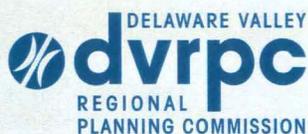


August 2017

MOORESTOWN TOWNSHIP
COASTAL
VULNERABILITY
ASSESSMENT REPORT



NEW JERSEY
RESILIENT
COASTAL
COMMUNITIES
INITIATIVE

Prepared for the Township of Moorestown, by Delaware Valley Regional Planning Commission, and funded by the National Oceanic and Atmospheric Administration (NOAA) for the New Jersey Resilient Coastal Communities Initiative, managed by the NJ Department of Environmental Protection Office of Coastal and Land Use Planning.



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We serve a diverse region of nine counties: Bucks,

Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania; and Burlington, Camden, Gloucester, and Mercer in New Jersey. DVRPC is the federally designated Metropolitan Planning Organization for the Greater Philadelphia Region — leading the way to a better future.



The symbol in our logo is adapted from the official DVRPC seal and is designed as a stylized image of the Delaware Valley. The outer ring symbolizes the region as a whole while the diagonal bar signifies the Delaware River. The two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey.

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The following people helped make this report possible:

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Executive Summary

Despite its location three miles inland of the Delaware River, Moorestown is susceptible to the effects of coastal flooding, as it is bordered by the tidal Rancocas and North Branch Pennsauken creeks. The combination of rising tidal waters and increasing extreme weather events along these creeks will gradually increase the risk of coastal flooding events in the township over time.

In this project, Moorestown Township staff and residents worked with DVRPC to conduct a coastal vulnerability assessment (CVA), in which participants reviewed and prioritized future risks to the township from the combined effects of storm surge and sea level rise. The CVA used 2100 sea level rise projections (3.3 feet) in combination with a model that shows the depth and extent of storm surge from a Category 2 storm if it were to strike at high tide and at an angle and direction that maximized the amount of surge.

The CVA project team reviewed the impact of this “CVA scenario” on 47 assets in Moorestown. Assets include properties, infrastructure, or natural resources that are of high value to the community and/or facilities and populations that might be particularly vulnerable to extreme events (see Table 1). The project team determined whether each asset would get flooded using the previously described flooding scenario, what would happen to the asset if it were to be flooded, and the consequences to the township if the asset were damaged or unable to function during a flood.

Table 1: Breakdown by Type for All Analyzed Assets

Asset Category	Count
Institutional/Cultural/Government	14
Utility	9
Evacuation Route/Transportation	7
Emergency Facility	5
Park/Open Space	4
Hazardous Site	3
Economic Asset	2
Senior Center/Retirement Home	2
Economically Disadvantaged Population	1
Total Number of Assets	47

Moorestown has a low overall vulnerability to the flooding scenario described, though the analysis revealed five assets that Moorestown should consider as being of high concern.

Table 2: Asset Types Considered to be of High Concern

Asset Category	Count
Hazardous Site	2
Utility	2
Economic Asset	1

Of the five assets of high concern, two (Azko Chemicals and the Main Street Pumping Station, both hazardous sites) are located in Maple Shade Township but have the potential to affect Moorestown in a severe flood. The other three assets of high concern are all located in Moorestown, and include the Moorestown Shopping Center (economic asset), the Moorestown Sewage Treatment Plant (utility), and the Strawbridge Lake Dam (utility).

Moorestown Coastal Vulnerability Assessment

Introduction

The municipal coastal vulnerability assessment (CVA) is a tool to help communities plan for flooding along their coastlines and tidal waterways and prioritize flood mitigation strategies, enabling them to better manage and recover from these floods. The CVA assesses the degree to which a community's "assets" (its properties, infrastructure, natural resources, and populations) will be affected by flooding from projected sea level rise and storm events. For those assets that are affected, the CVA analyzes the consequences that their temporary or long-term loss poses to the community. With this assessment, communities will be better informed to make decisions about land use planning, flood mitigation, sea level rise adaptation, infrastructure maintenance, capital improvements, and post-disaster recovery.

Moorestown Township developed the CVA in partnership with the Delaware Valley Regional Planning Commission, the region's Metropolitan Planning Organization. The project team used a CVA methodology created by Sustainable Jersey within the New Jersey Resilient Coastal Communities Initiative (RCCI), a program run by the Office of Coastal and Land Use Planning in the New Jersey Department of Environmental Protection (NJDEP). NJDEP and Sustainable Jersey developed the methodology to help municipalities prepare for sea level rise and likely increases in extreme storm events.

Moorestown's Location

Moorestown Township is a suburban municipality that encompasses 15 square miles in Burlington County, New Jersey. Located within the Delaware River watershed, it is approximately three miles inland of the Delaware River. Despite its distance from the coast, Moorestown will feel the effects of sea level rise, as it is bordered by the tidal Rancocas and North Branch Pennsauken creeks. At the same time, it will be affected by the stronger storms anticipated in the Northeastern United States. The combination of rising tidal waters, increasingly severe coastal storms, and more extreme precipitation events will increase the risk of flooding in the township over time.

Historical Flooding in Moorestown

Like the rest of New Jersey, Moorestown Township is susceptible to extreme precipitation events and potential flooding. However, to the knowledge of the participants in the CVA, the township has not had a catastrophic, i.e., a "100-year," flood event in recorded history. Historical storm events in the township have caused only localized flooding, with the main impact being road closures.

Moorestown Township's Coastal Vulnerability

Why a Coastal Vulnerability Assessment is Relevant to Moorestown

Despite the lack of catastrophic floods in Moorestown's past, the combination of sea level rise and increases in the intensity and frequency of coastal storms caused by climate change will introduce new vulnerabilities in Moorestown that need to be assessed.

Global warming is the gradual warming of the Earth from rising greenhouse gas emissions, primarily from peoples' use of fossil fuels. According to the National Climate Assessment, temperatures in the Northeast

United States—including New Jersey—increased by almost 2 degrees Fahrenheit between 1895 and 2011.¹ This warming leads to other changes in climate, such as precipitation quantities and patterns: hence the moniker “climate change.” In the Northeast United States, for example, annual precipitation has increased by approximately 5 inches, or over 10 percent, since 1895.² Global warming also causes the global mean sea level to rise, leading to increases in coastal flooding in New Jersey and elsewhere. In the Northeast United States, coastal flooding has increased from a rise in sea levels by approximately 1 foot since 1900.³

Climate change will continue to cause increases in the intensity of severe storm events and an accelerating rate of sea level rise in the coming decades. The following is a summary of the expected coastal and riverine flooding changes in New Jersey, assuming global greenhouse gas emissions trends continue as they are today.

Sea Level Rise

In New Jersey, the most recent sea level rise central estimate (meaning that the estimate has a 50 percent probability of being met or exceeded) is 1.4 feet from current sea levels by 2050, and 3.4 feet from current levels by 2100, assuming current rates of emissions continue.⁴

Figure 1 shows sea level rise projections for New Jersey at Atlantic City in 2030, 2050, and 2100. In the top chart, the red box-and-whisker plots indicate sea level rise projections for a high-emissions scenario, with a Representative Concentration Pathway, or RCP, of 8.5, which assumes that greenhouse gas emissions continue to rise over the course of the 21st century. The blue box-and-whisker plot indicates sea level rise projections for a low-emissions scenario (RCP 2.6) that peaks within the next several decades and then declines. The white line across the middle of each box-and-whisker plot denotes the 50th percentile value (the value that has a 50 percent probability of occurring). For example, in 2050, the white line is located at 1.4 feet. Moving away from the white line, the boxes denote the 17th-83rd percentile, the 5th-95th percentile, and the 1st-99th percentile. There is an approximately 66 percent chance that sea level rise will be some height within the largest (17th-83rd percentile) box, an approximately 24 percent chance that sea level rise will be some height within the medium (5th-95th percentile) boxes, and an approximately 8 percent chance that sea level rise will be some height within the (1st-99th percentile) “whiskers.”

In the bottom chart, the gold-colored line indicates observed tide-gauge heights. Solid red and blue lines are the 50th percentile projection for the high emissions (RCP 8.5) and low emissions (RCP 2.6) scenarios, respectively. Dashed lines are 17th-83rd percentile projections (with blue and red shading indicating the range), and dotted lines are the 5th-95th percentile.

The data presented in this report are the result of research conducted in 2016 by the New Jersey Climate Adaptation Alliance Advisory Committee, a consortium of respected climate researchers.⁵

¹ Radley Horton et al., “Ch. 16: Northeast” in *Climate Change Impacts in the United States: The Third National Climate Assessment*, eds. J. M. Melillo, T.C. Richmond, and G. W. Yohe (U.S. Global Change Research Program, 2014), 373, pubs.giss.nasa.gov/docs/2014/2014_Horton_ho06500e.pdf, accessed 1/9/2017.

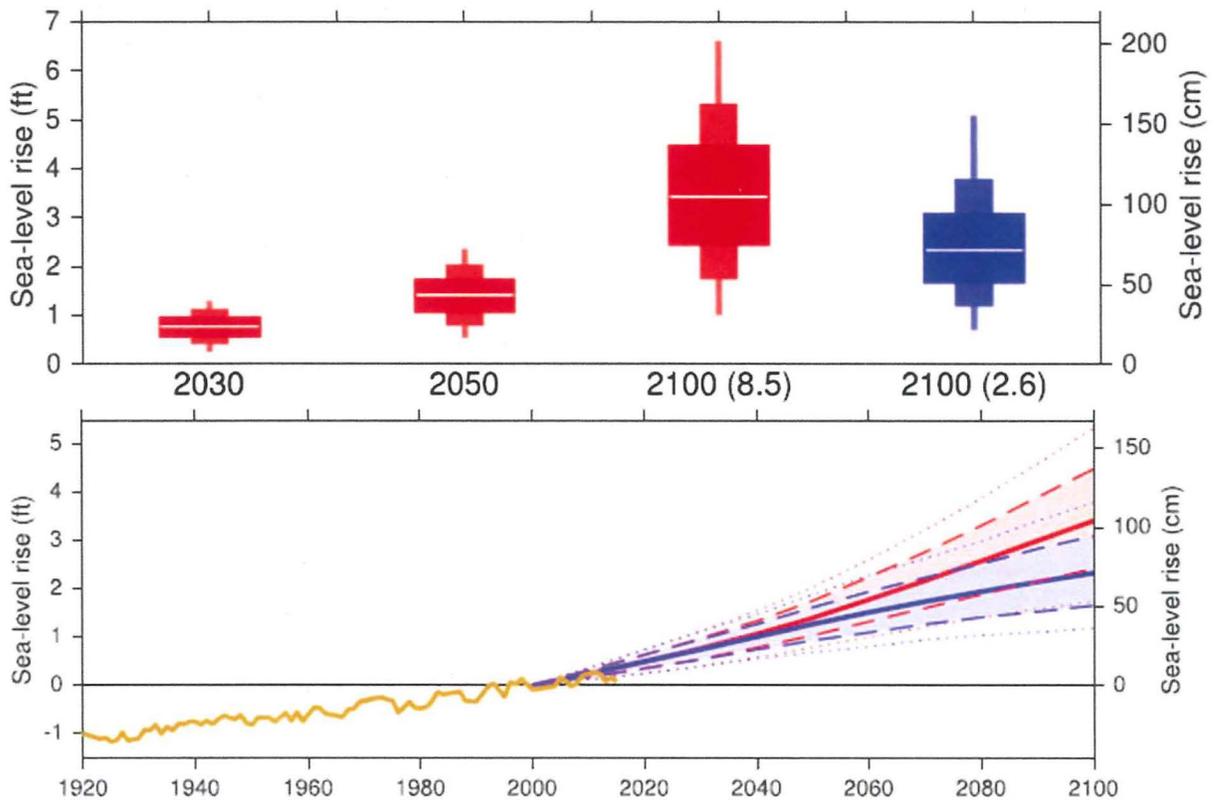
² Ibid.

³ Ibid.

⁴ R. E. Kopp et al., *Assessing New Jersey’s Exposure to Sea-Level Rise and Coastal Storms: Report of the New Jersey Climate Adaptation Alliance Science and Technical Advisory Panel*, prepared for the New Jersey Climate Adaptation Alliance, New Brunswick, New Jersey, Rutgers University (October 2016): 2.

⁵ R. E. Kopp et al., 2016.

Figure 1: Sea Level Rise Projections for New Jersey in 2030, 2050, and 2100



Source: Kopp et al., 2016.

