5.4.8 FLOOD

This section provides a profile and vulnerability assessment of the flood hazard.

Hazard Profile

This section presents the flood hazard description, extent, location, previous occurrences and losses, and probability of future occurrences.

Description

A flood is the inundation of normally dry land resulting from the rising and overflowing of a body of water. They can develop slowly over a period of days or develop quickly, with disastrous effects that can be local (impacting a neighborhood or community) or regional (affecting entire river basins, coastlines and multiple counties or states) (FEMA 2007). Floods are frequent and costly natural hazards in New York in terms of human hardship and economic loss, particularly to communities that lie within flood-prone areas or floodplains of a major water source.

The flood-related hazards most likely to impact Suffolk County are coastal flooding, riverine (inland) flooding, sea level rise, urban flooding, and flooding as a result of a dam failure. Ice jams were investigated but no historic events were identified. Ice jams were determined to not be a significant source of flooding in Suffolk County (USACE CRREL 2020).

Coastal Flooding

Coastal flooding occurs along the coasts of oceans, bays, estuaries, coastal rivers and large lakes. Coastal floods are the submersion of land areas along the ocean coast and other inland waters caused by seawater over and above normal tide action. Hurricanes, tropical storms and other storm events cause most of the coastal flooding in New York State. Coastal flooding may cause beach erosion; loss or submergence of wetlands and other coastal ecosystems; saltwater intrusion; high water tables; loss of coastal recreation areas, beaches, protective sand dunes, parks, and open space; and loss of coastal structures. Coastal structures can include sea walls, piers, bulkheads, bridges, or buildings (FEMA 2011).

There are several forces that occur with coastal flooding:

- *Hydrostatic forces* against a structure are created by standing or slowly moving water. Flooding can cause vertical hydrostatic forces, or flotation. These types of forces are one of the main causes of flood damage.
- *Hydrodynamic forces* on buildings are created when coastal floodwaters move at high velocities. These high-velocity flows are capable of destroying solid walls and dislodging buildings with inadequate foundations. High-velocity flows can also move large quantities of sediment and debris that can cause additional damage. In coastal areas, high-velocity flows are typically associated with one or more of the following:
    - Storm surge and wave run-up flowing landward through breaks in sand dunes or across low-lying areas
    - Tsunamis
    - Outflow of floodwaters driven into bay or upland areas
    - Strong currents parallel to the shoreline, driven by waves produced from a storm

- High-velocity flows

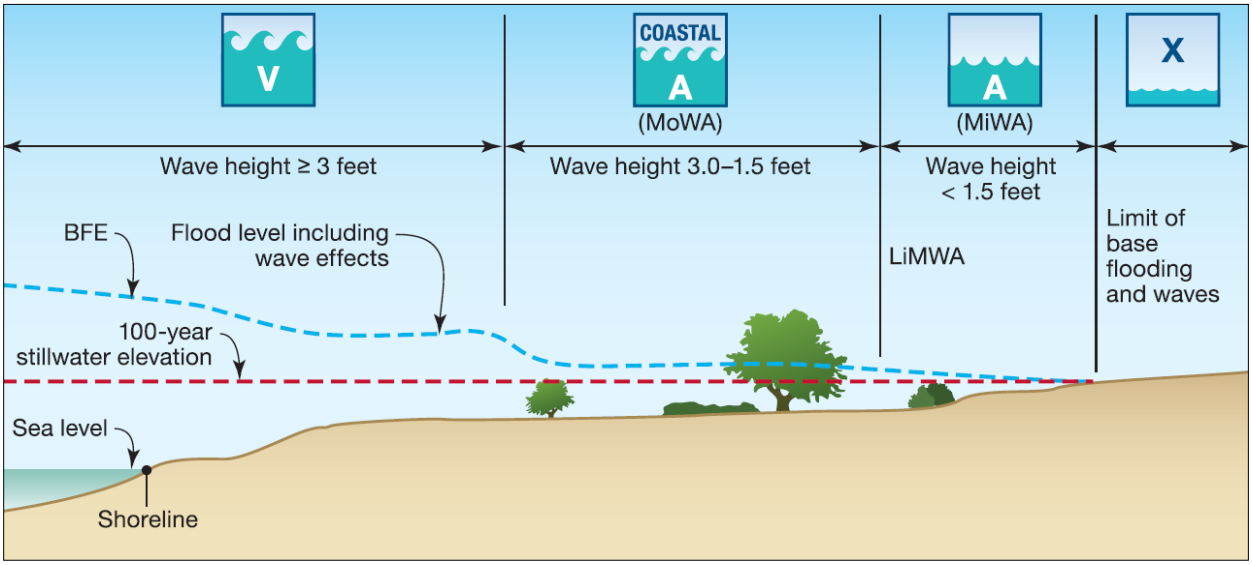
  High-velocity flows can be created or exacerbated by the presence of manmade or natural obstructions along the shoreline and by weak points formed by roads and access paths that cross dunes, bridges or canals, channels, or drainage features.

- *Waves* can affect coastal buildings from breaking waves, wave run-up, wave reflection and deflection, and wave uplift. The most severe damage is caused by breaking waves. The force created by these types of waves breaking against a vertical surface is often at least 10 times higher than the force created by high winds during a coastal storm.
- *Flood-borne debris* produced by coastal flooding events and storms typically includes decks, steps, ramps, breakaway wall panels, portions of or entire houses, heating oil and propane tanks, cars, boats, decks and pilings from piers, fences, erosion control structures, and many other types of smaller objects. Debris from floods are capable of destroying unreinforced masonry walls, light wood-frame construction, and small-diameter posts and piles (FEMA 2011).

The 2011 FEMA Coastal Construction Manual, FEMA P-55, Zone V (including Zones VE, V1-30, and V) identifies the Coastal High Hazard Area. This is the portion of the special flood hazard area (SFHA), or 1-percent annual chance flood event, that extends from offshore to the inland limit of a primary frontal dune along an open coast and any other portion of the SFHA that is subject to high-velocity wave action from storms or seismic sources. The boundary of Zone V is generally based on wave heights (3 feet or greater) or wave run-up depths (3 feet or greater). Zone V can also be mapped based on the wave overtopping rate (when waves run up and over a dune or barrier). Zone A or AE identify portions of the SFHA that are not within the Coastal High Hazard Area. These zones are used to designate both coastal and non-coastal SFHAs. Regulatory requirements of the NFIP for buildings located in Zone A are the same for both coastal and riverine flooding hazards. Zone AE in coastal areas is divided by the limit of moderate wave action (LiMWA). The LiMWA represents the landward limit of the 1.5-foot wave (FEMA 2011).

The area between the LiMWA and the Zone V limit is known as the Coastal A-zone (for building codes and standard purposes) and as the Moderate Wave Action area (by FEMA flood mappers). This area is subject to wave heights between 1.5 and 3 feet during the base flood. The area between the LiMWA and the landward limit of Zone A is known as the Minimal Wave Action area and is subject to wave heights less than 1.5 feet during the base flood (FEMA P-55 2011). Figure 5.4.8-1 shows a typical transect illustrating Zone V, the Coastal A-zone and Zone A, and the effects of energy dissipation and regeneration of a wave as it moves inland. Wave elevations are decreased by obstructions such as vegetation and rising ground elevation (FEMA 2011).

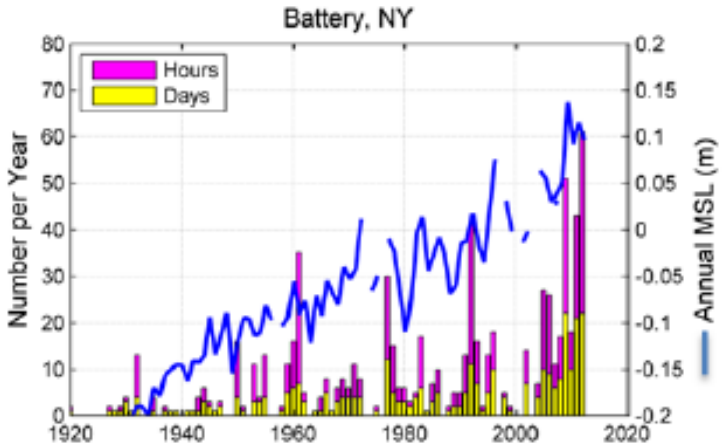
Figure 5.4.8-1. Transect Schematic of Zone V, Coastal A-zone, and Zone A



Source: *FEMA 2011*
BFE *Base Flood Elevation*
LiMWA *limit of moderate wave action*
MiWA *Minimal Wave Action area*
MoWA *Moderate Wave Action area*

In addition to coastal flood events that can cause damages, nuisance flooding can impact Suffolk County's low-lying areas along tidal waterways. Nuisance flooding, also known as high tide flooding or blue-sky flooding, causes public inconveniences, such as frequent road closures, overwhelmed storm drains, and compromised infrastructure. The threshold for nuisance flooding is site specific based on the regional tidal regime and is established by NOAA. Nuisance flooding has increased in the U.S. on average by approximately 50 percent over the past 20 years ago and 100 percent over the past 30 years (NOAA 2018). As sea level rises, the number of nuisance flooding days and the severity of nuisance flooding will continue increase. Figure 5.4.8-2 shows the hours and days per year that the NOAA tidal gauge in the Hudson River at the Battery in New York City has experienced nuisance flooding over time along with the rate of sea level rise.

