

New Jersey: Critical Assets Exposure Snapshot

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Introduction

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Critical assets are places a community needs to provide education, care, and public safety to residents. Some critical assets may be in areas that flood now, or are expected to flood in the future. It is important to understand critical assets' exposures to flood events, along with exposures to roads leading to and from those facilities. Knowing the services provided by critical assets will help a community plan for flooding.

There are 3 types of flood events:

1. Riverine (or 'fluvial') flood events occur when intense rain events cause rivers and streams to overtop their banks.
2. Flash (or 'pluvial') floods occur when intense rainfall causes a flood event that is not directly associated with a body of water. For example, flash flood events include floods in roadways from impaired stormwater management systems.
3. Coastal flood events occur when sea-level rise, high tides, and storm surge combine to create flood events that range from nuisance high-tide floods to destructive storm tides from seawater.

The Federal Emergency Management Agency (FEMA) models flood hazards, both riverine (1) and coastal (3), as part of the National Flood Insurance Program (NFIP) regulations and insurance requirements. FEMA does not model flash flood events (2) for their NFIP flood mapping.

In addition, coastal flood event exposures are assessed using a Total Water Level (TWL) approach for tidally influenced waters. The TWL approach combines sea-level rise and extreme water level information from NOAA to assess exposure to a variety of coastal flood events to complement FEMA flood mapping. [The Appendix below provides additional background.](#)



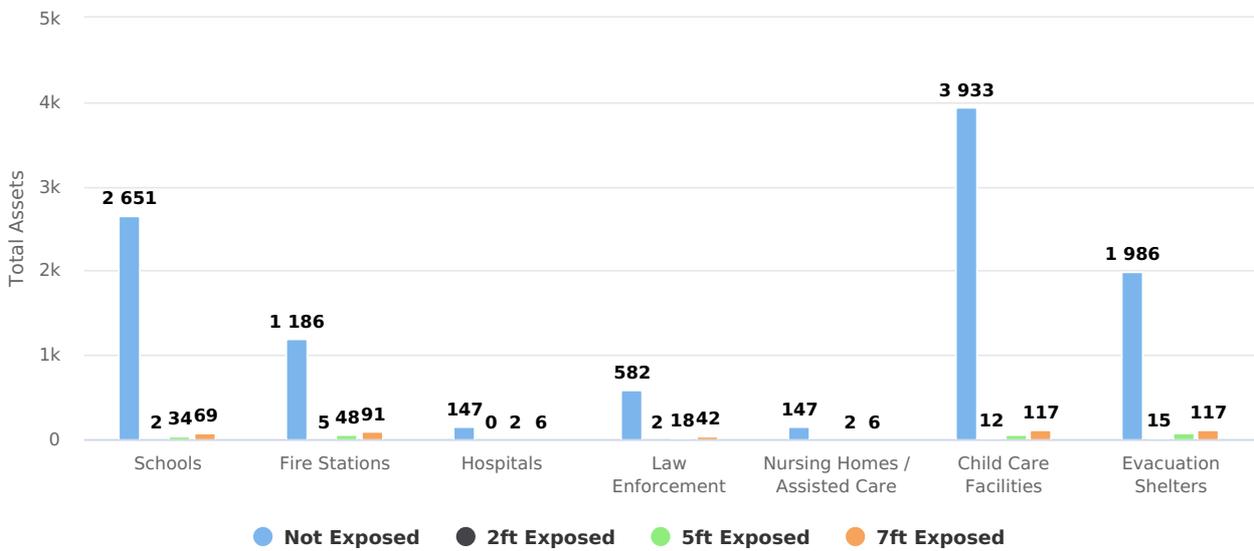
New Jersey: Critical Assets Exposure Snapshot

Critical Assets in Exposed Areas

Assets	Total Assets	# Exposed at 2ft TWL	# Exposed at 5ft TWL	# Exposed at 7ft TWL
Schools	2,720	2	34	69
Fire Stations	1,277	5	48	91
Hospitals	153	0	2	6
Law Enforcement	624	2	18	42
Nursing Homes / Assisted Care	153	0	2	6
Child Care Facilities	4,050	12	66	117
Evacuation Shelters	2,103	15	68	117

[LINK TO CRITICAL ASSETS LIVE MAP](#)

New Jersey Critical Assets Exposure Snapshot



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New Jersey: Critical Assets Exposure Snapshot