Scenes from the aftermath of severe coastal storms, such as Superstorm Sandy, demonstrate the potential adverse impacts of storm surge and coastal flooding on the basic functioning of municipalities, their businesses, and their residents. While coastal storms can strike at any time, sea level rise will exacerbate their impact. Absent any changes in storms, a 2-foot rise in sea levels, which New Jersey is likely to experience by 2100, would more than triple the frequency of dangerous coastal flooding in the region.⁶

Every level of government—federal, state, and local—has a role in planning for stressors and threats likely to afflict its citizens. However, municipalities that have the tools to understand, predict, and prepare for the natural disasters that occur within their borders are arguably best poised to assist their constituents in reducing potential harms associated with climate hazards and extreme weather events.

Coastal Storms and Storm Surge

Flooding from storm surge occurs when winds associated with strong coastal storms drive water onto land. This is the exact process that produced extreme flooding on the Atlantic Coast of New Jersey during Superstorm Sandy. The tidal Delaware River did not experience the same levels of storm surge during Superstorm Sandy, but it could have happened if the storm had taken a different track.

Unlike sea level rise, storm surge is a temporary condition. However, storm surge can happen at any time, and the potential height of water pushed onto land in the Delaware River region from a strong storm is much greater than the projected amount of sea level rise. For example, storm surge heights during Superstorm

⁶ Horton et al., 374.

Sandy exceeded 10 feet in some parts of northern New Jersey and New York, three times the median amount of projected sea level rise by 2100.

While the future frequency and intensity of coastal storms cannot be predicted with certainty, the warming in the atmosphere and oceans associated with climate change is likely to increase the intensity of coastal storms, particularly in the latter part of the 21st century.⁷

Riverine Flooding

While this report focuses primarily on coastal flooding, riverine flooding cannot be ignored and likely poses an even greater threat for an inland township like Moorestown. Moorestown currently uses FEMA's 100-year floodplain map (or "Flood Insurance Risk Map") to evaluate the threat of riverine flooding. The township should continue to use this map for that purpose, but at the same time should recognize that the frequency of storms with heavy downpours is projected to increase as a result of climate change.⁸ As products and models become available to project the spatial extent of this evolving threat, they should be evaluated by township officials.

Obtaining these models is of particular importance since coastal storms are typically accompanied by heavy precipitation. Combined, these processes will produce 100-year floodplains that are larger in both coastal and upland areas than the ones mapped by FEMA today.

Current Preparedness for Flooding and Extreme Events

Land Use and Master Plan

Fortunately for Moorestown, the majority of developed properties in the township are located inland, away from its waterways and at a sufficiently high elevation to prevent widespread damage. While the township's current land use patterns minimize the threat of flooding, the township is proactive in preventing the development of flood-prone areas. For example, Moorestown has designated much of the land along the Rancocas Creek and some of the land along the Pennsauken Creek for conservation, helping limit development in flood-prone areas (see Figure 2). At the same time, the township's Conservation Element of its Master Plan recommends concentrating residential development in upland areas to avoid stream disturbance, and designing properties to mimic pre-development hydrological conditions, thereby reducing the volume and velocity of stormwater discharges.⁹ According to the Conservation Element, the township also adopted an ordinance that requires a 25-foot buffer landward from the 100-year floodplain where no development may occur, further ensuring that development is kept out of harm's way.¹⁰

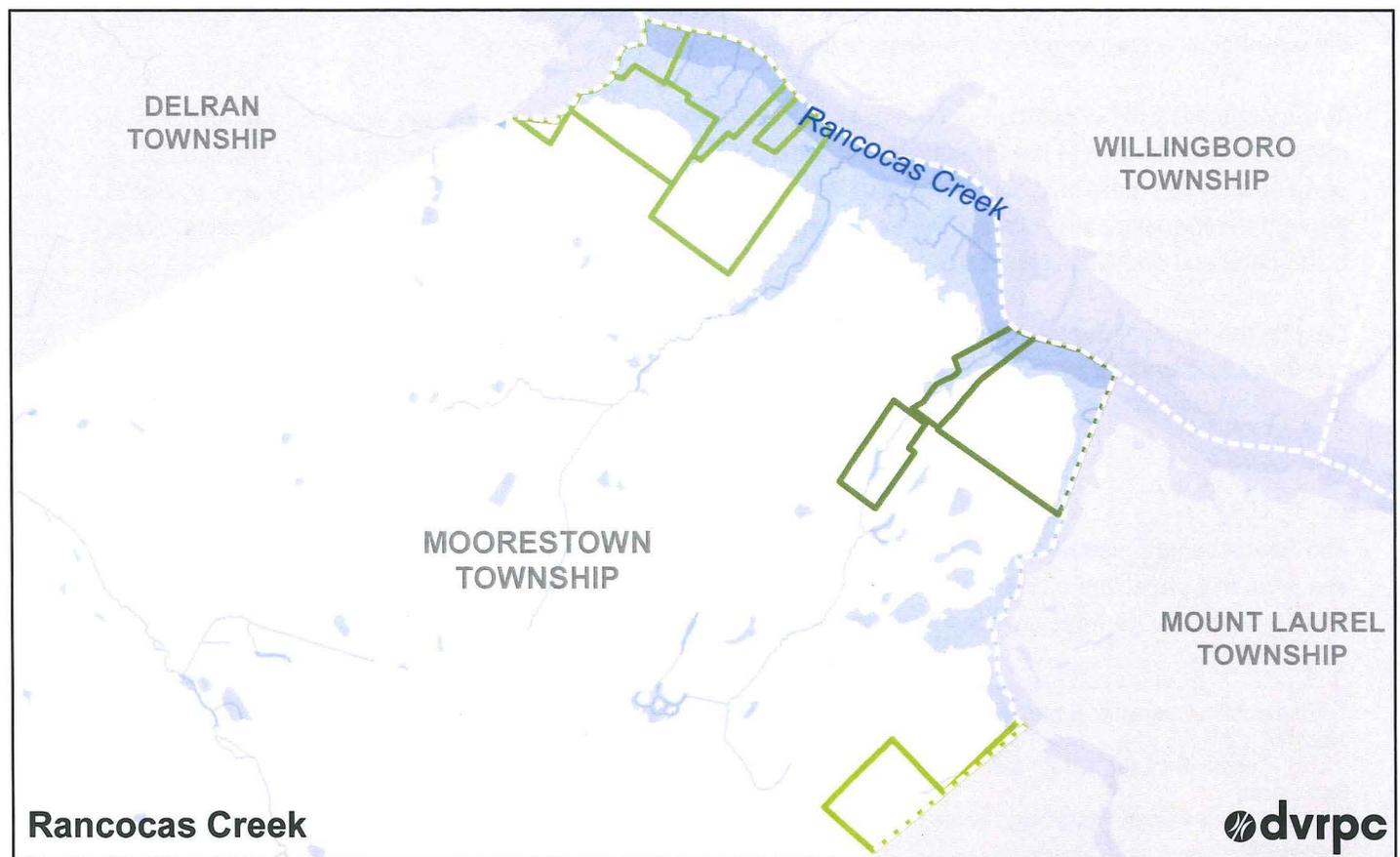
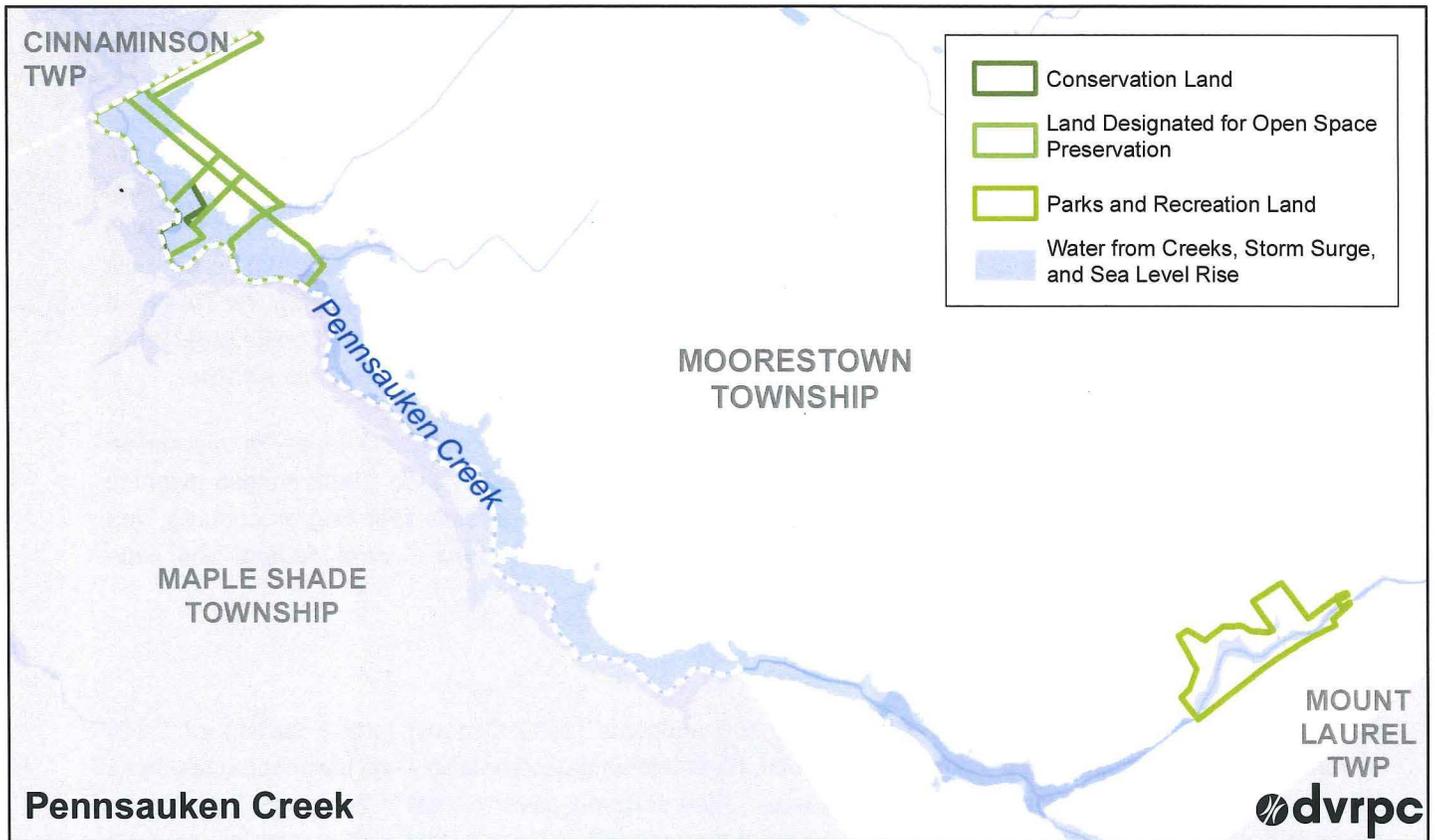
⁷ NOAA, Geophysical Fluid Dynamics Laboratory, *Global Warming and Hurricanes: An Overview of Current Research Results*, www.gfdl.noaa.gov/global-warming-and-hurricanes/, accessed 3/17/2017.

⁸ Horton et al., 374.

⁹ Moorestown Township, "Conservation Element of the Master Plan," Moorestown Master Plan, 2013, III-10 – III-11, www.moorestown.nj.us/DocumentCenter/View/140.

¹⁰ *Ibid*, III-25.

Figure 2: Proposed and Current Conservation Land in Moorestown Township



Sources: NJDEP, NJDOT, BCDIT, DVRPC. This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

Emergency Operations Procedures

Although Moorestown has not been substantially affected by flooding, township officials and staff are prepared for emergency evacuations. Officials and emergency response managers have multiple means of township-wide communication. The township currently uses five different programs: Swift 911, which conducts reverse 911 calls using traditional phone lines or voice over internet protocol (VOIP); social media platform Twitter; Nixle, which is a public alert texting system; the township website; and Register Ready, a countywide registration program for residents with mobility or other impairments that would make emergency evacuation more challenging. Citizens have to register for all services, except for the township website.