Figure 5.4.8-2. Frequency of nuisance flooding over time from Hudson River at the Battery, New York City

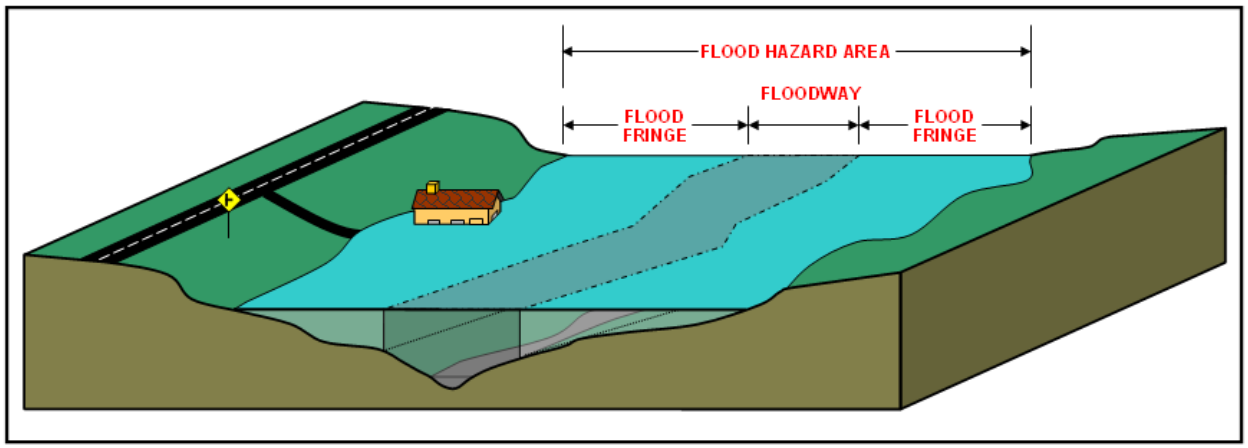


Source: NOAA 2014

Riverine (Inland) Flooding

A floodplain is defined as the land adjoining the channel of a river, stream, ocean, lake, or other watercourse or water body that becomes inundated with water during a flood. In Suffolk County, floodplains line the rivers and streams of the County and the coastal areas. The boundaries of the floodplains are altered as a result of changes in land use, the amount of impervious surface, placement of obstructing structures in floodways, changes in precipitation and runoff patterns, improvements in technology for measuring topographic features, and utilization of different hydrologic modeling techniques. Figure 5.4.8-3 depicts the flood hazard area, the flood fringe, and the floodway areas of a floodplain.

Figure 5.4.8-3. Illustration of a Floodplain



Source: New Jersey Department of Environmental Protection (NJDEP) Date Unknown

Flash Flooding

Flash floods are "a rapid and extreme flow of high water into a normally dry area, or a rapid water level rise in a stream or creek above a predetermined flood level, beginning within six hours of the causative event (e.g., intense rainfall, dam failure, ice jam). However, the actual time threshold may vary in different parts of the country. Ongoing flooding can intensify to flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters" (National Weather Service [NWS] 2009).

Urban Flooding

Heavy rainfall that overwhelms a developed area's stormwater infrastructure causing flooding is commonly referred to as urban flooding. Urban flooding can be worsened by aging and inadequate infrastructure and over development of land. The growing number of extreme rainfall events that produce intense precipitation are resulting in increased urban flooding (Center for Disaster Resilience 2016). While riverine and coastal flooding is mapped and studied by FEMA, urban flooding is not.

NOAA defines urban flooding as the flooding of streets, underpasses, low lying areas, or storm drains. (NOAA 2009). Urban drainage flooding is caused by increased water runoff due to urban development and inadequate drainage systems. Drainage systems are designed to remove surface water from developed areas as quickly as possible to prevent localized flooding on streets and other urban areas. The systems make use of a closed conveyance system that channels water away from an urban area to surrounding streams. This bypasses the natural processes of water filtration through the ground, containment, and evaporation of excess water. Because drainage systems reduce the amount of time the surface water takes to reach surrounding streams, flooding in

those streams can occur more quickly and reach greater depths than prior to development in that area (Harris 2008).

High groundwater levels can be a concern and cause problems even where there is no surface flooding. Basements are susceptible to high groundwater levels. Seasonally high groundwater is common in many areas, while elsewhere high groundwater occurs only after a long period of above-average precipitation (FEMA 1997).

Sea Level Rise

There is evidence that the sea is rising globally and will continue rising over the next century. The two major causes of sea level rise are thermal expansion caused by the warming of the oceans and the loss of land-based ice (glaciers and polar ice caps) due to increased melting. Thermal expansion can account for 50% of sea level rise and is a result of warming atmospheric temperatures and subsequent warming of ocean waters causing the expansion. Since 1947, records and research have shown that sea level has been rising at a rate of 0.13 inches per year at NOAA's Montauk tide gauge station (NOAA 2020).

There are two ways sea level rise is discussed: global and relative. Global sea level rise refers to the increase currently observed in the average global sea level trend (primarily attributed to changes in ocean volume due to ice melt and thermal expansion). The melting of glaciers and continental ice masses can contribute significant amounts of freshwater input to the earth's oceans. In addition, a steady increase in global atmospheric temperature creates an expansion of saltwater molecules, increasing ocean volume.

Relative sea level refers to the height of the water as measuring along the coast relative to a specific point on land. Water level measurements at tide stations are referenced to stable vertical points on the land and a known relationship is established. Measurements at any given tide station include both global sea level rise and vertical land motion (subsidence, glacial rebound, or large-scale tectonic motion). The heights of both the land and water are changing; therefore, the land-water interface can vary spatially and temporally and must be defined over time. Relative sea level trends reflect changes in local sea level over time and are typically the most critical sea level trend for many coastal applications (coastal mapping, marine boundary delineation, coastal zone management, coastal engineering, and sustainable habitat restoration) (NOAA 2013).

Short-term variations in sea level typically occur on a daily basis and include waves, tides, or specific flood events. Long-term variations in sea level occur over various time scales, from monthly to several years and may be repeatable cycles, gradual trends, or intermittent differences. Seasonal weather patterns (changes in the earth's declination), changes in coastal and ocean circulation, anthropogenic influences, vertical land motion, etc. may influence changes in sea level over time. When estimating sea level trends, a minimum of 30 years of data are used in order to account for long-term sea level variations and reduce errors in computing sea level trends based on monthly mean sea level (NOAA 2013).

Changes in global temperatures, hydrologic cycles, coverage of glaciers and ice sheets, and storm frequency and intensity are captured in long-term sea level records. Sea levels provide a key to understanding the impact of climate change (NOAA 2013). Sea level rise increases the risks coastal communities face from coastal hazards (floods, storm surges, and chronic erosion). It may also lead to the loss of important coastal habitats.

Sea level rise projections for Montauk Point (25th to 75th percentile) suggest four to eight inches of rise by the 2020s; 11 to 21 inches by the 2050s; and 18 to 39 inches by the 2080s (based on the 2000-2004 baseline). Scenarios in the high estimate suggest 10 inches by the 2020s; 30 inches by the 2050s; and 58 inches by the 2080s. As decades progress, the expansion of the range is driven by uncertainty in land-based ice mass change, ocean thermal expansion, and regional ocean dynamics (NYSERDA 2014).

Extent

The extent of coastal flooding due to coastal storms (hurricanes, tropical storms and Nor'Easters) is determined by three factors: 1) the nature of the storm with respect to intensity, duration, and path; 2) astronomical tide conditions at the time the storm surge wave reaches the shore; and 3) the physical geometry and bathymetry of a particular area, which affects the time and passage of the surge wave.

The NWS uses coastal flood watches, warnings and advisories to ensure that people know what to expect in the coming hours and days. Advisories are issued when minor tidal flooding is expected. Minor tidal flooding often results in some road closures and the usually the most vulnerable roadways will flood. Coastal flood watches are issued to inform the public and cooperating agencies that coastal flooding is possible approximately 12 to 36 hours after issuance time. They are issued when flooding with significant impact is possible. Coastal flood warnings are issued to warn the public and cooperating agencies that coastal flooding, posing a serious threat to life and property, is occurring, imminent, or highly likely to occur within the next 12 hours (NWS 2020).

Additionally, coastal flooding levels, categorized as minor, moderate, or major, are calculated based on the amount of water as it rises above the normal tide in a particular area. Minor flooding represents nuisance coastal flooding of locations adjacent to the shoreline. Minor beach erosion can be expected. Minor coastal flooding is not expected to close roads or do any major structural damage to homes and other buildings. Moderate coastal flooding is when more substantial coastal flooding occurs, threatening life and property. Some roads will likely become impassable and moderate beach erosion will occur. Some homes, businesses and other facilities will experience damage. Major coastal flooding represents a serious threat to both life and property. Many roads will likely become flooded and numerous homes and businesses along the coast will receive major damage. Major beach erosion is also expected (NWS n.d.). For details regarding the specific water levels for each type of coastal flooding in Cape May County, refer to the previous section "Historic Tide References".

As stated by the NWS, other important factors affecting the local severity, extent, and duration of coastal flooding include: (1) the various tidal cycles, (2) the persistence and behavior of the storm generating the flooding, (3) the topography, shoreline orientation, and bathymetry of the area, (4) the river stage or stream runoff in estuaries, and (5) the presence or absence of offshore reefs or other barriers. Coastal flooding intensities range from minor tidal overflow with little or no damage to a combination of the aforementioned causative factors resulting in extensive inundation and beach erosion (NWS 2020).

The frequency and severity of riverine flooding are measured using a discharge probability, which is the probability that a certain river discharge (flow) level will be equaled or exceeded in a given year. Flood studies use historical records to determine the probability of occurrence for the different discharge levels.

Floodplains are often referred to as 100-year floodplains. A 100-year floodplain is not a flood that will occur once every 100 years; the designation indicates a flood that has a 1-percent chance of being equaled or exceeded each year. Thus, the 100-year flood could occur more than once in a relatively short period of time. Due to this misleading term, FEMA has properly defined it as the 1-percent annual chance flood. Similarly, the 500-year floodplain will not occur every 500 years but is an event with a 0.2-percent chance of being equaled or exceeded each year. The "1-percent annual chance flood" is now the standard term used by most federal and state agencies and by the National Flood Insurance Program (NFIP) (FEMA 2003). The 1-percent annual chance floodplain establishes the area that has flood insurance and floodplain management requirements and is also referenced as the regulatory floodplain.