Critical Assets in FEMA Flood Zone Areas

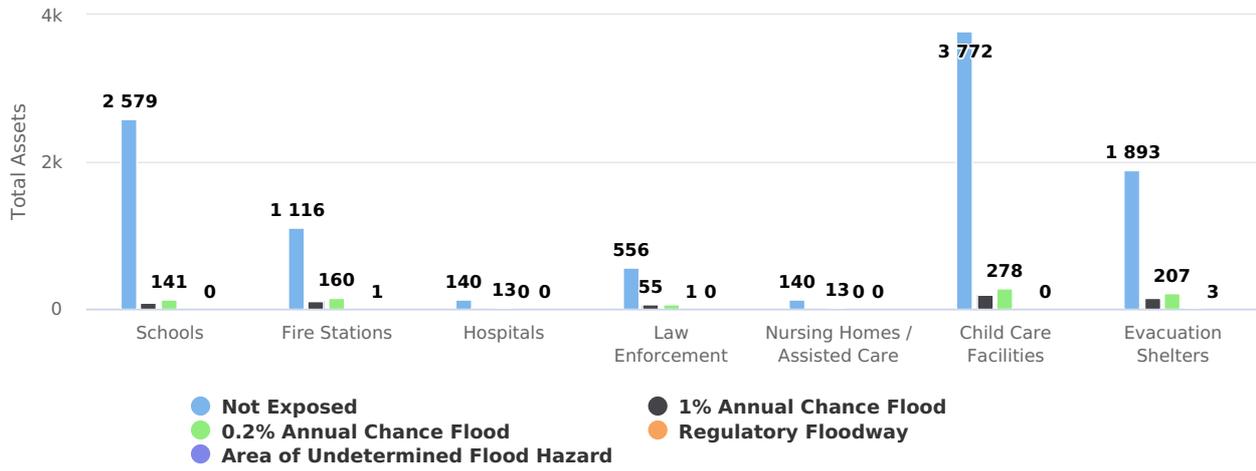
Assets	Total Assets	# Exposed in ...			
		1% Annual Chance Flood	0.2% Annual Chance Flood	Regulatory Floodway	Area of Undetermined Flood Hazard
Schools	2,720	91	141	1	0
Fire Stations	1,277	109	160	7	1
Hospitals	153	9	13	0	0
Law Enforcement	624	55	68	1	0
Nursing Homes / Assisted Care	153	9	13	0	0
Child Care Facilities	4,050	188	278	8	0
Evacuation Shelters	2,103	146	207	14	3

The FEMA National Flood Hazard Layer (NFHL) dataset represents the current effective flood data across the United States. Areas in the National Flood Hazard Layer are:

- Floodway: The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood height.
- 1% Annual Chance Flood: The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones **A**, **AE**, **AH**, **AO**, **AR**, **A99**, **V**, and **VE**. The Base Flood Elevation is that water-surface elevation of the 1% annual chance flood.
- 0.2% Annual Chance Flood: The 0.2% annual flood (500-year flood) is the flood that has a 0.2% chance of being equaled or exceeded in any given year.
- Areas of Undetermined Flood Hazard are areas with possible but undetermined flood hazards.
- FEMA Flood Zone exposure analyses are inclusive of lesser FEMA flood designations. The number exposed to 1% Annual Chance Flood includes those exposed in the Regulatory Floodway area in its analysis and the 0.2% Annual Chance Flood includes those exposed in the 1% Annual Change Flood and in the Regulatory Floodway.

[LINK TO CRITICAL ASSETS LIVE MAP](#)