The Office of Emergency Management's page on the township website also contains a variety of information for the public. The township has assembled fact sheets that provide guidance on preparedness planning actions, a link for additional guidance for people with disabilities, storm damage reporting procedures, and additional resources, including the American Red Cross, Center for Disease Control, federal and state Homeland Security departments, and others.¹¹

Vulnerable Populations

Moorestown has a population of approximately 20,700 residents (2010 Census), and a density of 1,410 residents per square mile. From a poverty standpoint, Moorestown has comparably few low-income residents that may lack resources to respond to an emergency. Moorestown's poverty level in 2015 was 3.8 percent, which is below the state and county values of 10.8 percent and 6.4 percent.¹² Likewise, approximately 96.2 percent of households in Moorestown have cars, allowing Moorestown residents more options to evacuate in the event of an emergency than townships with lower rates of car ownership.¹³

The most vulnerable population in Moorestown is the township's senior population (aged 60 and up), which makes up 22.1 percent of the township's population and is slightly above the state and county averages of 19 percent and 19.6 percent (2010 Census). While individual households with senior residents are scattered through the township, all dedicated senior housing facilities are located out of harm's way from flooding, being both inland and on higher elevations.

Despite the fact that the township has fewer "at risk" populations than many other communities, the township continues to demonstrate their desire to ensure that all citizens are given the assistance they need before, during, and after storms.

Scenarios

The flood scenario used in this CVA shows the result of storm surge generated by a Category 2 storm plus sea level rise projection of 3.3 feet by 2100.¹⁴ Storm surge was modeled using NOAA's SLOSH (Sea, Lake, and Overland Surge from Hurricanes) model and shows what would happen if a Category 2 storm were to

¹¹ Moorestown Township, *Emergency Management*, www.moorestown.nj.us/158/Emergency-Management, accessed 1/3/2017.

¹² U.S. Census Bureau, "DP03: Selected Economic Characteristics," 2011-2015 American Community Survey 5-Year Estimates.

¹³ U.S. Census Bureau, "B25044: Tenure by Vehicles Available," 2011-2015 American Community Survey 5-Year Estimates.

¹⁴ The 3.3 foot figure was from a report produced by the *New Jersey Climate Adaptation Alliance Science and Technical Advisory Panel* that pre-dates the current report. The 3.3-foot figure was already built in to the maps and models by the time the report with the 3.4-foot median estimate was produced.

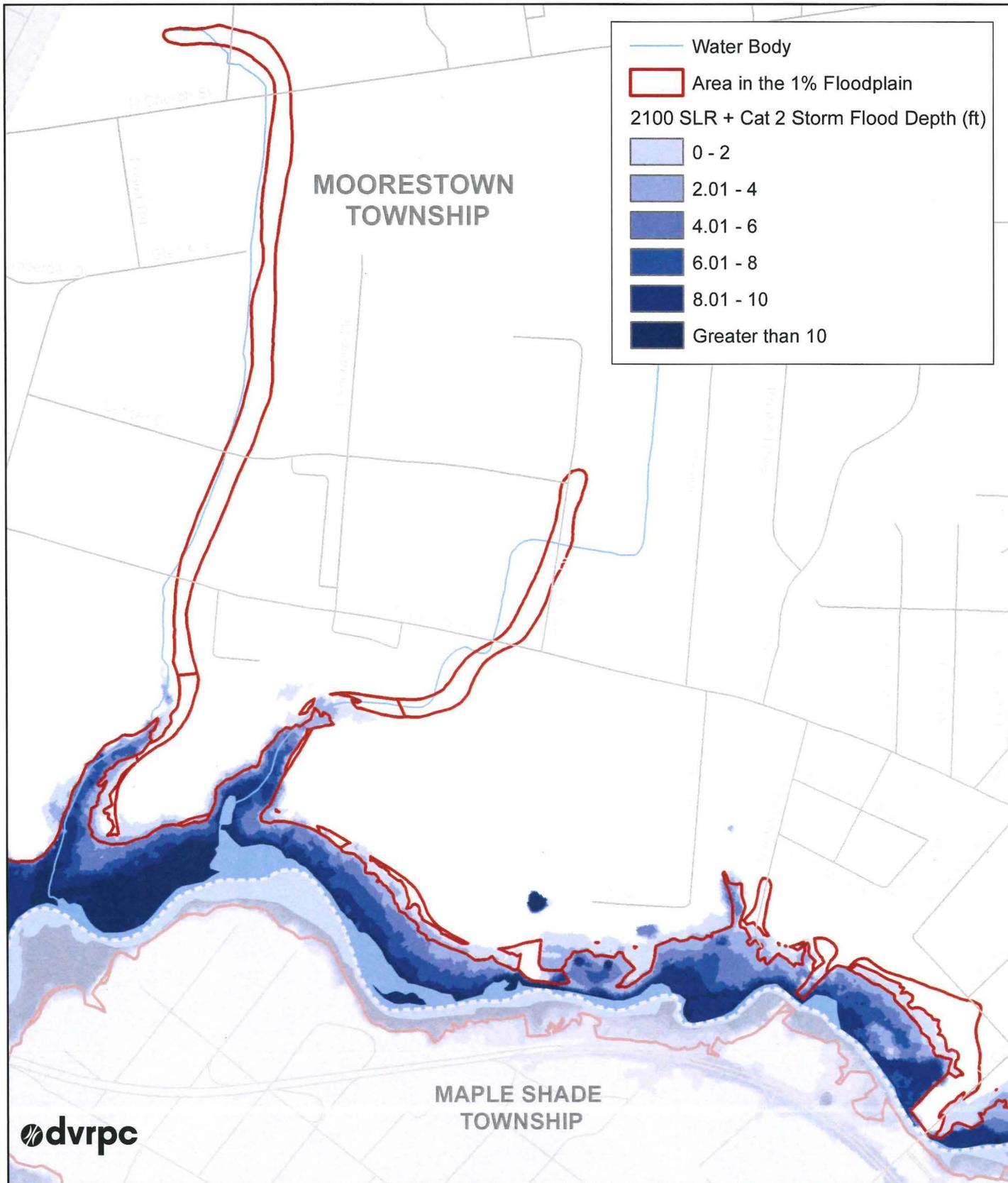
strike the Delaware Bay at an angle that would maximize storm surge at high tide. In other words, this is a “worst case scenario” for a Category 2 storm in the tidal Delaware River. **This flooding scenario will be described in this report as the “CVA scenario.”**

The datasets of sea level rise and storm surge were developed statewide by NJDEP and were layered on maps developed by DVRPC. Flood depths were determined using a baseline elevation derived from LiDAR data.¹⁵ The maps that show the flooding predicted in the CVA scenario are located in Figure 1, Figure 3, Appendix C, and Appendix D.

Figure 3 indicates the closeness with which this combined sea level rise and storm surge scenario resembles the 1–percent/100–year storm for coastal areas near the Pennsauken Creek. The Federal Emergency Management Agency (FEMA) uses the 1–percent scenario in its Flood Insurance Rate Maps (FIRMs), and Moorestown Township already uses these maps for planning purposes.

¹⁵ 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.

Figure 3: Comparison between the FEMA 1-Percent Floodplain and Flooding from 2100 Sea Level Rise and a Category 2 Storm along the Pennsauken Creek



Sources: NJDEP, NJDOT, BCDIT, DVRPC. This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

Assessing Vulnerabilities

Methodology

On September 8, 2015, DVRPC staff met with Tom Ford, then Director of Community Development at Moorestown Township and Chief Lee Lieber, Emergency Management Coordinator, to discuss Moorestown's past vulnerabilities to flooding. On February 3, 2016, Mr. Ford, Chief Lieber, and other Moorestown Township staff and residents (listed in the Acknowledgements section) met to discuss the township's critical assets and conduct the CVA. This team examined the vulnerability of 47 "assets," which are properties, infrastructure, or natural resources that are owned by the township or have high value to the community, as well as vulnerable populations located within the township. The assets are evaluated using a three-step process:

1. Community assets are identified, mapped, and compared with maps of flooding for selected flood scenarios to determine if they will be exposed to flooding or not.
2. The sensitivity of individual assets is determined. Sensitivity is shorthand for the impact of flooding on an asset. For example, a flooded basketball court will be relatively un-impacted after floodwaters recede, while paper documents in a repository would likely be permanently destroyed if they were exposed to flooding. While this is a clear-cut example, in many cases, the sensitivity of many types of assets, such as a downtown building or shopping center, is challenging to determine with much specificity.
3. The consequence is determined by the potential effects on the community if each individual asset were lost or damaged to flooding.

Identifying and Mapping Community Assets

The CVA relies on Geographical Information Systems (GIS) maps to locate and analyze community assets and flood hazards. Community assets are identified among three categories—Built Environment, Natural Environment, and Vulnerable Populations—and are plotted using GIS. DVRPC mapped assets and plotted them against the 2100 sea level rise plus Category 2 Storm scenario to determine whether they would be exposed to flooding.

Evaluating Asset Sensitivity and Vulnerability

Sensitivity is the degree to which an asset may become affected by predicted floodwaters. Vulnerability is the product of exposure and sensitivity. If an asset is exposed to flooding *and* it is sensitive to flooding, then it is vulnerable. The level of vulnerability is thus a function of the level of sensitivity of an asset. In other words, an asset that is exposed to flooding and is highly sensitive to flooding would be highly vulnerable, while an asset that is exposed and moderately sensitive would be moderately vulnerable. Assets that are not exposed are not vulnerable, regardless of their sensitivity.

The exposure and sensitivity of each asset determines its vulnerability ranking, which is categorized as insignificant, low, moderate, or high. A description of the categories can be found in Appendix B. When there was insufficient information to determine the exact vulnerability ranking for an asset, a range was used.

Evaluating the Consequences of Asset Damage

Consequence is the effect on the community if an asset is temporarily or permanently damaged or impaired by flooding. Consequence is ranked as insignificant, minor, moderate, or high for each asset. A description of the meaning of each ranking can be found in Appendix B.

Analysis and Findings

Moorestown's coastal vulnerability assessment examined 47 assets, which are listed by type in Table 3.

Table 3: Breakdown by Type for All Analyzed Assets

Asset Category	Count
Institutional/Cultural/Government	14
Utility	9
Evacuation Route/Transportation	7
Emergency Facility	5
Park/Open Space	4
Hazardous Site	3
Economic Asset	2
Senior Center/Retirement Home	2
Economically Disadvantaged Population	1
Total Number of Assets	47

The CVA indicates that Moorestown will not likely sustain many significant impacts from the combined effects of a Category 2 storm surge and sea level rise in 2100. Moorestown has a high elevation relative to its tidal waterways, and development is mostly located inland on these higher elevations, which increases the resiliency of its assets to flooding. Nevertheless, there are some assets in Moorestown that are vulnerable to potential flooding.

Areas of High Concern

Moorestown has a low overall vulnerability to the combined effects of flooding from storms and sea level rise, but the CVA yields five assets that are of high concern for the township. These assets are most vulnerable to flooding and have the largest consequences to the township should they become damaged.

Table 4 shows the vulnerability and consequence ratings for those assets. The highest vulnerability and consequence ratings belong to hazardous sites (the Azko Chemicals site and the Main Street Pumping Station) and to utilities (the sewer water treatment plant and the Strawbridge Lake Dam). The last asset of high concern is the Moorestown Shopping Center, an economic asset. For the full asset matrix, see Appendix A.

Table 4: Assets Selected as Top Areas of Concern

Areas of High Concern				
Asset Name	Asset Category	Range of Flood Depths on Parcel	Vulnerability	Consequences
Azko Chemicals	Hazardous Site	0-10.3 ft	Insignificant to Moderate	Minor to Moderate
Main Street Pumping Station	Hazardous Site	0-10.0 ft	Low to High	Minor to Moderate
Moorestown Shopping Center	Economic Asset	0-10.6 ft	High	Minor
Moorestown Township Sewer Water Treatment Plant	Utility	0-12.3 ft	Insignificant to Moderate	High
Strawbridge Lake Dam	Utility	2.2-6.6 ft	Insignificant to High	Minor

Azko Chemicals

This site is a registered contaminated site located at NJ Route 73 North and the Pennsylvania Railroad Bridge in Maple Shade Township. The driveway and some buildings onsite may face up to 2 feet of inundation in the CVA flooding scenario. As it is registered as a contaminated site, more information is needed about the property's sensitivity to the impacts of flooding. Flooding at the site could have no impact to Moorestown, or it could spread contaminants into areas of Moorestown located downstream.

Figure 4: Azko Chemicals Site



Source: Google Maps, maps.google.com

Main Street Pumping Station

This pump station is located at the Main Street Treatment Plant in Maple Shade Township, and is located across the Pennsauken Creek from Moorestown Township. The site could be flooded by up to 4 feet of water

in the CVA scenario, and as it is registered as a contaminated site, more information is needed regarding its sensitivity to the impacts of flooding. Flooding at the site could have no impact to Moorestown, or it could spread contaminants into areas of Moorestown located downstream.