The USGS National Water Information System (NWIS) collects surface water data from more than 850,000 stations across the country. The time-series data describes stream levels, streamflow (discharge), reservoir and

lake levels, surface water quality, and rainfall. The data is collected by automatic recorders and manual field measurements at the gage locations.

In the case of riverine flood hazard, once a river reaches flood stage, the flood extent or severity categories used by the NWS include minor flooding, moderate flooding, and major flooding. Each category has a definition based on property damage and public threat:

- Minor Flooding - minimal or no property damage, but possibly some public threat or inconvenience.
- Moderate Flooding - some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations are necessary.
- Major Flooding - extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations (NWS 2011).

The severity of a flood depends not only on the amount of water that accumulates in a period of time, but also on the land's ability to manage this water. The size of rivers and streams in an area and infiltration rates are significant factors. When it rains, soil acts as a sponge. When the land is saturated or frozen, infiltration rates decrease and any more water that accumulates must flow as runoff (Harris 2008).

Sea Level Rise

The Center for Operational Oceanographic Products and Services has been measuring sea level for over 150 years, with tide stations of the National Water Level Observation Network operating on all coastlines of the United States. Changes in mean sea level (MSL), either a sea level rise or sea level fall has been computed at128 long-term water level stations using a minimum span of 30 years of observations at each location. The measurements have been averaged by month to remove the effect of higher frequency phenomena (storm surge) in order to compute an accurate linear sea level trend (NOAA 2013).

Figure 5.4.8-4 presents the most recent NOAA relative sea level variations along the Mid-Atlantic coast. Two NOAA tide gauge stations are located on the Suffolk County coastline, where tide gauge measurements are made with respect to a local fixed reference level on land. Figure 5.4.8-4 presents the history and MSL trends at the two Suffolk County stations, which show the result of a combination of the global sea level rate and the local vertical land motion.

Figure 5.4.8-4. Sea Level Trends in Suffolk County

Source: NOAA 2020

For the Montauk gauge, the relative sea level trend is 3.37 millimeters/year based on monthly mean sea level data from 1947 to 2019 which is equivalent to a change of 1.11 feet in 100 years. The Port Jefferson gauge was only active from 1957 to 1992 but recorded a relative sea level trend of 2.4 millimeters/year which is equivalent to a change of 0.8 feet in 100 years (NOAA 2020).

Urban Flooding

Currently, there is no measurement used to further define the frequency and severity of urban flooding.

Hazardous Dams

According to the NYSDEC Division of Water Bureau of Flood Protection and Dam Safety, the hazard classification of a dam is assigned according to the potential impacts of a dam failure pursuant to 6 NYCRR Part 673.3 (NYSDEC, date unknown). Dams are classified in terms of potential for downstream damage if the dam were to fail. These hazard classifications are identified and defined below:

- *Low Hazard (Class A)* is a dam located in an area where failure will damage nothing more than isolated buildings, undeveloped lands, or township or county roads and/or will cause no significant economic loss or serious environmental damage. Failure or mis-operation would result in no probable loss of human life. Losses are principally limited to the owner's property
- *Intermediate Hazard (Class B)* is a dam located in an area where failure may damage isolated homes, main highways, minor railroads, interrupt the use of relatively important public utilities, and/or will cause significant economic loss or serious environmental damage. Failure or mis-operation would result in no probable loss of human life, but can cause economic loss, environment damage, disruption of lifeline facilities, or impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.
- *High Hazard (Class C)* is a dam located in an area where failure may cause loss of human life, serious damage to homes, industrial or commercial buildings, important public utilities, main highways or

railroads and/or will cause extensive economic loss. This is a downstream hazard classification for dams in which excessive economic loss (urban area including extensive community, industry, agriculture, or outstanding natural resources) would occur as a direct result of dam failure.

- *Negligible or No Hazard (Class D)* is a dam that has been breached or removed, or has failed or otherwise no longer materially impounds waters, or a dam that was planned but never constructed. Class "D" dams are considered to be defunct dams posing negligible or no hazard. The department may retain pertinent records regarding such dams.

Regulatory Oversight of Dams

Potential for catastrophic flooding caused by dam failures led to passage of the National Dam Safety Act (Public Law 92-367). For 30 years, the National Dam Safety Program (NDSP) has protected Americans from dam failure. NDSP is a partnership among the states, federal agencies, and other stakeholders that encourages individual and community responsibility for dam safety. Under FEMA's leadership, state assistance funds have allowed all participating states to improve their programs through increased inspections, emergency action planning, and purchase of needed equipment. FEMA has also expanded existing training programs and initiated new training programs. Grant assistance from FEMA provides support for improvement of dam safety programs that regulate most dams in the United States (FEMA 2013a).

New York State (NYS) has a comprehensive dam safety program through which three governmental authorities regulate dam safety throughout the State:

- NYS Department of Environmental Conservation (NYSDEC) – Environmental Conservation Law (ECL) Article 15, Part 673
- Federal Energy Regulatory Commission (FERC) – 18 *Code of Federal Regulations* (CFR) 12.22-24
- U.S. Army Corp of Engineers (USACE) – EP 1110-2-13, Dam Safety Preparedness.

Dam safety emergency action plans (EAP) are formal dam failure procedures written by the dam owner/operator. EAPs are site-specific plans and relate only to the facility's procedures to prevent/mitigate occurrence of a catastrophic dam failure. USACE is responsible to submit an EAP for dams it owns, operates, and maintains. EAPs for hydroelectric dams fall under the purview of FERC, and NYSDEC regulates dam safety and EAPs for all dams in NYS.

New York State Department of Environmental Conservation Dam Safety Section

The NYSDEC's Dam Safety Section is responsible for safety inspection of dams, technical review of proposed dam construction or modification, monitoring of remedial work for compliance with dam safety criteria, and emergency preparedness for all dams in NYS. NYSDEC is responsible for more than 100 flood control projects throughout the State, most of which were constructed by USACE and are operated and maintained by NYSDEC, in some cases with local municipal partners.

The State generally inspects high hazard (Class C) dams every two (2) years, and moderate hazard (Class B) dams every four (4) years. To support emergency planning efforts and raise awareness among local officials and emergency managers, a copy of each inspection report is sent to the chief executive of the community in which the dam is located. Municipal officials or emergency managers from any municipality in the dam's inundation area may receive a copy of the inspection report upon request.

U.S. Army Corps of Engineers Dam Safety Program

USACE is responsible for safety inspections of some federal and non-federal dams in the United States that meet size and storage limitations specified in the National Dam Safety Act. USACE has inventoried dams and has surveyed each state's and federal agency's capabilities, practices, and regulations regarding design, construction,

operation, and maintenance of dams. USACE has also developed guidelines for inspection and evaluation of dam safety (USACE 2014).

Federal Energy Regulatory Commission Dam Safety Program

FERC has the largest dam safety program in the United States. FERC cooperates with a large number of federal and state agencies to ensure and promote dam safety and, more recently, homeland security. A total of 3,036 dams are part of regulated hydroelectric projects and are included in the FERC program. Two-thirds of these are more than 50 years old. As dams age, concern about their safety and integrity grows, rendering oversight and regular inspection especially important (FERC 2011).

FERC staff inspect hydroelectric projects on an unscheduled basis to investigate the following:

- Potential dam safety problems
- Complaints about constructing and operating a project
- Safety concerns related to natural disasters
- Issues concerning compliance with terms and conditions of a license (FERC 2011).

Every five (5) years, an independent consulting engineer approved by the FERC must inspect and evaluate projects with dams higher than 32.8 feet (10 meters) or with total storage capacity of more than 2,000 acre-feet (FERC 2011).

FERC monitors and evaluates seismic research in geographic areas where concerns have been raised about seismic activity. This information is applied in investigating and performing structural analyses of hydroelectric projects within these areas. FERC staff also evaluate effects of potential and actual large floods on safety of dams. During and after floods, FERC staff visit dams and licensed projects, determine extent of damage, and direct any studies or remedial measures the licensee must undertake. FERC's *Engineering Guidelines for the Evaluation of Hydropower Projects* guides FERC engineering staff and licensees in evaluating dam safety. The publication is frequently revised to reflect current information and methodologies (FERC 2011).

FERC requires licensees to prepare EAPs and conducts training sessions on developing and testing these plans. The plans outline an early warning system in the event of an actual or potential sudden release of water from a dam failure. The plans include operational procedures that may be implemented during imposition of regulatory measures such as reducing reservoir levels and reducing downstream flows, as well as procedures for notifying affected residents and agencies responsible for emergency management. These plans are frequently updated and tested to ensure that all applicable parties are informed of proper procedures in emergency situations (FERC 2011).

Location

Flooding potential is influenced by climatology, meteorology and topography. Extensive development can also influence flooding potential as it leaves fewer natural surfaces available to absorb rainwater, forcing water directly into streams, rivers, and existing drainage systems swelling them more than when more natural surface buffered the runoff rate.

Suffolk County is subject to coastal and tidal flooding caused by Nor'easters, hurricanes, severe storms, as well as riverine flood hazards (FEMA 2009). Coastal areas are also subject to long-term flooding impacts from sea level rise. Refer to the following sections for additional information on hurricanes (Section 5.4.10), Nor'easters (Section 5.4.12) and severe storms (Section 4.3.13). Location specific information for the varieties of flooding facing Suffolk County are discussed below. The jurisdictional annexes in Section 9 provide additional information on floodprone areas in each jurisdiction.

Floodplains

The Digital Flood Insurance Rate Map (DFIRM) data provided by FEMA for Suffolk County show the following flood hazard areas:

- 1-Percent Annual Chance Flood Hazard: Areas subject to inundation by the 1-percent-annual-chance flood event. This includes Zone AE and Zone VE. Mandatory flood insurance requirements and floodplain management standards apply.
- 0.2-Percent Annual Chance Flood Hazard: Area of minimal flood hazard, usually depicted on FIRMs as the 500-year flood level or Shaded X Zone.