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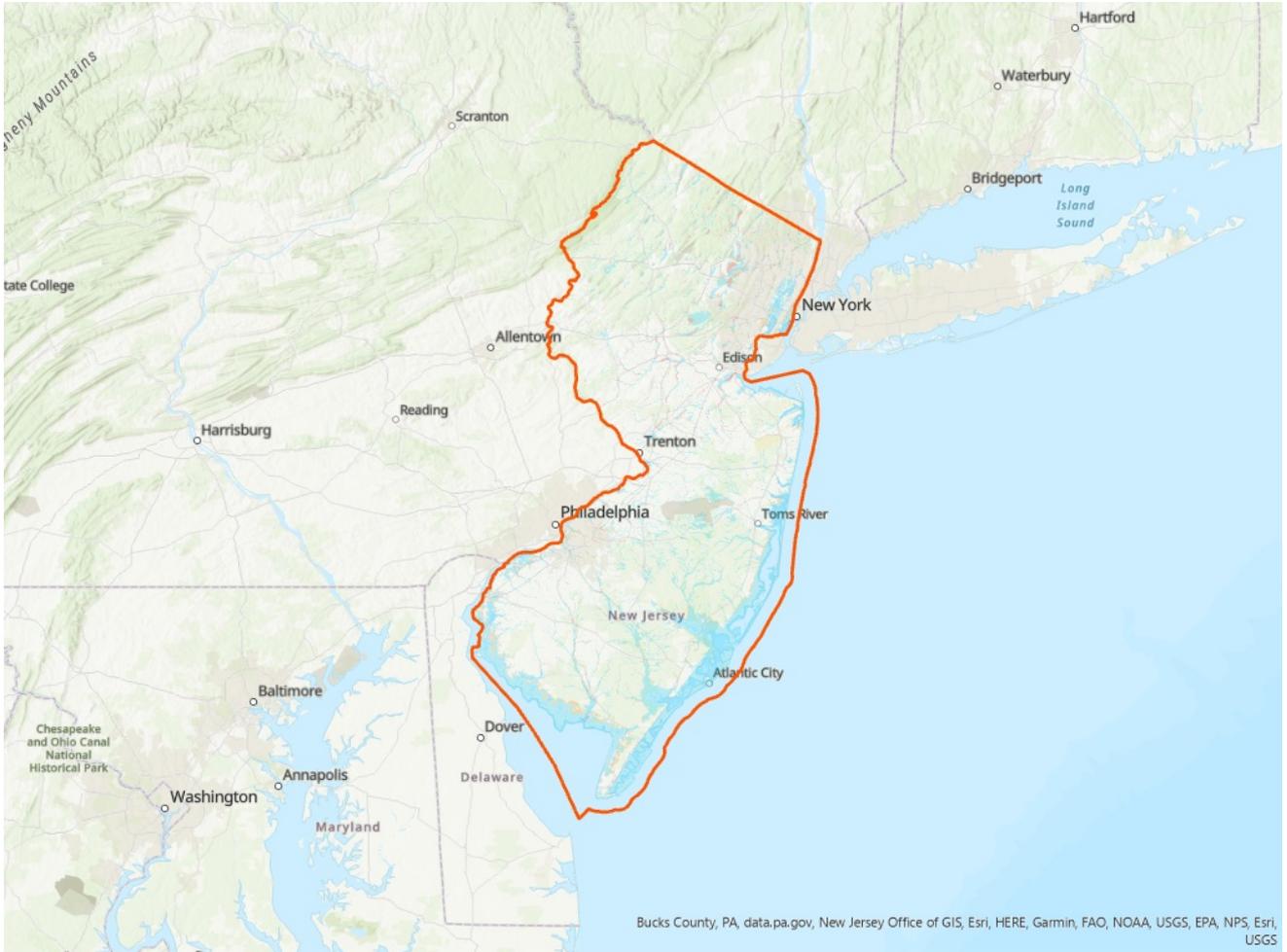
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New Jersey: Critical Assets Exposure Snapshot

Maps

FEMA Flood Zones

[LINK TO CRITICAL ASSETS LIVE MAP](#)