Figure 5: Main Street Pumping Station Site



Source: Google Maps, maps.google.com

Moorestown Shopping Center

The Moorestown Shopping Center, located on West Camden Avenue, contains a mixture of neighborhood-serving retail facilities. Because of its close proximity to Strawbridge Lake and the Pennsauken Creek, the shopping center is at a high risk of flooding. Flooding at the loading dock area behind the store is projected to reach depths of 5 feet, and flooding in much of the remainder of the building may reach depths of between 2 and 3 feet. Repeated floods could damage the structure, and could take months or years to repair.

Figure 6: Moorestown Shopping Center



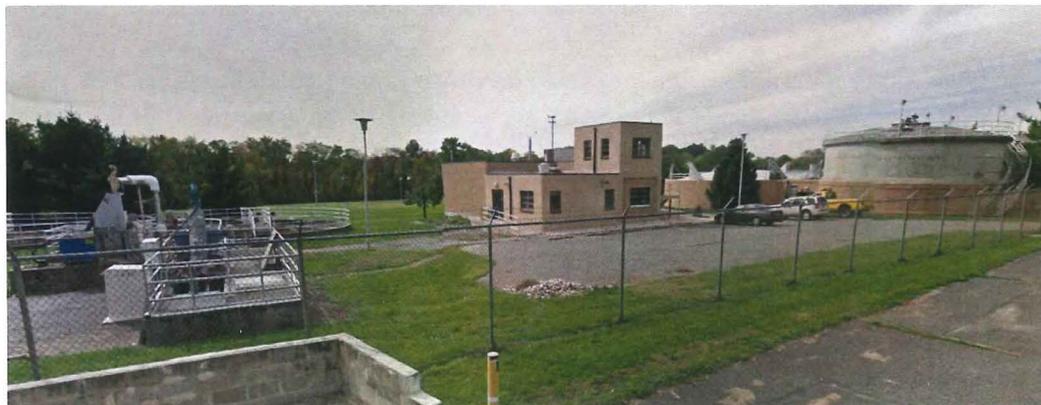
Source: Google Maps, maps.google.com

Moorestown Township Sewer Water Treatment Plant

Located on North Lenola Road, the sewer plant treats water for the entire township. About one-half of the site is projected to get flooded, with depths reaching 10 feet in some locations. Most onsite equipment is walled

in, increasing the likelihood that it will not be affected by flood water, but if damage to the plant occurred, it could cause pollution of the township's groundwater and surface water, and would require the township to seek an alternate means of sewer treatment, possibly at great cost, until the plant could be repaired.

Figure 7: Moorestown Sewer Water Treatment Plant



Source: Google Maps, maps.google.com

Strawbridge Lake Dam

The dam controls the flow of water along Pennsauken Creek to protect the Kings Highway Water Treatment Plant and structures along and near Kings Highway. The dam is projected to hold back 6 feet of water, but it could be overtopped by the higher flood waters projected in this CVA. However, as a Class III dam, the consequences of its loss or damage from flood waters are relatively low. The destruction of Class III dams causes a loss of adjacent property use, but not necessarily property damage.

Figure 8: A View of Strawbridge Lake Dam from Kings Highway



Source: Google Maps, maps.google.com

A full table showing the exposure, sensitivity, and consequences of all assets can be found in Appendix A of this report. Appendix C shows the location of all listed assets superimposed with the 2100 sea level rise and Category 2 storm surge flooding scenario, while Appendix D shows vulnerable assets along the Pennsauken and Rancocas creeks at a larger scale.

Municipal Assets of Lower Risk

The highest number of remaining (lower-risk) assets is within the Institutional/Cultural/Government assets category. This category includes several privately owned historic buildings, and ten schools and learning centers ranging from preschool to high school. None of Moorestown's school facilities are in areas likely to flood. The same is true for Moorestown's five emergency facility assets.

The most vulnerable of the municipal assets not listed as areas of high concern are utilities, many of which are also located in flood-prone regions. However, they appear to be adequately protected against the projected floods.

While the assets in the Park/Open Space category are in flood-prone areas, the consequences for their flooding are considered insignificant.

Table 5 combines the vulnerability and consequences rating to show the relative spread for all assets. Assets considered to be out of harm's way are not vulnerable to anticipated flooding, and the consequence of their potential loss is therefore moot. Of the 47 identified assets, 30 fall into this category. The remaining 12 assets were assigned to the minor risk category.

Table 5: Breakdown of Remaining Assets by Degree of Risk

Rating	Number of Assets
Out of Harm's Way	30
Minor Risk	12

Recommendations

Because not many of its assets are vulnerable in the CVA scenario, Moorestown does not need to implement many adaptation measures immediately. However, there are a few recommended actions for specific vulnerable assets. Action is particularly important for the assets considered areas of high concern. Recommendations are as follows:

Ascertain the Structural Vulnerability of Assets

Moorestown has several assets with structures that are projected to be exposed to flooding from sea level rise and coastal storms, but the sensitivity of many of these structures is currently unknown and depends on variables that the township has yet to measure or document. Thus, the true degree of vulnerability is unknown. Some of the assets that require this analysis are assets listed as areas of high concern.

Sewer Water Treatment Plant

About one half of the site, which includes structures and treatment or holding equipment, may flood. Flooding depths for the equipment are typically less than 4 feet, but may reach 10 feet in some locations. The overall sensitivity of the plant depends on the location and vulnerability of this equipment. Much of the equipment that could be flooded is safe because it is elevated or walled in, but more information is required to determine the sensitivity of each structure, particularly regarding its materials and age. The township could address these sensitivities and potential vulnerabilities through the following steps:

- Create a list of all structures within the projected flood zone and examine each to determine its elevation above flood waters, material composition, and age.
- Use the list of structures to verify which parts of the plant are vulnerable to flooding.
- Determine and implement the actions that need to be taken to address those vulnerabilities, likely a combination of relocating and protecting equipment.

Strawbridge Lake Dam

The Strawbridge Lake Dam is projected to have to hold back more than 6 feet of water in the CVA flooding scenario. As a Class III dam, its loss in a flood would cause a loss of adjacent property use, but not damage to property. However, its intrinsic sensitivity depends on its height relative to the potential height of the predicted flood waters, and the durability of its materials, both of which are currently unknown. In response, the township should take the following steps:

- Work with the Burlington County Office of Emergency Management to locate the dam's Emergency Action Plan, which should contain information on how the dam could fail and who would be affected.
- Ascertain the flood height at which the dam is overtopped and compare it to the likelihood that floodwaters could reach that height.
- If the dam is likely to be overtopped, research and implement structural or material improvements to increase the dam's resilience to damage from flood waters.

Kings Highway Water Treatment Plant

In the CVA scenario, open space within the site would be inundated, but all other equipment and structures are out of harm's way. However, the sensitivity of the plant also depends on the risks posed by the upstream Strawbridge Lake Dam. If the dam failed during a flood, the resulting floodwater could reach some of the structures onsite. The extent and depth of that resultant flooding is not predicted by the model used in this project and would require additional study. The township could address these sensitivities and potential vulnerabilities through the following steps:

- Partner with the Burlington County Office of Emergency Management and any other operators of the Strawbridge Lake Dam to study the likelihood and effects of the Strawbridge Lake Dam's failure on the Kings Highway Water Treatment Plant.
- If feasible within the plant's current renovation timeline, research and apply resilient building techniques to the renovation process.

Moorestown Shopping Center

While the entrance and a portion of the parking lot at the shopping center are out of harm's way in the CVA scenario, the remainder of the site will likely be flooded. Flooding of the loading dock area could reach 5 feet, while most of the building may encounter between 2 and 3 feet of flooding. The sensitivity of the building depends on its materials, age, and layout—in particular, whether it has a basement that could be flooded and would require pumping or other additional flood mitigation work. Malls are typically durable structures, but with repeat flooding, these materials can degrade over time. The township could address these potential sensitivities through the following steps:

- Gain access to mall floor plans and information on the building's materials to determine what parts of the building are at greatest risk.
- Work with the property owner to retrofit the mall to relocate structures that are sensitive to flooding.
- Work with the property owner to install green stormwater infrastructure, such as permeable pavement, tree trenches, or rain gardens, in the parking lot surrounding the mall to absorb part of the floodwater volume.
- Consider adding a dike or other flood barrier along the Pennsauken Creek as a last resort.

Pumping Stations

The South Valley Pumping Station and the South Lenola Road Pumping Station may become flooded in the CVA flooding scenario. Up to five structures on the South Valley Pumping Station site may be flooded; flood depths around the site's storage tanks may reach up to 5 feet, while other structures will see around 1 foot or less of flooding. The South Lenola Road Pumping Station currently receives some flooding, which is predicted to continue into 2100.

The pumping equipment at these two stations may be adversely affected by water at certain depths or extents, but more information is needed about the vulnerability of the equipment. Moorestown should investigate how the equipment could be damaged by flood waters, and then take any necessary measures to elevate or protect that equipment.

Form Partnerships with Neighboring Townships

Three of the assets in the CVA are located in Maple Shade Township, across the Pennsauken Creek and upstream of Moorestown. Two of these assets, the Azko Chemical site and the Main Street Pumping Station site, are considered areas of high concern because they may hold contaminants. However, not much is known in Moorestown about the sensitivity of these sites to the impacts of flooding, or the consequences for Moorestown Township if these sites were damaged by flood waters. For these two assets, Moorestown should:

- Meet with Maple Shade officials and staff, owners of the contaminated sites, and NJDEP to discuss the likelihood that contaminated floodwaters could reach Moorestown.
- Work with this group to determine the vulnerabilities of the two sites and determine what the impact might be on Moorestown and Maple Shade if the containment facilities onsite were damaged by a flood. In particular, determine:
 - How the contaminants are stored onsite.
 - How they have percolated into the soil.
 - Where flood waters might carry them in the future.
 - What the effect of further contamination or the spread of contamination could be to natural and human features downstream.

Resources and Funding Opportunities

Federal Programs: Flood Hazards

FEMA: Flood Mitigation Assistance Grants

The Flood Mitigation Assistance Grants program provides funding to states, municipalities, and other groups for projects or plans that reduce or eliminate the long-term risk of flood damage to structures insured under the National Flood Insurance Program. The funds for this grant program are disbursed through states. Moorestown should contact the NJ State Hazard Mitigation Officer (www.state.nj.us/njoem/) if it is interested in applying. More information is available at www.fema.gov/flood-mitigation-assistance-grant-program.

FEMA: Hazard Mitigation Grants

The Hazard Mitigation Grant Program helps communities implement hazard mitigation measures following a Presidential major disaster declaration. The funds for this grant program are disbursed through states. Moorestown should contact the NJ State Hazard Mitigation Officer (www.state.nj.us/njoem/) if it is interested in applying and has an eligible project. More information is available at www.fema.gov/hazard-mitigation-grant-program.

FEMA: Pre-Disaster Mitigation Grants

The Pre-Disaster Mitigation Grant Program assists states, municipalities, and other groups in implementing a sustained pre-disaster natural hazard mitigation program to reduce overall risk from future hazards while reducing reliance on federal funding in future disasters. This program awards planning and project grants and provides opportunities for raising public awareness about reducing future losses before disaster strikes. The funds for this grant program are disbursed through states. Moorestown should contact the NJ State Hazard Mitigation Officer (www.state.nj.us/njoem/) if it is interested in applying. More information is available at www.fema.gov/pre-disaster-mitigation-grant-program.

Federal Programs: Community Support

Partnership for Sustainable Communities

This partnership between HUD, DOT, and EPA provides grants to help communities create vibrant, healthy neighborhoods that provide more housing options, economic opportunities, and efficient transportation while reinforcing existing investments. The program website includes grant offerings from each of these agencies. More information is available at www.sustainablecommunities.gov/partnership-resources. Information about the grants available in this program is also posted on www.grants.gov.

US Department of Housing and Urban Development: Community Development Block Grant Program

Burlington County receives funding from the federal Community Development Block Grant Program for developing viable urban communities with an emphasis on assisting low-income persons. Funding may be used to meet urgent needs where conditions pose a threat to the health or welfare of the community. Examples of projects funded include reconstruction of affordable housing after a flood, or the redevelopment of public access along waterways to include ADA access. More information is available at www.co.burlington.nj.us/258/Block-Grant-Program.

US Economic Development Administration: Economic Adjustment Assistance Program

This program provides financial assistance to communities experiencing gradual or sudden adverse economic changes, including but not limited to those caused by federal declared disasters. More information is available at www.eda.gov/funding-opportunities/.