The Suffolk County FEMA DFIRM dated September 2009 was used to evaluate exposure and determine potential future losses. In Suffolk County, the flood hazard areas are located along coastal areas, creeks, and rivers. The total land area in the floodplain, inclusive of waterbodies, is summarized in Table 5.4.8-1, and the locations of flood zones in Suffolk County as depicted on the FEMA effective DFIRM are illustrated in Figure 5.4.8-5 through Figure 5.4.8-7.

Table 5.4.8-1. Total Land Area in the 1-Percent and 0.2-Percent Annual Chance Flood Zones (Acres)

	Acres	Percent of Total Land Area in Suffolk County
Acres Exposed to Flood 1%	64,333	10.9%
Acres Exposed to Flood 0.2%	71,534	12.1%

Source: FEMA Effective DFIRM 2009/LOMR 2019; Suffolk County GIS 2020

Figure 5.4.8-5. Suffolk County DFIRM 1-Percent and 0.2-Percent Flood Zones - West

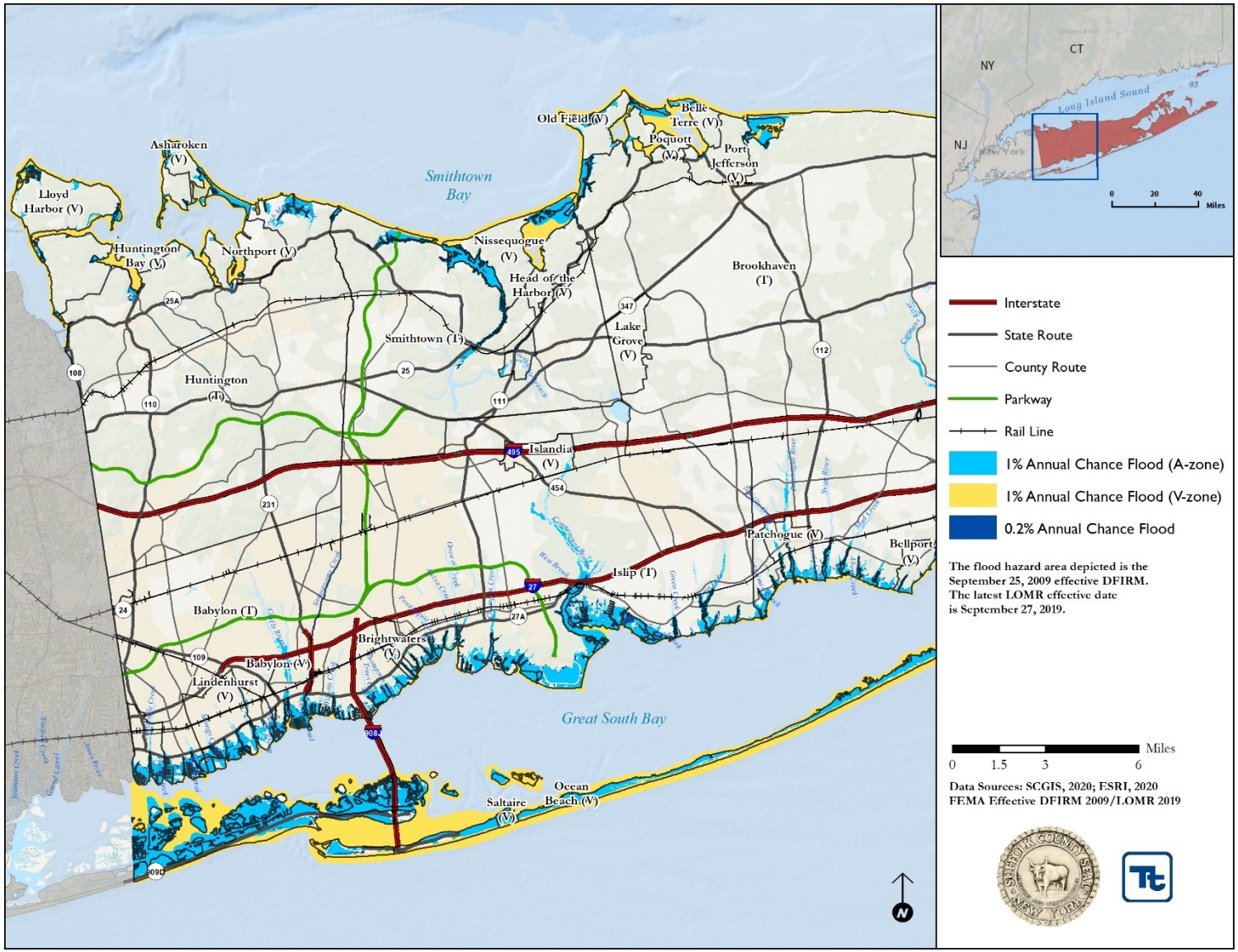


Figure 5.4.8-6. Suffolk County DFIRM 1-Percent and 0.2-Percent Flood Zones - Central

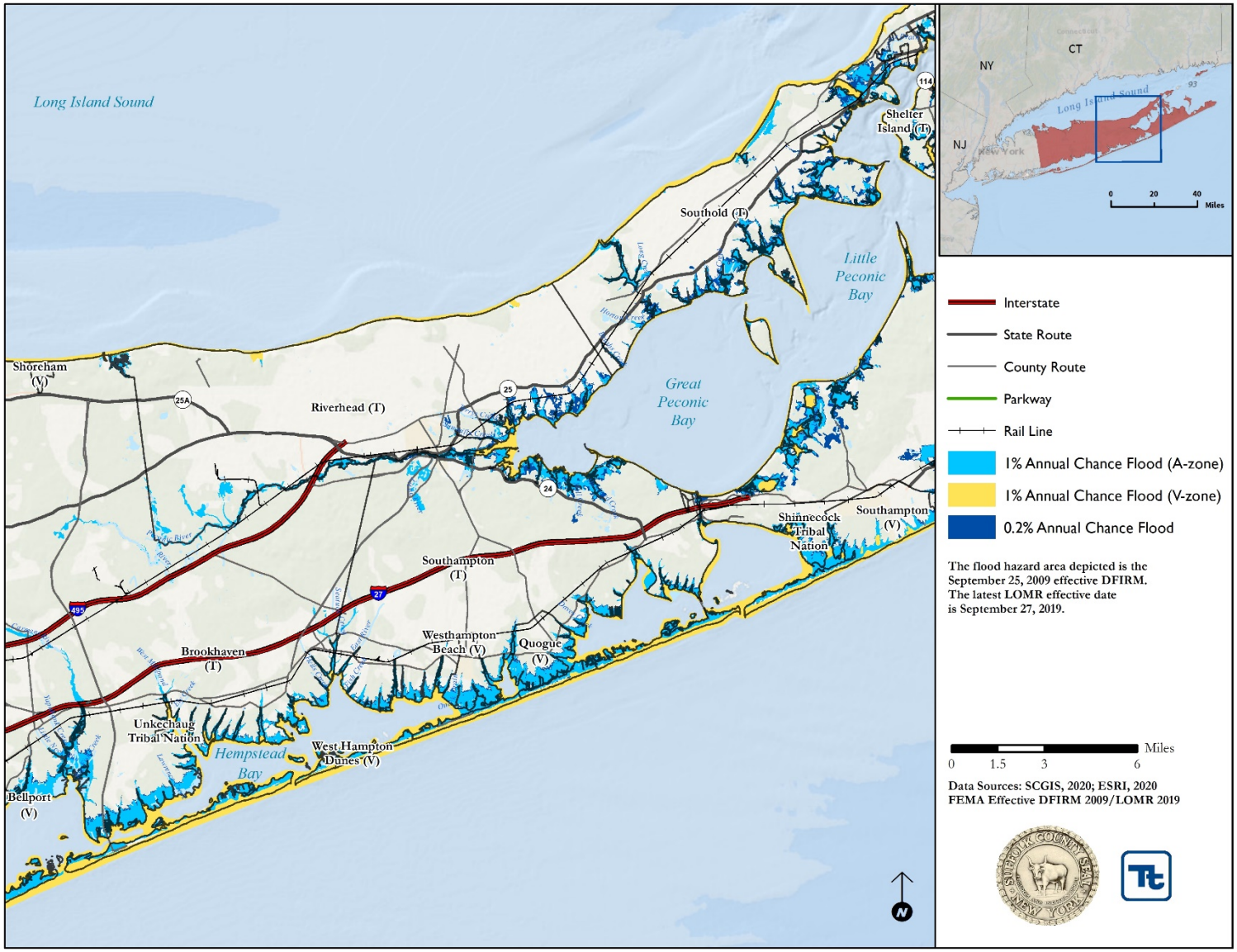
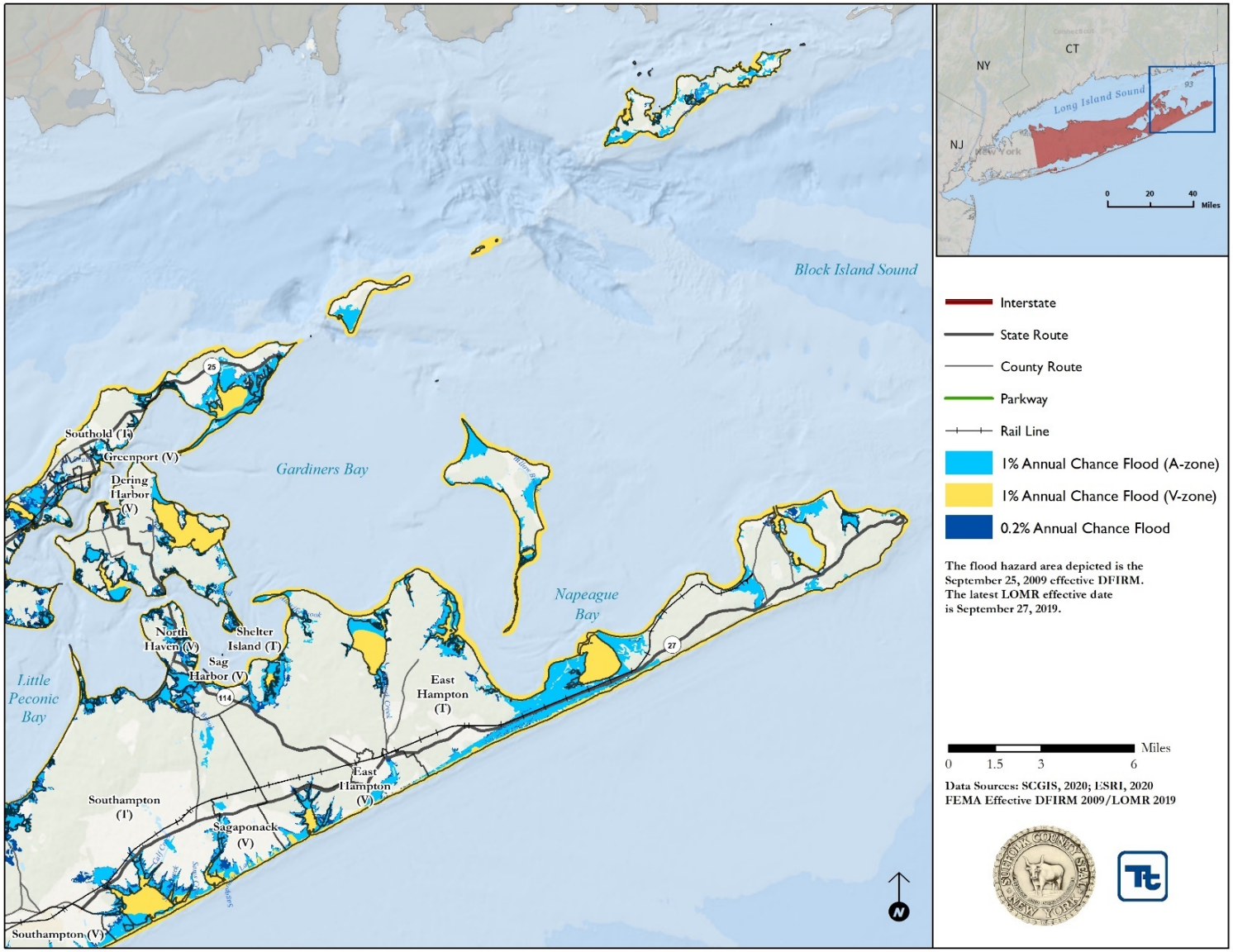


