shop

17, Sinnickson Landing Boat Ramp

18, Sinnickson Landing Dyke Road

21, VFW & Park

22, Tillbury

2050 Sea Level Rise

Depth

High : 50 ft.

Low : 0 ft.

0

0.075

0.15

0.3

Miles

N

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Elsinboro Community Vulnerability Assessment

2050 CAT1 Hurricane

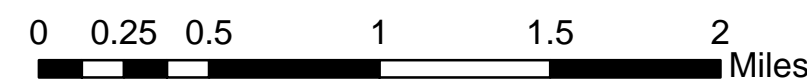
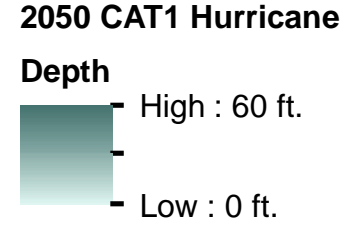


- Municipal Boundary
 - Local Roads
 - Evacuation Route
 - PSE&G Transmission Lines
 - Community Resources & Amenities
 - Critical Facilities & Infrastructure Systems
 - Natural Resources & Ecosystems
- Community Assets**
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- 3, Drenk Behavioral Center
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- 19, Sinnickson Landing Sluice Gate


- 20, The Little Brown Derby
 - 21, VFW & Park
- District Assets**
- 22, Tillbury
 - 23, The Cove
 - 24, North Oakwood Beach
 - 25, South Oakwood Beach



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August 2016











Elsinboro (West) Community Vulnerability Assessment


2050 CAT1 Hurricane


Municipal Boundary


Local Roads


Evacuation Route


Community Resources & Amenities


Critical Facilities & Infrastructure Systems


Natural Resources & Ecosystems


4, Elsinboro Fire Company


5, Elsinboro Municipal Building


6, Elsinboro Point

7, Elsinboro School

9, Fort Elfsborg Salem Road Bend


23, The Cove

24, North Oakwood Beach

25, South Oakwood Beach

2050 CAT1 Hurricane

Depth

High : 60 ft.
Low : 0 ft.

0

0.075

0.15


0.3

0.45

0.6

Miles

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Elsinboro (Tillbury) Community Vulnerability Assessment

2050 CAT1 Hurricane

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21, VFW & Park

District Assets

22, Tillbury

2050 CAT1 Hurricane

Depth

High : 60 ft.
Low : 0 ft.

00.0750.150.3Miles

N

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