Federal Programs: Infrastructure

US Army Corps of Engineers: Emergency Streambank and Shoreline Protection

This program funds the construction of streambank and shoreline protection projects to reduce erosion risks for structures including highways, municipal water supply systems and sewage disposal plants, churches, hospitals, schools, non-profit public services, and known cultural sites. More information is available at www.mvr.usace.army.mil/Business-With-Us/Outreach-Customer-Service/Flood-Risk-Management/Section-14/.

US Army Corps of Engineers: Small Flood Risk Management Projects

This program funds construction or improvement of flood control works, levees, floodwalls, impoundments, or pumping stations; flood proofing; relocation of structures; or flood warning and preparedness systems. The Corps of Engineers oversees planning, design, and construction of flood risk management projects in coordination with the project sponsor. More information on this funding resource is available at www.mvr.usace.army.mil/Business-With-Us/Outreach-Customer-Service/Flood-Risk-Management/Section-205/.

Federal Programs: Open Space and Natural Resources

US Army Corps of Engineers: Aquatic Ecosystem Management and Restoration

This program provides financial and technical assistance to restore degraded aquatic ecosystems to a more natural condition. More information is available at www.mvr.usace.army.mil/Business-With-Us/Outreach-Customer-Service/Ecosystem-Restoration/Section-206/.

US Army Corps of Engineers: Project Modifications for Improvement of the Environment

This program offers financial and technical assistance for the planning, engineering, design, and construction of projects to restore ecosystems that have been degraded by a previously constructed Corps of Engineers project. Projects typically involve environmental restoration of aquatic, floodplain, and upland areas. More information on this program is available at www.mvr.usace.army.mil/Business-With-Us/Outreach-Customer-Service/Ecosystem-Restoration/Section-1135/.

US Army Corps of Engineers: Snagging and Clearing for Flood Control

This program provides financial and technical assistance to reduce flood damages by clearing and excavating channels, as well as constructing embankments in some instances, using materials from the clearing operation. More information on this program is available at www.mvr.usace.army.mil/Business-With-Us/Outreach-Customer-Service/Flood-Risk-Management/Section-208/.

State Programs: General Assistance

NJDEP Bureau of Flood Control

The Community Assistance Program Unit in NJDEP's Bureau of Flood Control offers a range of floodplain assistance to municipalities. This unit offers assistance with floodplain issues (in person or on the phone), floodplain ordinance and floodplain map creation and adoption, solving problems on development within Special Flood Hazard Areas, CRS applications and compliance, flood mapping, and disaster response. The unit also offers regular workshops on floodplain-related topics. More information on this program is available at www.nj.gov/dep/floodcontrol/about.htm#management.

NJDEP Coastal Management Program

The New Jersey Coastal Management Program (NJCMP) is part of the National Coastal Zone Management Program and provides resources for sustainable and resilient coastal community planning, and climate change planning. Their technical assistance offerings include contractor assistance, direct municipal grant programs, and funding for the implementation of living shorelines or other nature-based mitigation projects. The available resources are updated regularly. For more information, contact the Coastal Management Office (www.state.nj.us/dep/cmp/czm_contact.html).

State Programs: Flood Relief and Control

NJDEP Shore Protection Program

This cost-share program provides grants to protect property and infrastructure from coastal storm damage, erosion and shoreline migration, and sea level rise. Funds can be used for the protection, stabilization, restoration, or maintenance of the shore, including monitoring studies and land acquisition. Projects must be consistent with the New Jersey Shore Protection Master Plan and Coastal Zone Management Program. Project areas must be affected by normal tidal cycles and be located on public or private property which has legal, perpetual easements assigned to the state for public access and use. More information is available at www.nj.gov/dep/shoreprotection/funding.htm.

NJ Office of Emergency Management Public Assistance Program

This program was developed to assist public entities in New Jersey with getting federal funding for repairs, restorations, reconstruction, or replacement of public facilities or infrastructure damaged by a disaster. The program coordinates damage and needs assessments in response to expected or actual emergency situations as part of the Federal Disaster Assistance Program. The funds available differ for each community in each declared disaster area. More information is available at www.state.nj.us/njoem/plan/public-assist.html.

State Programs: Open Space Preservation and Management

NJDEP Blue Acres Program

In 2009, New Jersey passed an act to authorize bonds for the acquisition of lands in the state's floodways for recreation and natural resources protection. \$24 million is available for acquiring properties that have been damaged by storms, may be prone to incurring damage from storms or storm-related flooding, or protect other

lands from such damage. All Blue Acres acquisitions must be from willing sellers. More information is available at www.nj.gov/dep/greenacres/blue_flood_ac.html.

NJDEP Community Stewardship Incentive Program (CSIP) Grant

This program provides grants to local governments and shade tree commissions to help implement a comprehensive community forestry management plan. Grant categories include resiliency planning, hazard mitigation, and reforestation and tree planting. More information on the program is available at www.state.nj.us/dep/parksandforests/forest/community/grants-csip.html.

NJDEP Green Acres Program

The Green Acres program provides low-interest loans and grants to municipal and county governments to acquire open space and develop outdoor recreation facilities. Green Acres works with local governments from grant application through project completion. All land funded under this program must be open to the public. More information is available at www.nj.gov/dep/greenacres/local.html.

NJDEP Green Communities Grant (Community Forest Program)

This program assists local governments in developing Community Forestry Management Plans that guide communities in establishing and maintaining urban and community forests. Funding is provided through the USDA Forest Service Urban and Community Forestry Program. More information is available at www.nj.gov/dep/grantandloanprograms/nhr_gccg.htm.

State Programs: Contaminant Mitigation

NJDEP Hazardous Discharge Site Remediation Fund

This program provides grants to municipalities, counties, and redevelopment entities for investigating and remediating contaminated sites identified as areas in need of redevelopment, and for remediating contaminated sites located in a designated Brownfield Development Area. Applications are available online or may be obtained by request from NJDEP. More information on the program is available at www.nj.gov/dep/srp/finance/hdsrf/.

NJDEP Technical Assistance Grants

Technical Assistance Grants provide funding to nonprofit community groups to improve the community's understanding of the environmental conditions at a contaminated site and remediation processes. The bulk of the funding must be used to hire an independent Licensed Site Remediation Professional as a technical advisor to help interpret and comment on site documents. The grant funds are available to community groups during the Remedial Investigation phase and the Remedial Action phase of remediating a contaminated site. Local governments have to partner with an eligible nonprofit organization to make use of these funds. More information is available at www.nj.gov/dep/grantandloanprograms/sr_techassist.htm.

State Programs: Water Quality Protection

NJDEP and NJEIT Environmental Infrastructure Financing Program

This program, funded through both NJDEP and NJEIT, provides low-interest loans for constructing water quality protection facilities, including for wastewater treatment and stormwater and nonpoint source pollution

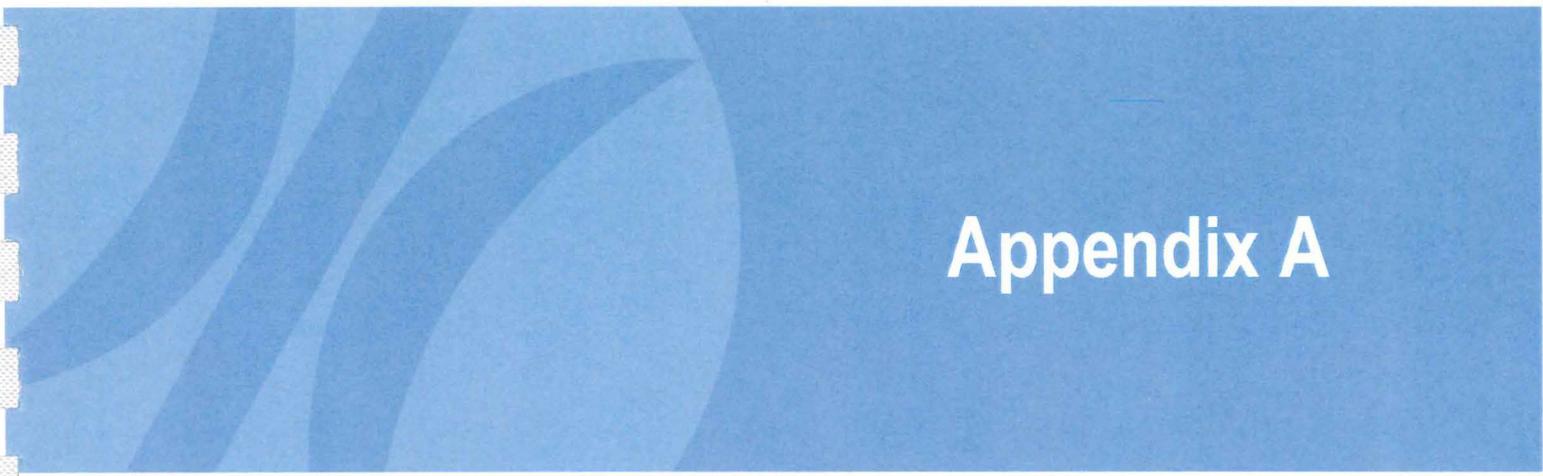
management. The Financing Program also provides loans for activities such as open space land purchase and conservation, contamination remediation, and well sealing. More information is available at www.nj.gov/dep/grantandloanprograms/sr_techassist.htm and www.njeit.org/.

[NJDEP Nonpoint Source Pollution Control Grants \(319 Grant Program\)](#)

The Nonpoint Source Pollution Control Grants program provides grants to reduce water quality impairment through nonpoint source pollution control projects. More information on the program is available at www.nj.gov/dep/grantandloanprograms/eps_nspc.htm.

[Rutgers University Cooperative Extension Water Resources Program](#)

The Water Resources Program is a specialized program at Rutgers Cooperative Extension that identifies and addresses community water resources issues. Their projects and programs currently include agricultural watershed planning and implementation, green infrastructure education and construction, impervious cover reduction, municipal stormwater management, community training on water quality issues, rain garden and rain barrel workshops, and watershed planning and implementation. More information is available at water.rutgers.edu/.



Appendix A

Coastal Vulnerability Assessment Matrix for Moorestown's Assets Vulnerability and Consequences in 2100 in a Category 2 Storm

Sea Level Rise Projections

YEAR	SLR FROM PRESENT
Present	-
2050	1.4
2100	3.3

TOP AREAS OF CONCERN

Asset Name	Asset Category	Asset Description	Flood Depths on Parcel	Exposure	Sensitivity	Vulnerability Rating	Consequences	Consequences Rating
Azko Chemicals	Hazardous Site	Located at NJ Route 73 N. and Pennsylvania Railroad Bridge (Maple Shade Township). As of April 2016, the site is active with confirmed contamination. It is still operating, producing specialty epoxies for various industries and applications.	0 ft - 10.3 ft	The driveway and some buildings onsite may face up to 2 ft of inundation.	As this site is outside of Moorestown Township, the sensitivity of the structures onsite is unknown. Bill Butler, Utilities Superintendent at the wastewater treatment plant, may be able to provide more information.	Insignificant to Moderate	A flood event could spread contaminants from this site onto Moorestown Township property downstream after a storm, but the consequences depend on the location of the contamination, the type of contaminants onsite, and their current rate and volume of migration through soil and groundwater. Bill Butler, Utilities Superintendent at the wastewater treatment plant, may be able to provide more information.	Minor to Moderate
Strawbridge Lake Dam	Utility (Flood Control Structure)	Located downstream of the Kings Highway Water Treatment Plant, which is located at 120 Kings Hwy., Moorestown (Block 2900, Lot 1). It controls the flow of water along the Pennsauken Creek and helps protect the Kings Highway Water Treatment Plant and structures along and near Kings Hwy. from being flooded.	2.2 ft - 6.6 ft	The dam is projected to hold back more than 6 ft of water. Depending on the height of the dam, it may be overtopped.	The sensitivity of the dam depends on the height of the dam relative to the potential height of the predicted flood waters. If the dam is of newer construction or made of more durable materials, these qualities may increase the dam's resilience to flood effects.	Insignificant to High	As a Class III dam, loss of the dam in a flooding scenario would cause a loss of adjacent property use, but not damage to property. A small portion of the township along Haines Dr., Foxwood Dr., Lois Ln., and Nixon Dr. might receive additional inundation if the dam failed.	Minor
Main Street Pumping Station	Hazardous Site	Located at Main Street Treatment Plant (Maple Shade Township). As of April 2016, the site is active with confirmed contamination. It pumps water from the Pennsauken Creek.	0 ft - 10.0 ft	All buildings except for one at the entrance to the site may be inundated with up to 4 ft of water. Much of the driveway into the site would also be inundated with up to 4 ft of water.	As this site is outside of Moorestown Township, the sensitivity of the pumping station is unknown. Bill Butler, Utilities Superintendent at the wastewater treatment plant, may be able to provide more information.	Low to High	A flood event could spread contaminants from this site onto Moorestown Township property downstream after a storm, but the consequences depend on the location of the contamination, the type of contaminants onsite, and their current rate and volume of migration through soil and groundwater. Bill Butler, Utilities Superintendent at the wastewater treatment plant, may be able to provide more information.	Minor to Moderate
Moorestown Shopping Center	Economic Asset	Located at 200 W. Camden Ave., Moorestown. Contains a mixture of neighborhood-serving retail.	0 ft - 10.6 ft	While the entrance and some parking at the shopping center will not be flooded, the remainder of the site will. Flooding of the loading dock area could reach 5 ft, while most of the building will see 2-3 ft of flooding.	The sensitivity of the building depends on its materials, age, and layout (in particular, whether it has a basement). Malls are often made of durable materials, but with repeat flooding, these materials can degrade over time.	High	The mall may have to be renovated or reconstructed after a flood, which could take several months to several years, depending on the extent of the damage. Besides being expensive for the owner, any closure would cause staff to be temporarily unemployed. Community members who shop at the mall would find similar amenities in other malls, but would be more inconvenienced.	Minor