Figure 5.4.8-7. Suffolk County DFIRM 1-Percent and 0.2-Percent Flood Zones - East



The primary flooding sources in Suffolk County are the Atlantic Ocean, Long Island Sound, the various bays between the North and South Forks, and the small rivers and creeks that flow to the coast. Section 9 (Jurisdictional Annexes) contains information regarding specific areas of flooding and a map depicting the floodplains for each jurisdiction in Suffolk County.

Coastal Flooding

Areas most at risk to coastal flooding and storm surge are coastal areas and barrier islands. Barrier islands are especially vulnerable to flooding, storm surge, storm events and other natural hazards because they have few evacuation routes. Low-lying inland areas are also more susceptible to coastal flooding and storm surge because those areas may be near a waterway and a higher risk than assumed (NOAA n.d.).

The barrier islands of Suffolk County are ecologically fragile and quite vulnerable to storms and erosion. The impacts of flooding and erosion along these barrier islands make them extremely vulnerable to sea level rise, hurricanes and storms, and human use and development. In the early 1990s, severe storm activity, combined with natural coastal geological processes, caused extensive flooding and erosion of the County's south coast. This caused significant damage to oceanfront property, municipal infrastructure, commercial fishing docks, and recreational beaches (Town of Southampton 1999). More recently, Superstorm Sandy in 2012 resulted in major damages to the same areas. As a result of Sandy, much mitigation has taken place to reduce flood risk through beach replenishment, home elevations, and buyouts.

Sea Level Rise

Locations in Suffolk County that border tidal waters and are at a low elevation are at risk to static sea level rise. Figure 5.4.8-8 through Figure 5.4.8-10 show sea level rise scenarios in Suffolk County.