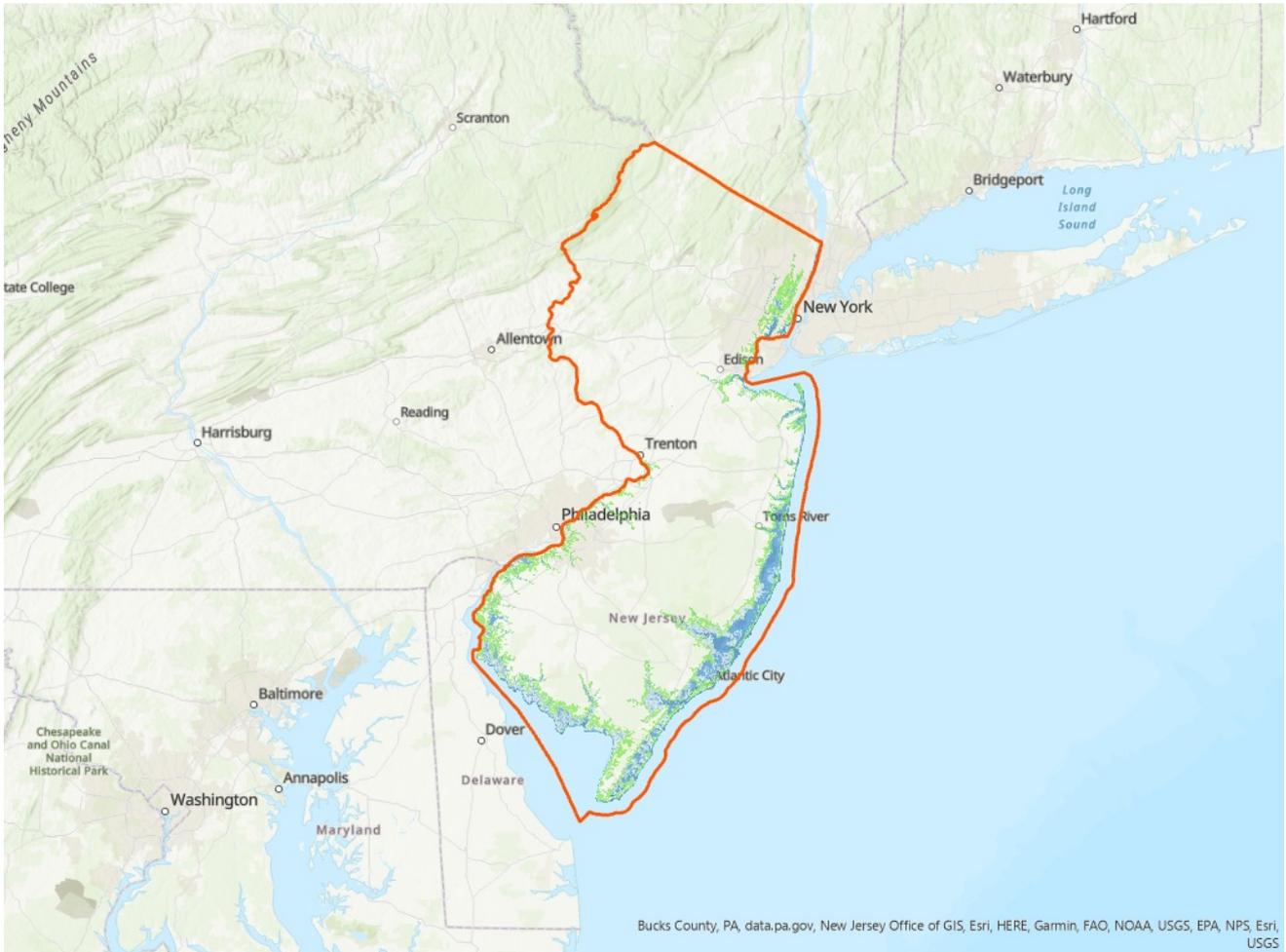


New Jersey: Critical Assets Exposure Snapshot

2 ft. Exposed

[LINK TO CRITICAL ASSETS LIVE MAP](#)

A 2-foot flood event along the New Jersey coast today can occur because of a coastal storm or especially high tide. By 2050, the same 2-foot flood event may happen during daily high tide alone because of sea-level rise. While daily high tides will result in flood inundation for parts of every day, coastal storm-induced flood events last only for the duration of a storm (although their impacts could be felt for far longer). Critical assets with exposures to a 2-foot flood event should consider short-term impacts from temporary inundation due to a storm, and longer-term impacts from permanent inundation when waters may not recede.