TOP AREAS OF CONCERN (CONT'D)

Asset Name	Asset Category	Asset Description	Flood Depths on Parcel	Exposure	Sensitivity	Vulnerability Rating	Consequences	Consequences Rating
Moorestown Township Sewer Water Treatment Plant	Utility (Wastewater Treatment Plant)	Located on N. Lenola Rd., Moorestown. Treats sewer water for the entire township.	0 ft - 12.3 ft	About one half of the site, including structures and treatment/holding equipment, may flood. Flooding depths for equipment are typically in the 0-4-ft range but reach 10 ft in some locations.	Much of the equipment that could be flooded is safe because it is elevated or walled in. More information is required to determine the sensitivity of each structure, particularly regarding its materials and age.	Insignificant to Moderate	The closure of parts of the sewer water treatment plant after a flood could affect virtually the entire township. Repairs to systems that flood could take weeks or months, during which time the township would have to find other means to treat municipal wastewater. Those connected to the municipal sewer system would be unable to function normally during this time.	High

NATURAL ENVIRONMENT

Boundary Creek Natural Resource Area	Park	Located at 518 Creek Road, Moorestown. 34-acre passive recreation park and wildlife refuge.	0 ft - 10.7 ft	Flooding may cover about one-third of the park, including portions of the two trail loops.	The trails may be damaged by the flooding, depending on their construction materials, but there is no other infrastructure that could be damaged. The area that floods is already located within the 100-year (1 percent) floodplain. From an ecological perspective, the site is likely already fairly resistant to the expected extent and depth of flooding.	Low	Visitors would temporarily be unable to walk through the park. The area that floods is already located within the 100-year (1 percent) floodplain, so most species would likely be reasonably tolerant of this extent of flooding, and the basic functioning of the ecosystem would not likely be disrupted.	Insignificant
Capped Former Landfill	Open Space	Located at 201 Creek Rd., Moorestown.	0 ft - 12.2 ft	An approximately 150-ft shoreline along the Rancocas Creek is subject to flooding, as is the wetland area within the property that is located along a tributary of Parkers Creek.	The area that floods is already located within the 100-year (1 percent) floodplain. From an ecological perspective, the site is likely already fairly resistant to the expected extent and depth of flooding.	Low	The extent of flooding, as it is at the edges of the site, would not substantially affect visitors. The area that floods is already located within the 100-year (1 percent) floodplain, so most species would likely be reasonably tolerant of this extent of flooding, and the basic functioning of the ecosystem would not likely be disrupted.	Insignificant
Riparian Open Space and Habitat	Open Space and Habitat	Wetlands, shrubland, and forested areas located along the Pennsauken and Rancocas Creeks.	0 ft - 9.1 ft	Much of the open space that will face coastal flooding is in the form of wetlands. It will continue to be inundated, with increased depths likely, through 2100.	Wetland plant and animal species already in the 100-year (1 percent) floodplain should be somewhat adapted to flooding conditions, though not as much as species immediately on the waterfront.	Low	The area that is predicted to flood is already located within the 100-year (1 percent) floodplain, so most species would likely be reasonably tolerant of this extent of flooding, and the basic functioning of the ecosystem would not likely be disrupted. However, if certain areas are permanently inundated that were not previously so, the change could disrupt normal ecosystem processes. Erosion of habitat, often wetlands, reduces the amount of open space that serves as a buffer between water bodies and neighborhoods, making the flooding of structures more probable.	Insignificant to Minor (Insignificant to Moderate after 2100)
Strawbridge Park	Park	Located at 440 S. Church St., Moorestown. Passive recreation park.	0 ft - 7.5 ft	The shoreline of the park may be flooded with a little over 1 ft of water. Deeper flooding is concentrated close to the bridge at Kings Hwy.	The shoreline does not contain structures that could increase the sensitivity of the site. Water can pass over the site and recede without much impact.	Low	Deep or prolonged flooding could cause some erosion to the shoreline. Visitors may temporarily not have access to the waterfront at the park. Some parking lots may be partially flooded.	Insignificant

BUILT ENVIRONMENT (CONT'D)								
Asset Name	Asset Category	Asset Description	Flood Depths on Parcel	Exposure	Sensitivity	Vulnerability Rating	Consequences	Consequences Rating
Moorestown Children's School	Institutional/Cultural/Govt (School)	Located at 760 Garwood Rd., Moorestown. Private school serving preschoolers as well as after-school activities for kids up to 6th grade.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
Moorestown Friends School K-12	Institutional/Cultural/Govt (School)	Located at 114 E. Main St., Moorestown. Private school serving grades K-12 with approx. 670 students.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
Moorestown High School	Institutional/Cultural/Govt (School)	Located at 350 Bridgeboro Rd., Moorestown. Public high school serving grades 9-12 with approx. 1,400 students.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
Moorestown Mall	Economic Asset	Regional center located at 400 NJ Route 38, Moorestown.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
Moorestown Police Department	Emergency Facility (Police)	Municipal police headquarters located at 1245 N. Church St., Moorestown.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
Moorestown Upper Elementary School	Institutional/Cultural/Govt (School)	Located at 325 Borton Landing Rd., Moorestown. Public elementary school serving grades 4-6 with approx. 930 students.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
New Albany Road	Transportation (Designated Evacuation Route)	Located in central and west Moorestown. Evacuates residents to Maple Shade Township.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
NJ Route 38	Transportation (Designated Evacuation Route)	Located in south Moorestown. Evacuates residents to Maple Shade and Mount Laurel Townships.	0 ft - 4.5 ft	This route may see inundation of up to 4 ft in the section of the road between Nixon Dr. and E. Gate Rd.	Extended periods of flooding, high-velocity floods, or flooding that parallels a road can cause erosion of roadway infrastructure, but the elevation of the roadway may prevent flooding from occurring.	Insignificant to Moderate	Moorestown has multiple evacuation routes, and drivers attempting to cross the Pennsauken Creek at NJ Route 38 would be able to reroute to other parallel roads. The inconveniences of traffic rerouting and delays on redundant unflooded roads would be temporary.	Minor
Our Lady of Good Counsel	Institutional/Cultural/Govt (School)	Located at 23 W. Prospect Ave., Moorestown. Private school affiliated with the church serving preschoolers and grades K-8.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
Route 38 Pumping Station	Utility	Located at 325 W. Route 38, Moorestown (Block 3104, Lot 2). It pumps water from the Pennsauken Creek.	0 ft - 4.3 ft	A small amount of inundation on the shoreline is predicted, but the pumping station itself is out of harm's way. However, some flooding may reach the station in decades after 2100.	The pumping equipment may be adversely affected by water at certain depths or extents, but more information is needed about the equipment.	Insignificant (Insignificant to Low after 2100)	If the pumping station equipment were flooded, then residences and businesses in neighborhood relying on this station would not have access to their typical water source for days or weeks.	Insignificant (Insignificant to Minor after 2100)
Sbar Pumping Station	Utility	Located at Sbar Boulevard, Moorestown (Block 100, Lot 1.03). It pumps water from the Pennsauken Creek.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
South Lenola Road Pumping Station	Utility	Located at 257 S. Lenola Rd., Moorestown (Block 1800, Lot 1). It pumps water from the Pennsauken Creek.	0 ft - 9.5 ft	The site currently receives partial inundation, which will continue into 2100. No equipment appears to be affected by flooding in 2100; however, flooding from more severe storms in subsequent decades could reach the equipment.	The pumping equipment may be adversely affected by water at certain depths or extents, but more information is needed about the equipment.	Insignificant (Insignificant to Moderate after 2100)	If the pumping station equipment were flooded, then residences and businesses in neighborhood relying on this station would not have access to their typical water source for days or weeks.	Insignificant (Insignificant to Minor after 2100)

BUILT ENVIRONMENT (CONT'D)

Asset Name	Asset Category	Asset Description	Flood Depths on Parcel	Exposure	Sensitivity	Vulnerability Rating	Consequences	Consequences Rating
South Valley Elementary School	Institutional/Cultural/Govt (School)	Located at 210 S. Stanwick Rd., Moorestown. Public elementary school serving preschoolers and grades K-3 with approx. 430 students.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
South Valley Pumping Station	Utility	Located at 238-240 Pine St., Moorestown. It pumps water from the Pennsauken Creek.	0 ft - 12.3 ft	Up to five structures onsite may be affected by flooding. Depths around the storage tanks may reach up to 5 ft while other structures will see around 1 ft of flooding or less.	The anticipated flooding around the storage tanks is too shallow to have an impact. The other structures should be evaluated for their sensitivity to slight flooding.	Insignificant to Low	If the pumping station equipment were flooded, then residences and businesses in the neighborhood relying on this station would not have access to their typical water source for days or weeks.	Minor
Star Gas Propane	Hazardous Site (Gas Station)	Gas station located at 3110 NJ Route 73 N. (Maple Shade Township).	0 ft	The site will not receive inundation through 2100, but is on the edge of the predicted extent and may see damages in following decades.	As this site is outside of Moorestown Township, the sensitivity of the pumping station is unknown. Bill Butler, Utilities Superintendent at the wastewater treatment plant, may be able to provide more information.	Insignificant (Low to High after 2100)	A flood could spread contaminants from this site onto Moorestown property downstream after a storm, but the consequences depend on the location of the contamination, the type of contaminants onsite, and their rate and volume of migration through soil and groundwater. Bill Butler may be able to provide more information.	Insignificant (Minor to Moderate after 2100)
Tallman House	Institutional/Cultural/Govt (Place with Cultural and Historical Significance)	Private historic property located at 651 Centerton Rd., Moorestown.	0 ft - 9.4ft	Some inundation of forested area in the property will occur, but structures appear to be out of harm's way. Shallow flooding may reach structures in stronger storms or decades after 2100.	More information is needed on the materials and condition of the structures closer to Rancocas Creek to determine their sensitivity. Historic structures may be more sensitive because they are old, fragile, and/or cannot be moved, or they may be less sensitive because they were built to withstand decades of use with durable materials and high levels of craftsmanship.	Insignificant	The property is a valued historic resource in the township, but if it were closed for temporary repairs from flooding, it would not substantially affect the township's population.	Insignificant (Insignificant to Minor after 2100)
Venable/Browning House and Slim House	Institutional/Cultural/Govt (Place with Cultural and Historical Significance)	Private historic property located at 834 N. Lenola Rd., Moorestown.	0 ft - 0.1 ft	Negligible inundation of the property may occur in 2100. Very shallow flooding may reach structures in stronger storms or decades after 2100.	More information is needed on the materials and condition of the structures closer to Pennsauken Creek to determine their sensitivity. Historic structures may be more sensitive because they are old, fragile, and/or cannot be moved, or they may be less sensitive because they were built to withstand decades of use with durable materials and high levels of craftsmanship.	Insignificant	The property is a valued historic resource in the township, but if it were closed for temporary repairs from flooding, it would not substantially affect the township's population.	Insignificant (Insignificant to Minor after 2100)
Wagon Bridge Run Pumping Station	Utility	Located at 14 Wagon Bridge Run, Moorestown. It pumps water from the Pennsauken Creek.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
William Allan Middle School	Institutional/Cultural/Govt (School)	Located at 801 N. Stanwick Rd., Moorestown. Public middle school serving grades 7-8 with approx. 670 students.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A