Figure 5.4.8-8. Sea Level Rise Scenarios for Suffolk County - West

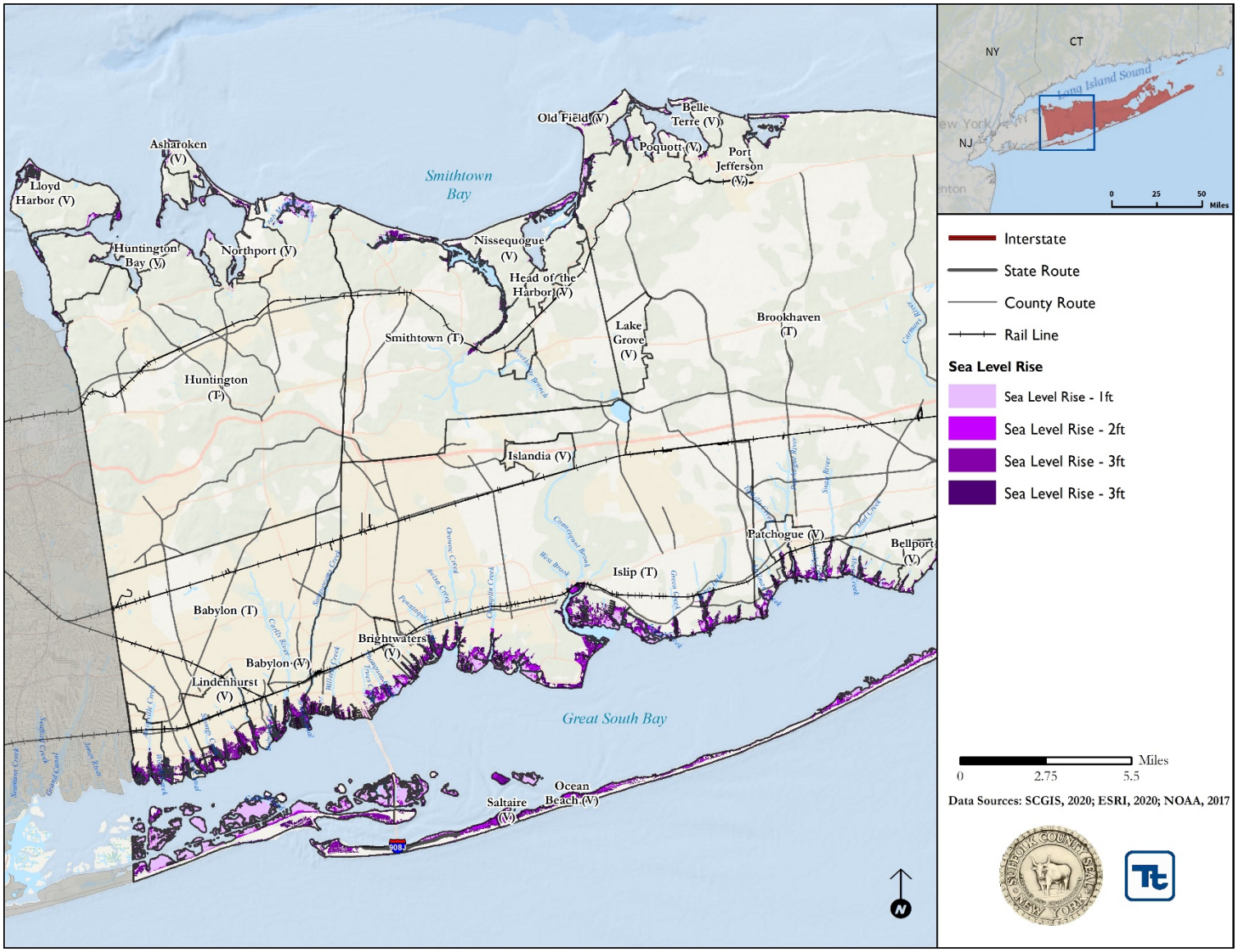


Figure 5.4.8-9. Sea Level Rise Scenarios for Suffolk County - Central

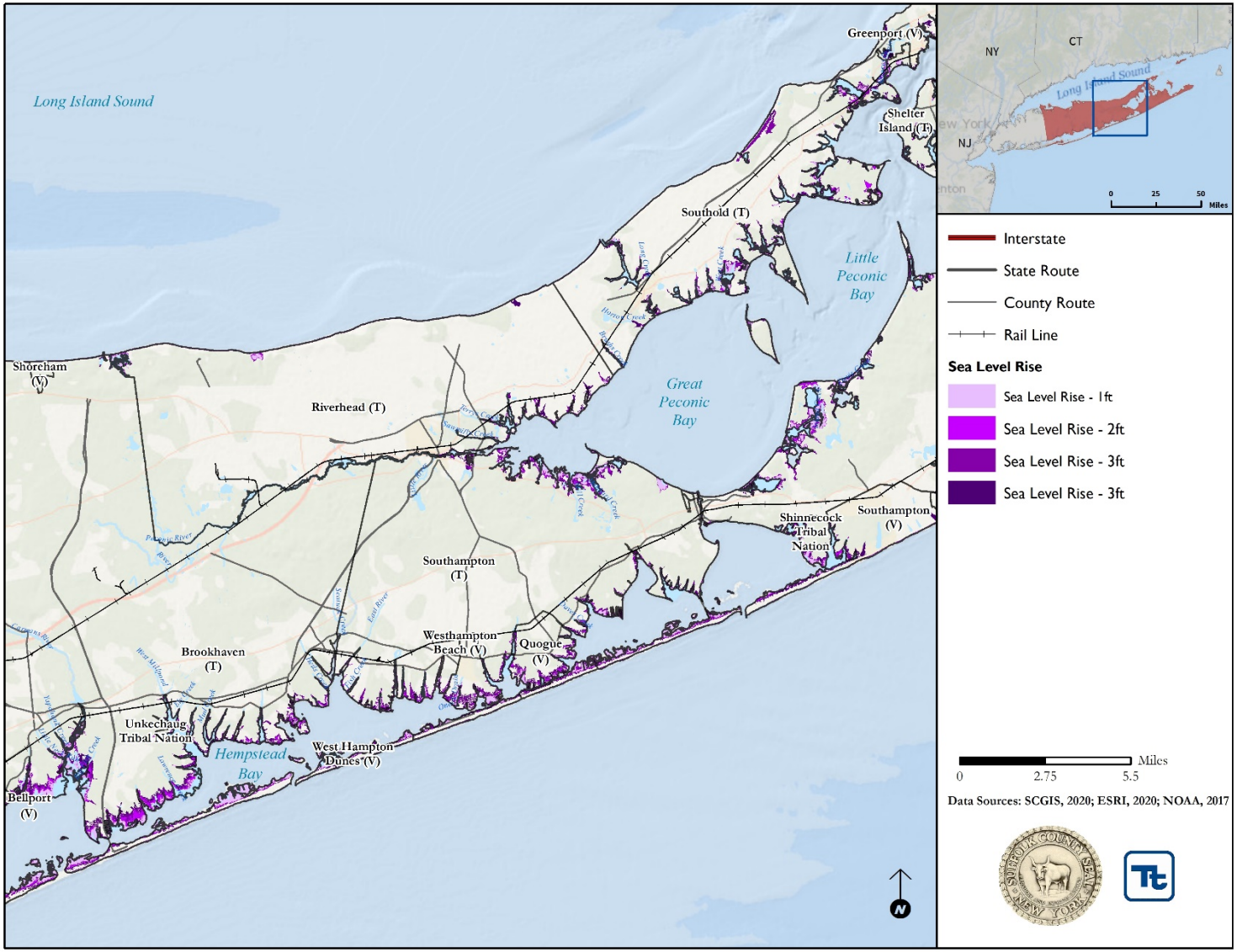
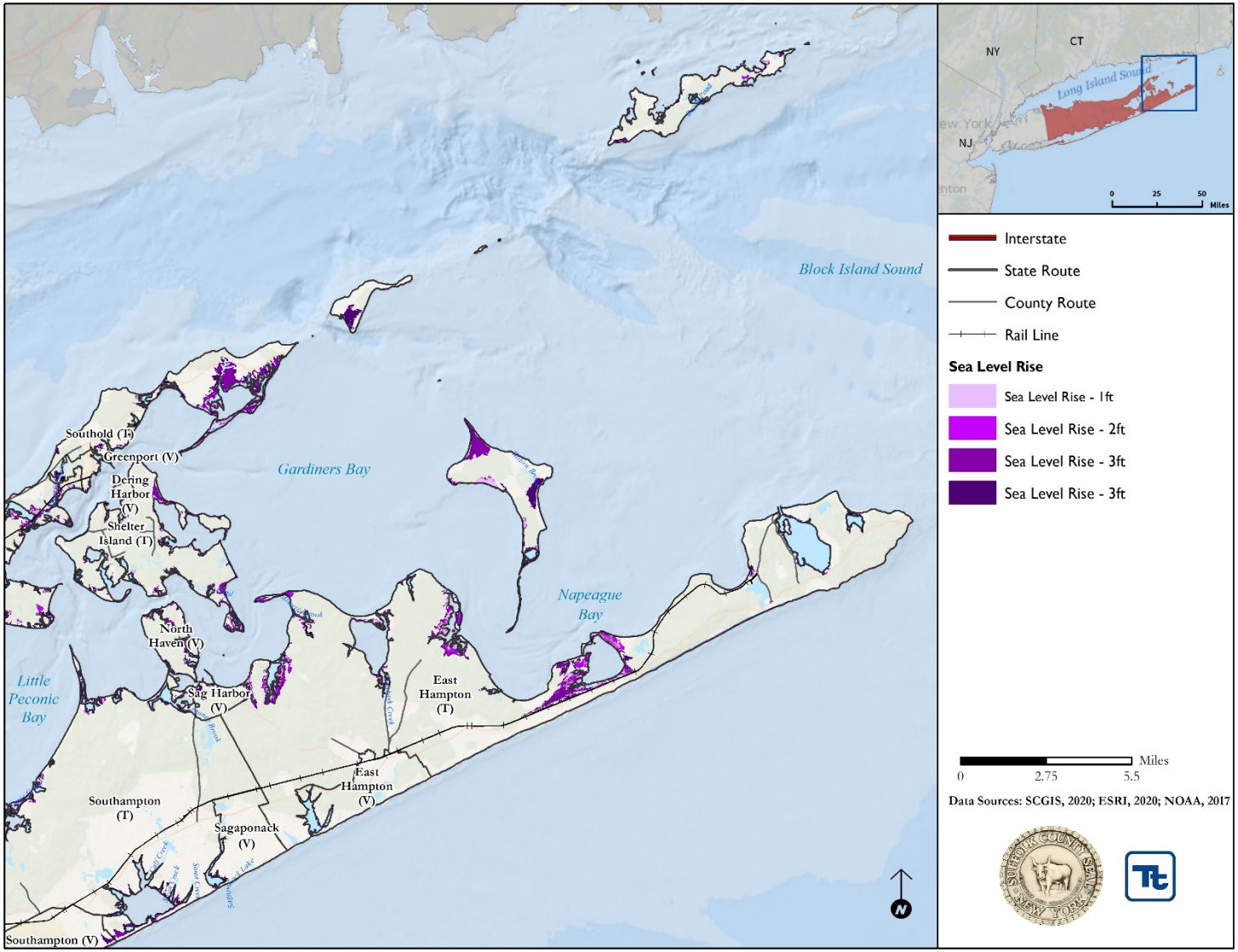


Figure 5.4.8-10. Sea Level Rise Scenarios for Suffolk County - East



Riverine/Flash Flooding

Riverine flooding in Suffolk County is often connected to coastal flooding events. However, heavy rainfall can lead to riverine flooding on the County's many creeks and rivers. Major rivers in Suffolk County include the Carmans River, Champlin Creek, Connetquot River, Nissequogue River, Patchogue River, Peconic River, and Swan River. Flash flooding can occur throughout Suffolk County; however, the distinctive flash flood event that is characterized by fast moving water and damaging impacts requires a steep topography (NYS DHSES 2013).

Flood Protection Measures

Although seawalls and bulkheads have been installed along shoreline areas and are used to prevent soil erosion in coastal communities in Suffolk County, these structures only minimize flood damage caused by minor (less than 1-percent annual chance) tidal surges. There are no flood protection measures substantial enough to protect against a 1-percent annual chance flood event within the County (FEMA 2009).

Dams

According to information available from NYSDEC, Suffolk County is home to 70 dams. Of the 70 dams, four are identified as intermediate hazard dams where dam failure may result in damage to isolated homes, main highways, and minor railroads as well as interruption of utilities. No loss of human life would be expected. Suffolk County does not have any high hazard dams (NYSDEC 2020).

Urban Flooding

During the planning process, urban flooding locations were identified in the Town of Riverhead, the Town of Sag Harbor, the Town of Shelter Island, the Village of Amityville, the Village of Brightwaters, the Village of East Hampton, the Village of Greenport, the Village of Huntington Bay, the Village of Lloyd Harbor, the Village of North Haven, the Village of Shoreham. These urban flooding locations are mapped in their respective municipal annexes in Section 9. These urban flooding locations are also found in Figure 5.4.8-11 through Figure 5.4.8-13.