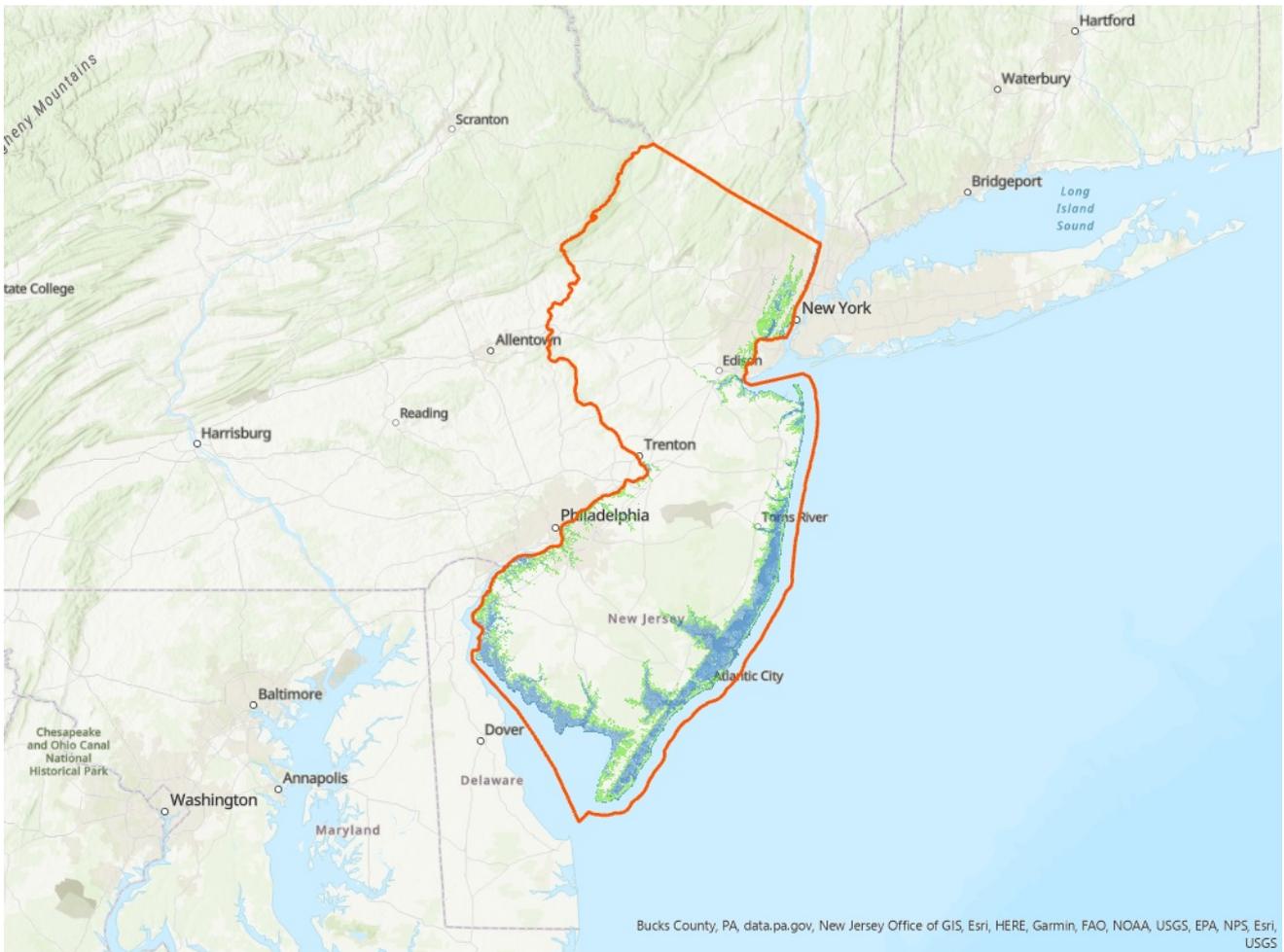


New Jersey: Critical Assets Exposure Snapshot

5 ft. Exposed

[LINK TO CRITICAL ASSETS LIVE MAP](#)

A 5-foot flood event along the New Jersey coast today can occur from a combination of coastal storm surge (hurricane or nor'easter) on top of a rising mean sea level. In the future, a 5-foot flood event along the New Jersey coast would become more likely to occur as the mean sea-level rises. By 2100, the same 5-foot flood event is projected to happen during daily high tide alone because of sea-level rise. While daily high tides will result in flood inundation for parts of every day, coastal storm-induced flood events last only for the duration of a storm (although their impacts could be felt for far longer). Critical assets with exposures to a 5-foot flood event should consider short-term impacts from temporary inundation due to a storm, and longer-term impacts from permanent inundation when waters may not recede.