VULNERABLE POPULATIONS & HOUSING FACILITIES

Clover Apartments	Economically Disadvantaged Populations	Located at 108 W. Camden Ave., Moorestown.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
Lenola School Apartments	Senior Centers/Retirement Homes	Located at 100 New Albany Rd., Moorestown.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
Moorestown Mews	Senior Centers/Retirement Homes	Located at Centerton Rd., Moorestown (Block 9103, Lot 2).	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A

BUILT ENVIRONMENT								
Asset Name	Asset Category	Asset Description	Flood Depths on Parcel	Exposure	Sensitivity	Vulnerability Rating	Consequences	Consequences Rating
Borton Landing House and Barn	Institutional/Cultural/Govt (Place with Cultural and Historical Significance)	Private historic property located on Borton Landing Rd., Moorestown (Block 8600, Lot 1).	0 ft - 12.1 ft	The dock is the major piece of infrastructure that may be inundated. Some portions of the main building and the pool may become inundated with 0-4 ft of water.	More information is needed on the materials and current condition of the main building structure to determine its level of sensitivity. Historic structures may be more sensitive because they are old, fragile, and/or cannot be moved, or they may be less sensitive because they were built to withstand decades of use with durable materials and high levels of craftsmanship.	Low to Medium	The property is a valued historic resource in the township, but as only part of it might be affected in a storm, and could likely be reconstructed soon after, the township should not be affected substantially or for a long period of time.	Insignificant
Camden Avenue	Transportation (Designated Evacuation Route)	Located in west Moorestown. Evacuates residents to Maple Shade Township.	0 ft - 0.2 ft	Inundation on this route is expected to be minor within Moorestown Township. However, up to 6 ft of inundation may occur along the evacuation route just outside of Moorestown in Maple Shade Township.	Extended periods of flooding, high-velocity floods, or flooding that parallels a road can cause erosion of roadway infrastructure, but the elevation of the roadway may prevent flooding from occurring.	Road within Moorestown: Insignificant; Including Maple Shade Twp: Insignificant to Moderate	Moorestown has multiple evacuation routes, and the area of Camden Avenue that is predicted to experience flooding in Maple Shade Township is close to the New Albany Road evacuation route, which does not experience flooding. The inconveniences of traffic rerouting and delays on redundant unflooded roads would be temporary.	Minor
Church Street	Transportation (Designated Evacuation Route)	Located in west Moorestown. Evacuates residents to Cinnaminson and Mount Laurel Townships.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
Fire District 1 Relief Engine Company	Emergency Facility (Fire Department)	Located at 200 Chester Ave., Moorestown.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
First Aid and Emergency Squad/ Fire District 1	Emergency Facility (Fire Department and Designated Emergency Shelter)	Located at 261 W. Main St., Moorestown.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
George Baker Elementary School	Institutional/Cultural/Govt (School)	Located at 139 W. Maple Ave., Moorestown. Public elementary school serving preschoolers and grades K-3 with approx. 380 students.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
Hartford Road Water Treatment Plant	Utility	Located at 510 Hartford Rd., Moorestown (Block 7301, Lot 20). It holds and treats water.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
Kings Highway	Transportation (Roadway)	Road located in south Moorestown.	0 ft - 8.1 ft	Kings Highway may become flooded by up to 8 ft of water as it crosses Pennsauken Creek.	Extended periods of flooding, high-velocity floods, or flooding that parallels a road can cause erosion of roadway infrastructure, but the elevation of the roadway may prevent flooding from occurring.	Insignificant to Moderate	Moorestown has multiple evacuation routes, and drivers attempting to cross the Pennsauken Creek at Kings Highway would be able to reroute to other parallel roads. The inconveniences of traffic rerouting and delays on redundant unflooded roads would be temporary.	Minor

BUILT ENVIRONMENT (CONT'D)

Asset Name	Asset Category	Asset Description	Flood Depths on Parcel	Exposure	Sensitivity	Vulnerability Rating	Consequences	Consequences Rating
Kings Highway Water Treatment Plant	Utility	Located at 120 Kings Hwy., Moorestown (Block 2900, Lot 1).	0 ft - 8.1 ft	Some open space would be inundated, but all other equipment and structures are out of harm's way.	The township already relocates moveable equipment from the site during storms. The water treatment plant is at level with or slightly upstream of a Class III (low hazard) dam that protects it. If the dam did fail, the resulting floodwater could reach some of the structures onsite, but the extent and depth of that flooding is not predicted by the SLOSH model used in this project and would require additional study.	Insignificant to Low	Inundation of critical structures at the plant could cause the township to shut it off to prevent contamination in the municipal water supply. As a result, residents and businesses in Moorestown Township who rely on municipal water would not have access to this particular water source for days, or potentially weeks or months, until the flooding abated and the township was able to adequately treat the water. The township would be required to seek an alternative source for those buildings during the period of reconstruction.	Minor
Kingsway Learning Center	Institutional/Cultural/Govt (School)	Located at 244 W. NJ Route 38, Moorestown. Private special education school serving pre-K through age 21.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
Landing Court/Cove Road	Transportation (Roadway)	Road located in east Moorestown.	0 ft - 1.7 ft	Landing Court and Cove Road may experience some minor flooding, with Landing Court having greater flooding levels of around 1 ft.	Extended periods of flooding, high-velocity floods, or flooding that parallels a road can cause erosion of roadway infrastructure, but the elevation of the roadway may prevent flooding from occurring.	Low	The flooding along these two roadways would block egress from five homes. However, these households appear to have sufficient resources to leave beforehand if needed and recover from damages.	Minor
Lenola Fire Company	Emergency Facility (Fire Department)	Located at 229 N. Lenola Rd., Moorestown.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
Lenola Road	Transportation (Designated Evacuation Route)	Located in west Moorestown. Evacuates residents to Cinnaminson and Mount Laurel Townships.	0 ft - 9.6 ft	This route may see inundation of up to 10 ft where it crosses the Pennsauken Creek. There is additional, more minor inundation of up to 0.3 ft possible along the evacuation route in Cinnaminson Township to the north.	Extended periods of flooding, high-velocity floods, or flooding that parallels a road can cause erosion of roadway infrastructure, but the elevation of the roadway may prevent flooding from occurring.	Insignificant to Moderate	Moorestown has multiple evacuation routes, and drivers attempting to cross the Pennsauken Creek at Lenola Road would be able to reroute to other parallel roads. The inconveniences of traffic rerouting and delays on redundant unflooded roads would be temporary.	Minor
Littles House	Institutional/Cultural/Govt (Place with Cultural and Historical Significance)	Private historic property located at 301 Creek Rd., Moorestown.	0 ft - 4.8 ft	Some inundation of forested area in the property may occur; structures appear to be out of harm's way. Shallow flooding may reach structures in stronger storms or decades after 2100.	More information is needed on the materials and current condition of the structures closer to Rancocas Creek to determine their level of sensitivity. Historic structures may be more sensitive because they are old, fragile, and/or cannot be moved, or they may be less sensitive because they were built to withstand decades of use with durable materials and high levels of craftsmanship.	Insignificant	The property is a valued historic resource in the township, but if it were closed for temporary repairs from flooding, it would not substantially affect the township's population.	Insignificant (Insignificant to Minor after 2100)
Lockheed Martin Emergency Medical Services	Emergency Facility	Located at 199 Borton Landing Rd., Moorestown.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A
Mary Roberts Elementary School	Institutional/Cultural/Govt (School)	Located at 290 Crescent Ave.; inland of Pennsauken Creek. Public elementary school serving preschoolers and grades K-3 with approx. 280 students.	0 ft	No inundation is expected from coastal flooding or sea level rise.	-	Insignificant	N/A	N/A



Appendix B

Appendix B: Vulnerability and Consequences Rating Keys

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 or 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, typical operations, routine, or daily life.</p> <p><i>Accessibility:</i> Key staff members are able to access facilities or locations without interruption.</p>
Low	<p><i>Exposure to Flooding:</i> Majority of this community asset is located out of harm's way.</p> <p><i>Physical/Structural Damage:</i> Minor physical or 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 members are able to access facilities or locations with minimal interruption.</p>
Moderate	<p><i>Exposure to Flooding:</i> Significant portion of this community asset is located in harm's way.</p> <p><i>Physical/Structural Damage:</i> Moderate physical or structural damages are 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 are moderately affected by flood hazard scenario.</p> <p><i>Accessibility:</i> Secondary evacuation and access routes available for use if or when primary systems fail.</p>
High	<p><i>Exposure to Flooding:</i> Majority of this community asset is located in harm's way.</p> <p><i>Physical/Structural Damage:</i> Severe level of harms (destruction on property, degradation of function, and/or injury) expected, resulting in 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, yielding a "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 asset, cause accessibility issues to other community assets. Key individuals, material supplies, core operating systems, and functioning interrupted or unavailable.</p>