Figure 5.4.8-11. Urban Flooding Locations in Suffolk County - West

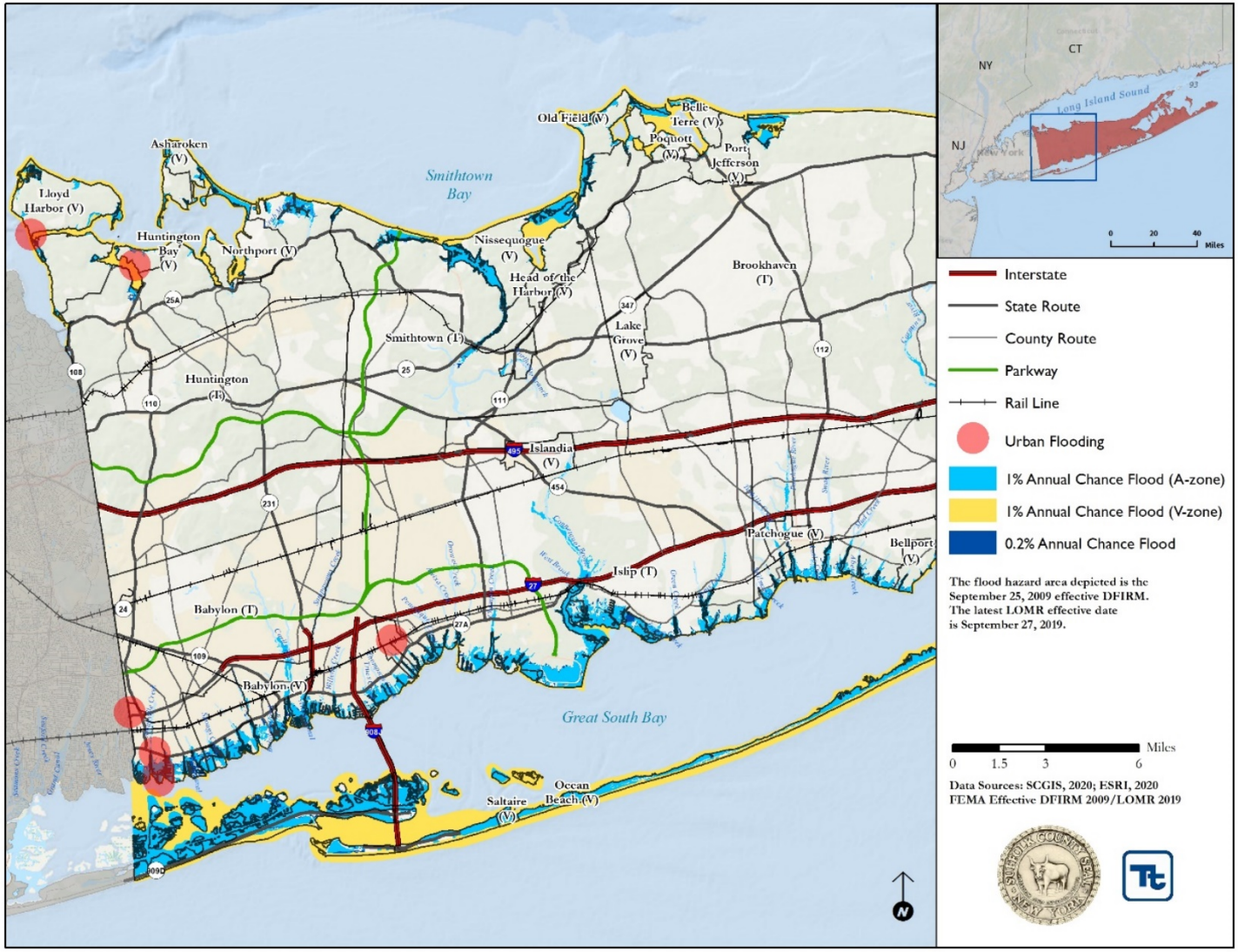


Figure 5.4.8-12. Urban Flooding Locations in Suffolk County - Central

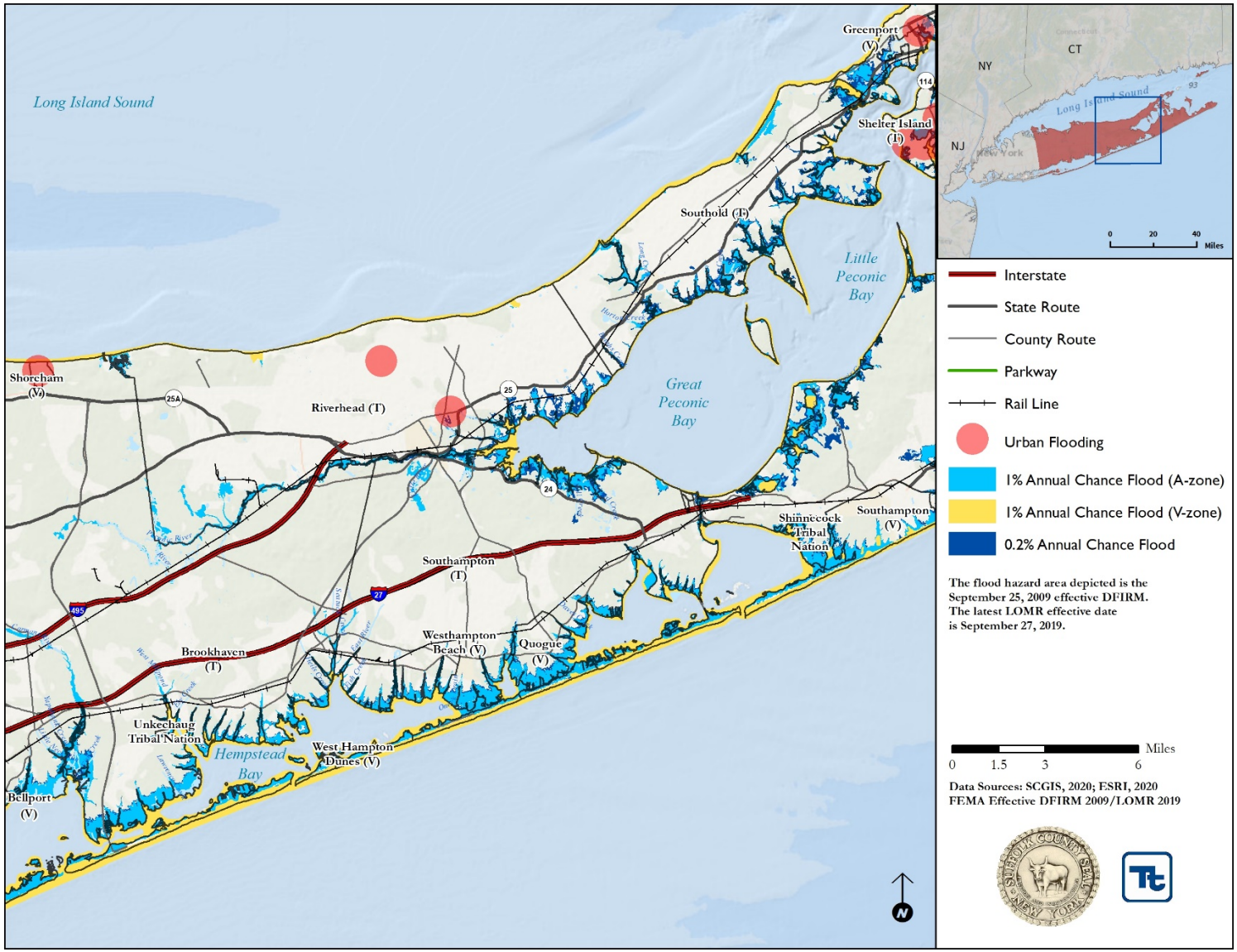
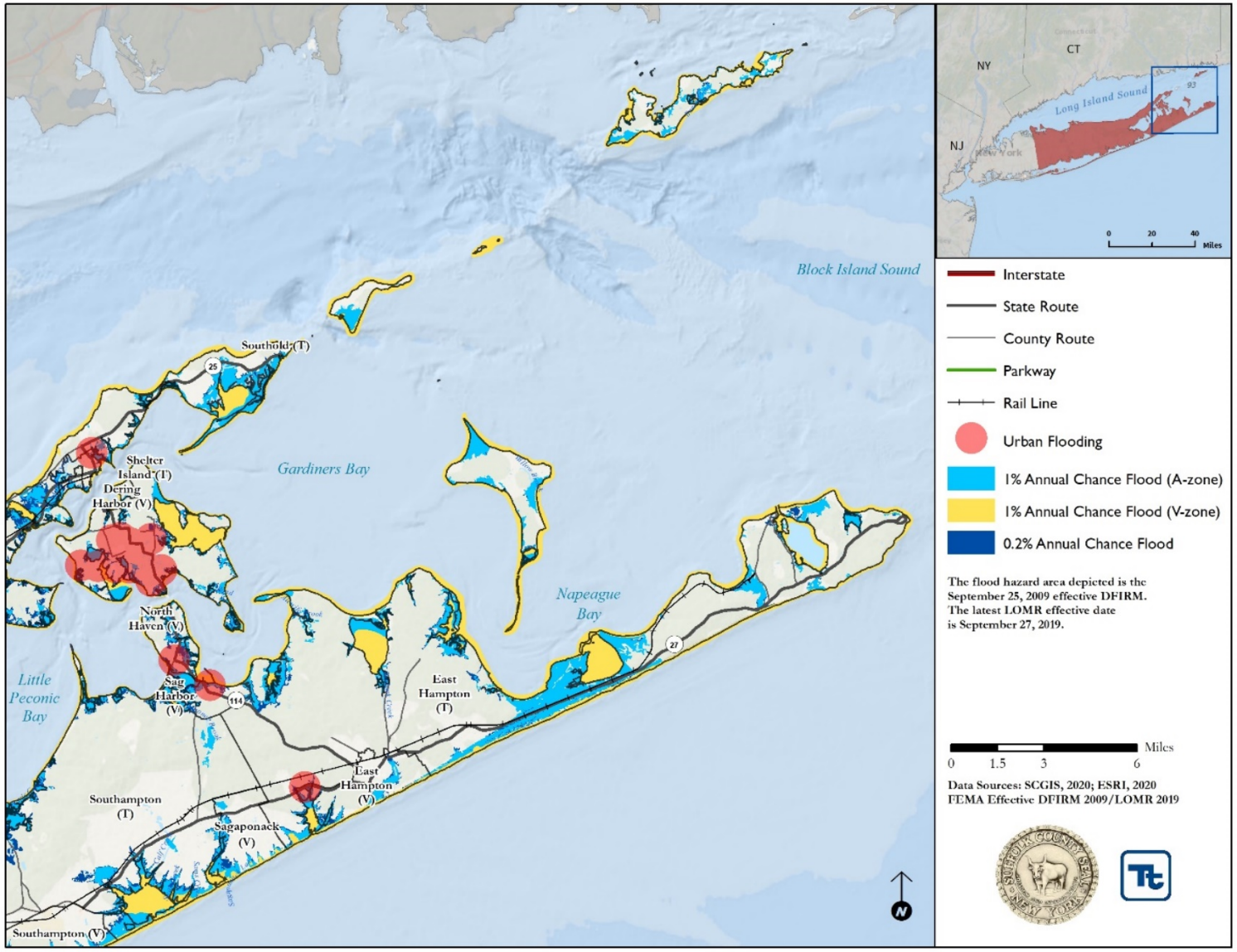


Figure 5.4.8-13. Urban Flooding Locations in Suffolk County - East



Previous Occurrences and Losses

Between 1954 and 2020, the State of New York was included in 25 flood-related disaster (DR) or emergency (EM) declarations. Suffolk County was included in three of these declarations (FEMA 2020).

Table 5.4.8-2. Severe Storm-Related FEMA Declarations for Suffolk County, 1954 to August 2018

Date(s) of Event	FEMA Declaration Number	Event Type
September 13, 1971	DR-311	Severe Storms and Flooding
March 28-April 8, 1984	DR-702	Coastal Storms and Flooding
December 10-14, 1992	DR-974	Coastal Storm, High Tides, Heavy Rain, and Flooding

Source: FEMA 2020

Known flooding events that have impacted Suffolk County between 2013 and 2020 are identified in Table 5.4.8-3. Events identified in the 2014 HMP are included in Appendix E.