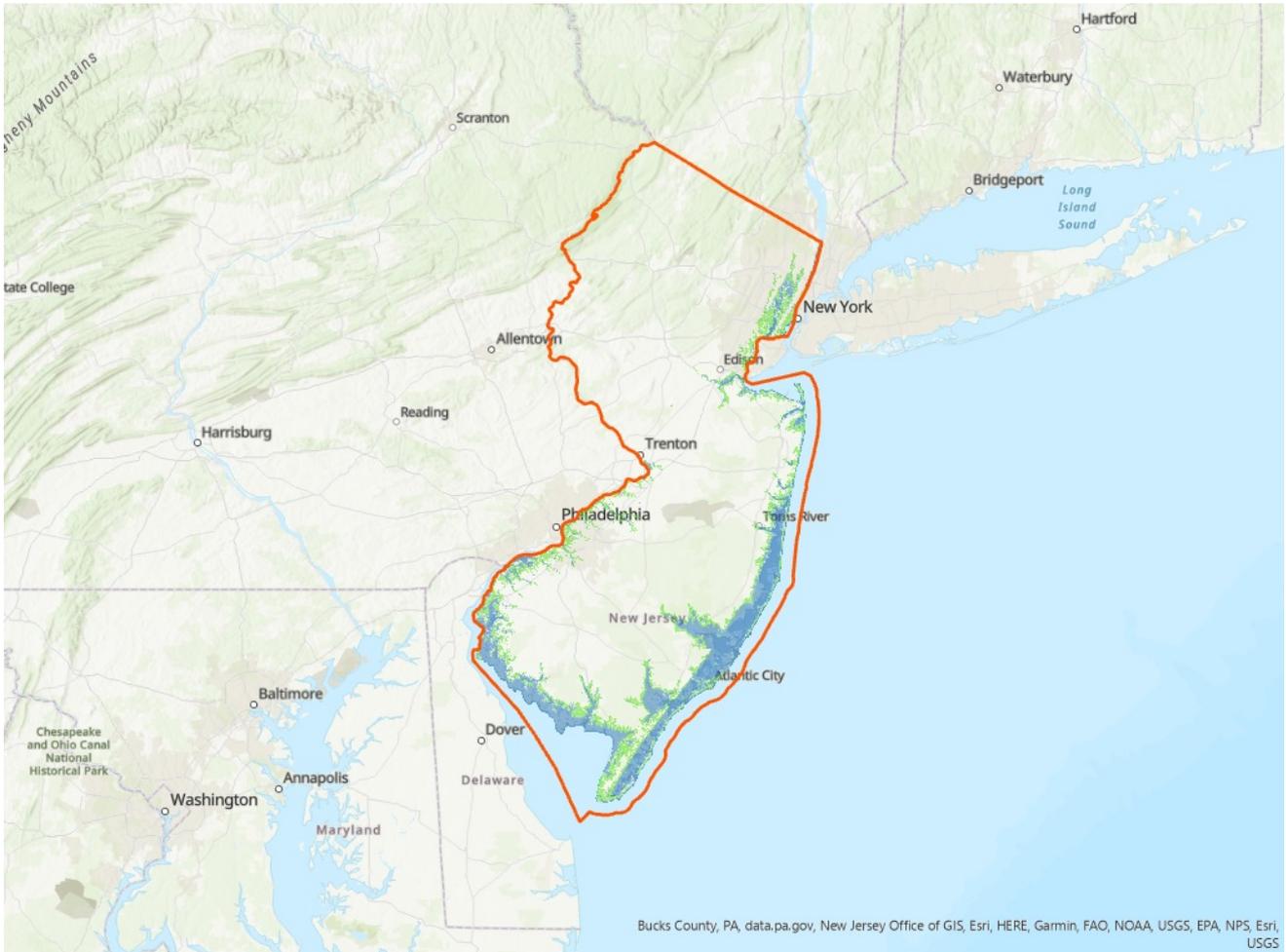


New Jersey: Built Infrastructure Assets Exposure Snapshot

7 ft. Exposed

[LINK TO CRITICAL ASSETS LIVE MAP](#)

A 7-foot flood event along the New Jersey coast today can occur from a combination of coastal storm surge (hurricane or nor'easter) on top of a rising mean sea level. In the future, a 7-foot flood event along the New Jersey coast would become more likely to occur as the mean sea-level rises. For critical facilities it is important to be aware of and plan for currently “low probability, high consequence” flood events whose probability of occurring will become greater as sea-levels rise. Critical assets with exposures to a 7-foot flood event should consider short-term impacts from temporary inundation due to a storm, and longer-term impacts from the increasing probability that such an event could occur as sea-levels rise.



New Jersey: Critical Assets Exposure Snapshot

Legend

NJ Political Boundaries

 State Boundary

FEMA NSS - Shelter Locations

-  Open
-  Closed
-  Full
-  Alert
-  Standby
-  Unknown

TWL

TWL Low-lying Areas



TWL Depth

-  High
-  Low
-  Low

FEMA Flood Zones

Flood Hazard Areas

-  1% Annual Chance Flood Hazard
-  Regulatory Floodway
-  Area of Undetermined Flood Hazard
-  0.2% Annual Chance Flood Hazard

Public schools



Fire Stations



Hospitals



Local Law Enforcement Locations



Nursing Homes



Child Care Centers



New Jersey: Built Infrastructure Assets Exposure Snapshot

Appendix: Background Information Regarding the Total Water Level Approach

This Appendix provides additional background on sea-level rise and the Total Water Level approach for assessing vulnerability of people, places, and assets in New Jersey to sea-level rise and sea-level rise combined with storm events.

Sea level Rise and Total Water Level: From 1911 to 2019, the mean sea-level rose 1.5 feet along the New Jersey coast, compared to a 0.6 feet rise in the global mean sea-level. New Jersey coastal areas are likely to experience sea-level rise of 0.5 to 1.1 feet between 2000 and 2030, and 0.9 to 2.1 feet between 2000 and 2050.

The number of days that New Jersey residents have experienced high-tide floods has also increased. From 2007 through 2016, there was an average of 8 high-tide flood events in Atlantic City each year. Based on the likely range of sea-level rise projections, Atlantic City will experience 17-75 days of expected high-tide flooding per year in 2030, and 45-255 days per year of expected high-tide flooding in 2050.

For the purposes of the exposure snapshots, different flood events are defined by total water levels (TWLs). TWLs present a height above high tide (See Figure A-1) that reflects the combined inundation from future sea-level rise and current flood events projected into the future from the year 2000 (Kopp et al., 2019).

Flood events¹ can occur from surge created by a coastal storm (such as a hurricane or nor'easter) or from high tide each day as sea levels rise. For example, a 2-foot flood event along the New Jersey coast today can occur because of seasonal 'high-tide flood' conditions. By 2050, the same 2-foot flood events will become more frequent, occurring under normal high-tide conditions and inundating the affected areas². While flood events resulting from daily tides will result in permanent inundation (i.e., the water will not recede), coastal storm induced flood events last only for the duration of a storm. A 7-foot flood event along the New Jersey coast that approximates potential hurricane storm tides today will become more likely in the future as coastal storm surge occurs on top of an increased baseline of sea-level to create higher storm tides. You can use our tools at ([NJADAPT](#) / [NJFLOODMAPPER](#)) to develop custom water levels for your region.