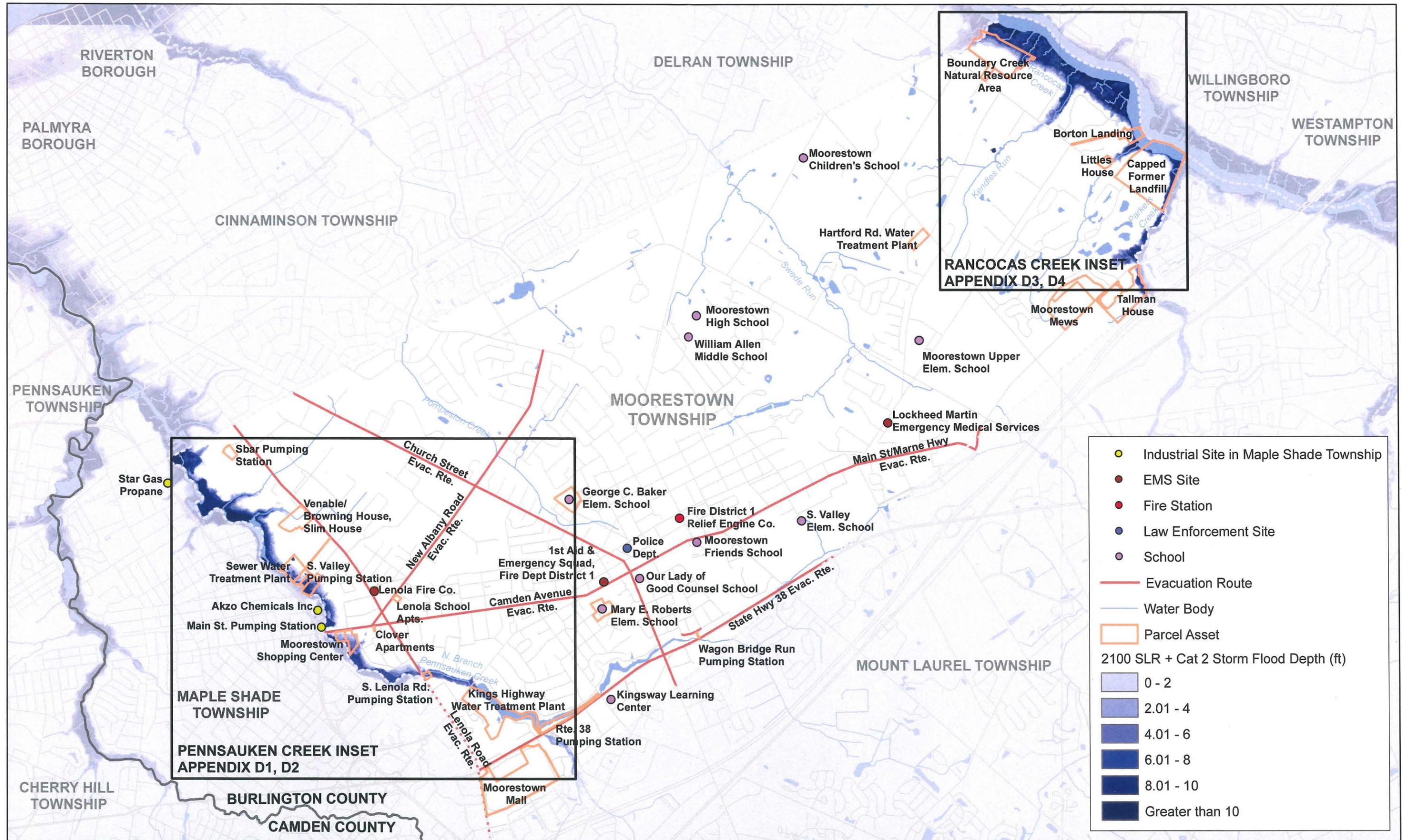
Consequences Rating Key

Level	Given Vulnerability of Assets, Rate the Magnitude or Severity of Consequences
1 Insignificant	<p><i>Injuries & Fatalities:</i> Only minor injuries, if any.</p> <p><i>Property Damages:</i> Only minor property damage.</p> <p><i>Population Displacement:</i> No population displacement.</p> <p><i>Public Health:</i> Human health impacts are negligible or not measurable.</p> <p><i>Economy:</i> Little to no impacts to major and local businesses. No loss of services.</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 or ecosystem exposure to toxics or hazardous materials.</p> <p><i>Municipal Budget:</i> Negligible operational costs.</p>
2 Minor	<p><i>Injuries & Fatalities:</i> Minor injuries, limited in geographic scope and/or affected population(s).</p> <p><i>Property Damages:</i> Limited property in narrow affected area damaged or destroyed.</p> <p><i>Population Displacement:</i> Temporary displacement of a small portion of the population.</p> <p><i>Public Health:</i> Measurable but minor adverse human health effects and increase of disease.</p> <p><i>Economy:</i> Minor impacts to major and local businesses. Minor interruption of supply and services.</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 "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>Injuries & Fatalities:</i> Multiple deaths or injuries possible over a broad population.</p> <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>Public Health:</i> Human health impacts are widespread, including increased risk of the spread of communicable diseases. Extended interruption of supply and services.</p> <p><i>Economy:</i> Disruptions to major and local businesses.</p> <p><i>Typical Operations/Daily Life:</i> Operations, routine, or daily life affected such that only redundant or alternative systems can be used for an extended duration. Highly vulnerable services, businesses, and populations suffer heavy adverse impacts while less sensitive systems seek alternative arrangements.</p> <p><i>Environment:</i> Major damage or loss of habitat or functioning of the systems as a component of "green" infrastructure of the community that may be permanent with adverse impacts. Large loss of natural resource base.</p> <p><i>Emergency Response:</i> Emergency response is strained, and may result 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>Injuries & Fatalities:</i> High number of deaths or injuries possible across a wide population.</p> <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>Public Health:</i> Widespread adverse and significant health impacts, possibly including spread of communicable disease.</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, routines, or daily life patterns intensely impacted for an extended period. Highly vulnerable services, businesses, and populations unlikely to bounce back from shock.</p> <p><i>Environment:</i> Permanent degradation of habitat and species or functioning of the systems as a component of "green" infrastructure of the community. Majority destruction of critical natural resources base.</p> <p><i>Economy:</i> Major loss of local businesses.</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> <p><i>Municipal Budget:</i> Operational costs exceed funding and place local government into adverse long-term financial conditions.</p>



Appendix C

Figure C1: Moorestown Township with Flooding from Sea Level Rise in 2100 and a Category 2 Storm



Sources: NJDEP, NJDOT, BCDIT, DVRPC. This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

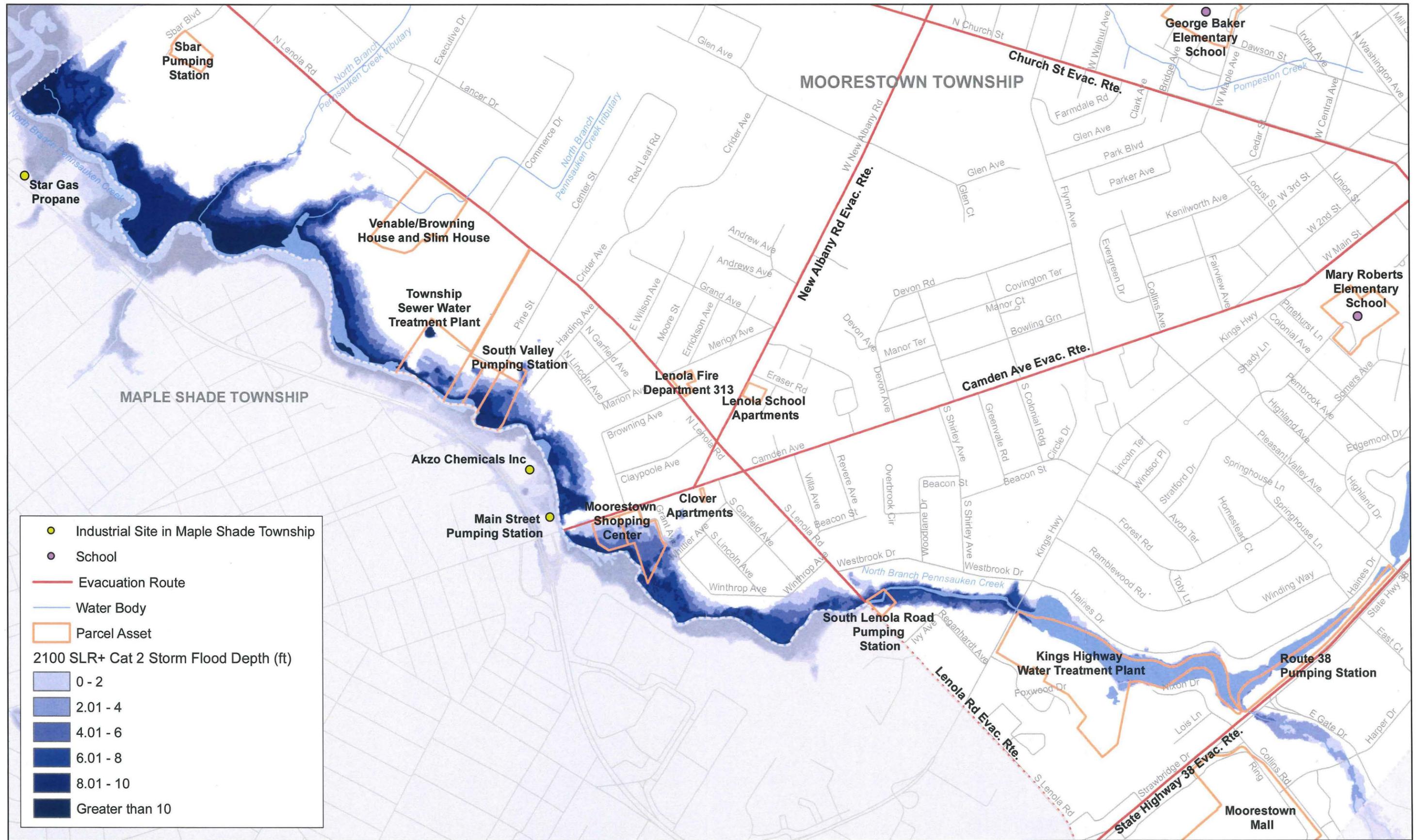






Appendix D

Figure D1: Pennsauken Creek with Flooding from Sea Level Rise in 2100 and a Category 2 Storm



0 0.25 0.5 1 Miles



Sources: NJDEP, NJDOT, BCDIT, DVRPC. This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.



Figure D2: Pennsauken Creek with Aerials, Open Space, and CVA Flood Scenario (Extent Only)



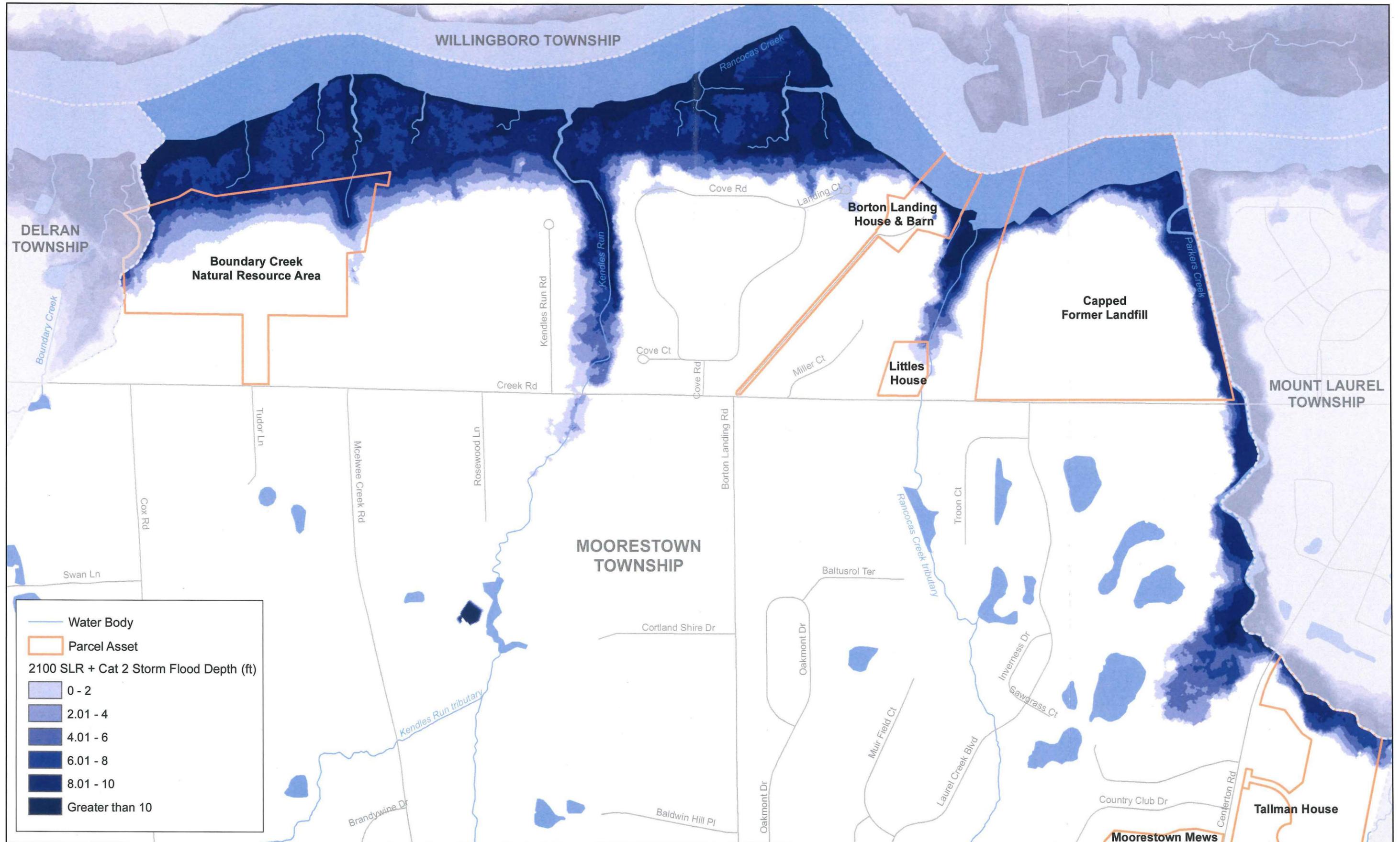
- Industrial Site in Maple Shade Township
- School
- Evacuation Route
- Parcel Asset
- Open Space, incl. Wetland and Upland Habitat
- Water from Creeks, Storm Surge, and Sea Level Rise



Sources: NJDEP, NJDOT, BCDIT, DVRPC. This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.



Figure D3: Rancocas Creek with Flooding from Sea Level Rise in 2100 and a Category 2 Storm



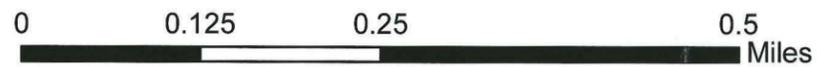
Sources: NJDEP, NJDOT, BCDIT, DVRPC. This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.



Figure D4: Rancocas Creek with Aerials, Open Space, and CVA Flood Scenario (Extent Only)



	Parcel Asset
	Open Space, incl. Wetland and Upland Habitat
	Water from Creeks, Storm Surge, and Sea Level Rise



Sources: NJDEP, NJDOT, BCDIT, DVRPC. This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.



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Burlington County, climate change, coastal vulnerability assessment, environment, flooding, hazard mitigation, Maple Shade Township, Moorestown Township, municipal planning, natural resources, New Jersey, Pennsauken Creek, Rancocas Creek, sea level rise, waterfront.

Abstract:

This report documents the coastal vulnerability assessment that DVRPC conducted with municipal staff and residents from Moorestown Township in 2016. The narrative outlines projected effects of climate change in New Jersey, records Moorestown's historic flooding issues and the actions taken to increase its resilience to floods, and discusses the coastal vulnerability assessment's methods, findings, and recommendations.

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