¹Flood events referenced in this document as examples reflect 'total water level' heights above Year 2000 Mean Higher High Water, consistent with the sea-level baseline datum. See Kopp et al., 2019.

²See Kopp et al., 2019 Appendix B for region specific high-tide flood frequency projections.

Total Water Level Approach

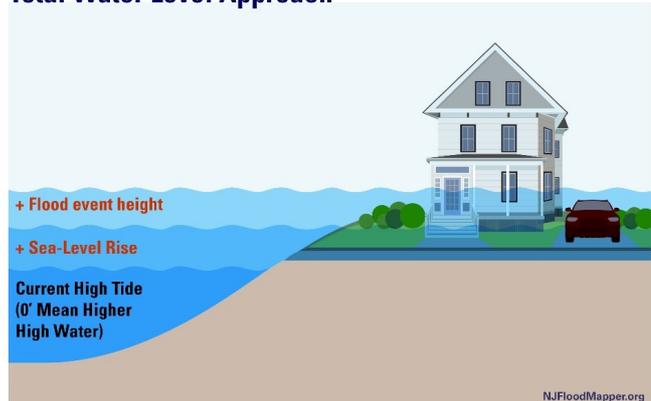


Figure A-1. Total Water Level reflecting combined inundation from future sea-level rise and flood events.

Metadata / Sources - Flood Hazards

Name	Description	Where to Get It	
		Map Service	Authoritative Source
FEMA Flood Zones	This FIRM data service allows users to view FIRMs for NJ. Counties were combined using the data downloaded from FEMA's Region II office.	FEMA Flood Zones Map Service	Federal Emergency Management Agency(FEMA)
Total Water Level (0 - 20 ft)	This dataset illustrates the scale of potential flooding, not the exact location, and does not account for erosion, subsidence, or future construction. Inundation is shown as it would appear during the highest high tides (excludes wind driven tides). The dataset should be used only as a screening-level tool for management decisions. As with all remotely sensed data, all features should be verified with a site visit.	Total Water Level Map Service	
Sea Level Rise (0 - 10 ft.)	This dataset was created as part of the National Oceanic and Atmospheric Administration Office for Coastal Management's efforts to depict potential sea level rise and its associated impacts on the nation's coastal areas. The purpose of the mapping viewer is to provide coastal managers and scientists with a preliminary look at sea level rise and coastal flooding impacts. The purpose of this dataset is to show potential sea level rise inundation above current Mean Higher High Water (MHHW) for the area. This dataset illustrates the scale of potential flooding, not the exact location, and does not account for erosion, subsidence, or future construction. Inundation is shown as it would appear during the highest high tides (excludes wind driven tides) with the sea level rise amount. The dataset should be used only as a screening-level tool for management decisions.	Sea Level Rise Map Services	NOAA Office for Coastal Management
SLR Mapping Confidence (0 - 10 ft.)	Inundation Uncertainty Associated with Elevation Data and Tidal Datum Conversion for Sea Level Rise. The purpose of this dataset is to depict errors that are directly related to elevation and water height data. These errors can be used to begin defining areas with mapped inundation that do not have the same level of confidence as other areas. For a detailed explanation of mapping methods, see https://meridian.allenpress.com/jcr/article-abstract/30/3/548/202407/Mapping-and-Portraying-Inundation-Uncertainty-of?redirectedFrom=fulltext	SLR Mapping Confidence Map Services	NOAA Office for Coastal Management

Metadata / Sources - Facilities

Name	Description	Where to Get It	
		Map Service	Authoritative Source
Public Schools	<p>This Public Schools feature dataset is composed of all Public elementary and secondary education facilities in the United States as defined by the Common Core of Data (CCD, https://nces.ed.gov/ccd/), National Center for Education Statistics (NCES, https://nces.ed.gov/), US Department of Education for the 2015-2016 school year. This includes all Kindergarten through 12th grade schools as tracked by the Common Core of Data. Included in this dataset are military schools in US territories and referenced in the city field with an APO or FPO address. DOD schools represented in the NCES data that are outside of the United States or US territories have been omitted. This release includes the addition of 1889 new records, and removal of 1985 records not present in the NCES CCD data.</p>	<p>Public Schools Map Service</p>	<p>Office of Homeland Security - Homeland Infrastructure Foundation-Level Data (HIFLD) Working Group</p>
Fire Stations	<p>Fire Stations in the United States Any location where fire fighters are stationed or based out of, or where equipment that such personnel use in carrying out their jobs is stored for ready use. Fire Departments not having a permanent location are included, in which case their location has been depicted at the city/town hall or at the center of their service area if a city/town hall does not exist. This dataset includes those locations primarily engaged in forest or grasslands firefighting, including fire lookout towers if the towers are in current use for fire protection purposes. This dataset includes both private and governmental entities. Firefighting training academies are also included. TGS has made a concerted effort to include all fire stations in the United States and its territories</p>	<p>Fire Stations Map Service</p>	<p>Office of Homeland Security - Homeland Infrastructure Foundation-Level Data (HIFLD) Working Group</p>
Hospitals	<p>This feature class/shape file contains locations of Hospitals for 50 US states, Washington D.C., US territories of Puerto Rico, Guam, American Samoa, Northern Mariana Islands, Palau, and Virgin Islands. The dataset only includes hospital facilities based on data acquired from various state departments or federal sources which has been referenced in the SOURCE field. Hospital facilities which do not occur in these sources will be not present in the database. The database does not contain nursing homes or health centers. Hospitals have been categorized into children, chronic disease, critical access, general acute care, long term care, military, psychiatric, rehabilitation, special, and women based on the range of the available values from the various sources after removing similarities.</p>	<p>Hospitals Map Service</p>	<p>Office of Homeland Security - Homeland Infrastructure Foundation-Level Data (HIFLD) Working Group</p>

		Where to Get It	
Name	Description	Map Service	Authoritative Source
Law Enforcement Facilities	<p>Law Enforcement Locations in the United States, any location where sworn officers of a law enforcement agency are regularly based or stationed. Law Enforcement agencies "are publicly funded and employ at least one full-time or part-time sworn officer with general arrest powers". This is the definition used by the US Department of Justice - Bureau of Justice Statistics (DOJ-BJS) for their Law Enforcement Management and Administrative Statistics (LEMAS) survey. Although LEMAS only includes non-Federal Agencies, this dataset includes locations for federal, state, local, and special jurisdiction law enforcement agencies. Law enforcement agencies include, but are not limited to, municipal police, county sheriffs, state police, school police, park police, railroad police, federal law enforcement agencies, departments within non law enforcement federal agencies charged with law enforcement (e.g., US Postal Inspectors), and cross jurisdictional authorities (e.g., Port Authority Police).</p>	Law Enforcement Facilities Map Service	Office of Homeland Security - Homeland Infrastructure Foundation-Level Data (HIFLD) Working Group
Nursing Home/Assisted Care Facilities	<p>The Nursing Home / Assisted Care feature class/shape file contains facilities that house elderly adults. This feature class's/shape file's attribution contains physical and demographic information for facilities in the continental United States and some of its territories. The purpose of this feature class/shape file is to provide accurate locations for high concentrations of elderly adults in the event of a disaster. The attribution within this feature class/shape file was populated via open source methodologies of authoritative sources. During the update cycle for this deliverable, there were 6010 records added.</p>	Nursing Home/Assisted Care Facilities Map Service	Office of Homeland Security - Homeland Infrastructure Foundation-Level Data (HIFLD) Working Group
Child Care Centers	<p>This data is a graphical representation of the listing of licensed active child care centers in NJ. It was created for the State of New Jersey's initiative regarding child care centers near contaminated sites. As of the April 2017 child care center GIS layer revision, non-profit child care centers found in Public Schools (NIPS) are also included in this GIS layer even though they are not required to submit environmental data to the NJDEP for NJDCF licensing. Proposed child care centers are not listed until a NJDCF License number is issued.</p>	Child Care Centers Map Service	New Jersey Department of Environmental Protection (NJDEP)
Evacuation Shelters	<p>The National Shelter System feature class/shape file contains facilities that can house individuals in the event of an issued evacuation for the facilities area. This feature class/shape file's attribution contains physical, demographic, and capacity information for facilities in the continental United States and some of its territories. The purpose of this feature class/shape file is to provide accurate locations for a potential shelter in the event of a disaster. The facilities included have been designated as a Shelter by either the Federal Emergency Management Agency (FEMA) or the American Red Cross (ARC)</p>	Evacuation Shelter Map Service	Office of Homeland Security - Homeland Infrastructure Foundation-Level Data (HIFLD) Working Group

Name	Description	Where to Get It	
		Map Service	Authoritative Source
Historic Preservation Properties	Historic Properties are buildings, sites, structures or objects that are evaluated as historically significant. This dataset represents the polygon boundaries of historic properties that: 1. Are National Historic Landmarks, 2. Are included in the New Jersey or National Registers of Historic Places, 3. Have been determined Eligible for inclusion in the registers through federal or state processes administered by the HPO, 4. Have been designated as Local Landmarks by local government, or 5. Have been identified through cultural resource survey or other documentation on file at the HPO.	Historic Property Map Service	New Jersey Department of Environmental Protection