Table 5.4.8-3. Flooding Events in Suffolk County Between 2013 and 2020

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Location	Description
June 7, 2013	Flash Flood	N/A	N/A	Wyandanch, Amityville Airport, Babylon, Melville, Deerfield, Halesite	The remnants of Tropical Storm Andrea tracked up the eastern seaboard in early June, resulting in a prolonged period of heavy rain, which caused flash flooding in portions of Southeast New York. Twenty to thirty cars became submerged in water up to their roofs in the Wyandanch Long Island Railroad parking lot. Four feet of standing water accumulated at the intersection of Scutter Ave. and Hawkins Blvd. in Copiague. In East Farmingdale, portions of Route 110, Wellwood Ave. and New Highway were closed due to flooding. The ASOS at Republic Airport in Farmingdale reported 1.03 inches of rainfall in one hour. Total rainfall amounts in Suffolk County ranged from 2.73 inches in West Islip to 5.65 inches in Centereach. Several cars were stuck in flood waters at the end of Rt. 231 between Udall Rd. and Montauk Hwy. in Babylon. The three westbound lanes of the Long Island Expressway were closed at Rt. 110 in Melville due to flooding. Deerfield Rd. was closed between Head of Pond/Scuttle Hole Rd. and Edge of Woods Rd. in Water Mill due to flooding. In Huntington, the intersections of Rt. 110 at Pulaski Rd. and Mill Dam Rd. at Park Ave. were closed due to flooding.
September 3, 2013	Flash Flood	N/A	N/A	East Quogue, Sagaponack, Southampton	A cold front moved slowly across the area producing scattered showers and thunderstorms. A moist air mass with precipitable waters around 1.75 inches resulted in heavy rain and flash flooding in eastern Suffolk County. Old Country Rd. at Lewis Rd. in East Quogue was closed due to flooding. A car became stuck in water on Montauk Highway in Sagaponack. Numerous roads across the town of Southampton were closed due to flash flooding. Deerfield Rd. was also closed in Watermill.
August 13, 2014	Flash Flood	N/A	N/A	Pine Aire, East Half Hollow Hill, Lake Grove, Commack, East Moriches, Smithtown, West Babylon,	A surface low with its associated warm front approached the area early in the morning before partially lifting through. This boundary provided the focus for very heavy rain in an extremely moist air mass and resulted in historic flash flooding on Long Island. New York State's 24 hour rainfall record was broken with 13.78 inches of rainfall being reported by the Automated Surface Observing System at Islip MacArthur Airport.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Location	Description
				Ronkonkoma, Bay Shore, Holtsville, Babylon, Sound Beach, Amityville, Islip, Nesconsett, Bayshore, McArthur Field, Wildwood, Islandia	The Sagtikos Parkway southbound was closed at Exit S2, Crooked Hill Rd., in Brentwood due to flooding. Storm total rainfall amounts reported in Suffolk County ranged from 0.14 inches in Montauk to 13.27 inches at Islip/MacArthur Airport with a 24-hour rainfall record of 13.78 inches at MacArthur Airport which broke the New York State record. Damage amounts are validated costs of damage assessment inspections of municipal property, $11.7 million, and $23.5 million for small business administration loans as a result of the FEMA private property and business damage assessment. This information was provided by the Suffolk County Office of Emergency Management. The westbound Long Island Expressway was closed between exits 51 and 50 in Dix Hills due to flooding. The Lake Grove local fire department deployed boats to rescue trapped vehicle occupants in Nesconset at the intersection of Nichols Rd. and Roy Dr. Jericho Turnpike was closed in both directions in Commack due to flooding. Sunrise Highway was closed at Railroad Ave. in Manorville due to flooding. The intersection of Route 25 and Maple Ave. in Smithtown was closed due to flooding. The Southern State Parkway was closed with cars stranded in high water at exit 37 in West Babylon. An estimated six to twelve inches of water was flowing at the intersection of Ronkonkoma Ave. and Waltess Rd. in Ronkonkoma. Cars were stuck in high water on both the northbound and southbound ramps from the eastbound Long Island Expressway to Nicholls Rd. in Holtsville. An estimated three feet of standing water accumulated on Livingston Ave. in Babylon. Multiple cars were stuck in high water at the intersection of Hallock Landing Rd. and Culross Dr. in Rocky Point. Six to ten inches of flowing water accumulated on Union Ave. in Amityville. An estimated two feet of standing water accumulated on Lagoon Place in East Islip while water was up to the mailboxes on Argosy St. in Islip Terrace. Browns Rd. in Nesconset was closed with two cars stuck in flood waters. Two feet of standing water accumulated in the parking lot of the Bayshore train station in Bayshore. Sunrise Highway and the Service Road at 5th Ave., exit 43, in Bayshore was closed due to flooding. Sunrise Highway was completely flooded with cars stranded in high water in front of the South Shore Mall in Bayshore. A car was fully submerged in flood waters at the intersection of Blue Point Rd. and Middle Country Rd. in Selden. Two cars were stuck in flood waters at the

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Location	Description
					intersection of Union Ave. and Mill Rd. in Holbrook. There was a partial collapse of the westbound lane of Hulse Landing Rd. between Route 25A and Sound Ave. in Wading River. The Long Island Expressway was closed at exit 57 in Islandia due to flooding.
December 9, 2014	Coastal Flood	N/A	N/A	Southwest Suffolk County	An intensifying low-pressure system, tracking up the coast towards Long Island on the early morning into afternoon hours of December 9, produced a 12 hour period of northeast gales. The surge from these gale force winds and preceding 36 hours of northeast flow, combined with morning high tide, resulted in widespread minor coastal flooding along the New York coastline. Locally moderate coastal flooding was experienced across vulnerable communities along the south shore bays of Western and Central Long Island. At the corner of Seacrest Avenue and Lido Promenade, 13 inches of water were observed. Water was up to car doors and some garages were flooded. The corner of East Shore Rd. and Mckinley Avenue was inundated with about 20 inches of water, with one car stranded. The USGS tidal gauge in Great South Bay at Lindenhurst recorded a water level of 3.6 ft. MLLW during the morning high tide cycle. This is just .2 ft below the threshold for moderate coastal flooding established by the National Weather Service.

Sources: NOAA-NCEI 2020, FEMA 2020
Notes:
Monetary figures within this table were U.S. Dollar (USD) figures calculated during or within the approximate time of the event. If such an event would occur in the present day, monetary losses would be considerably higher in USDs as a result of increased U.S. Inflation Rates.

With flooding documentation for New York State and Suffolk County being so extensive, it is possible not all sources have been identified or researched. Therefore, Table 5.4.8-3 may not include all events that have occurred in the County.

DR Federal Disaster Declaration
EM Federal Emergency Declaration
FEMA Federal Emergency Management Agency
IA Individual Assistance
K Thousand ($)
M Million ($)
N/A Not applicable
NCDC National Climate Data Center
NOAA National Oceanic Atmospheric Administration
NWS National Weather Service
PA Public Assistance
SHELDUS Spatial Hazard Events and Losses Database for the U.S.

Probability of Future Events

Given the history of flood events that have impacted Suffolk County and climate change projections, it is apparent that future flooding of varying degrees will occur. As defined by FEMA, geographic areas within the SFHA are estimated to have a one-percent chance of flooding in any given year. A structure located within a 1-percent annual chance flood area has a 26-percent chance of suffering flood damage during the term of a 30-year mortgage. Geographic areas in Suffolk County located within the 0.2-percent annual chance flood area boundary are estimated to have a 0.2-percent chance of being flooded in any given year.

According to the Storm Events Database, Suffolk County has been impacted by 146 flood events between 1950 and 2020 (Table 5.4.8-4).

Table 5.4.8-4. Probability of Occurrence of Severe Storm Events in Suffolk County

Hazard Type	Number of Occurrences Between 1950 and 2020	Rate of Occurrence or Annual Number of Events (average)	Recurrence Interval (in years) (# Years/Number of Events)	Probability of Event in any given year	% chance of occurrence in any given year
Coastal Flood	49	0.70	1.45	0.69	69.01
Flash Flood	75	1.07	0.95	1.06	100
Flood	17	0.24	4.18	0.24	23.94
Storm Surge/Tide	5	0.07	14.20	0.07	7.04
Total	**146**	**2.09**	**0.49**	**2.06**	**100**

Source: NOAA NCEI 2020

In Section 5.3, the identified hazards of concern for Suffolk County were ranked. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Committee, the probability of occurrence for flood in the County is considered 'frequent'.

It is anticipated Suffolk County will continue to experience direct and indirect impacts of flooding events annually that may induce secondary hazards such as erosion, storm surge in coastal areas, infrastructure deterioration or failure, utility failures, power outages, water quality and supply concerns, and transportation delays, accidents, and inconveniences.

Climate Change Impacts

Climate change is beginning to affect both people and resources in New York State, and these impacts are projected to continue growing. Impacts related to increasing temperatures and sea level rise are already being felt in the State. ClimAID: the Integrated Assessment for Effective Climate Change in New York State (ClimAID) was undertaken to provide decision-makers with information on the State's vulnerability to climate change and to facilitate the development of adaptation strategies informed by both local experience and scientific knowledge (New York State Energy Research and Development Authority [NYSERDA] 2011).

Each region in New York State, as defined by ClimAID, has attributes that will be affected by climate change. Suffolk County is part of Region 4, New York City and Long Island. Some of the issues in this region, affected by climate change, include: the area contains the highest population density in the State; sea level rise and storm surge increase coastal flooding, erosion, and wetland loss; challenges for water supply and wastewater treatment; increase in heat-related deaths; illnesses related to air quality increase; and higher summer energy demand stresses the energy system (NYSERDA 2011).

In Region 4, it is estimated that temperatures will increase by 4.1ºF to 5.7ºF by the 2050s and 5.3ºF to 8.8ºF by the 2080s (baseline of 54.6 ºF, mid-range projection). Precipitation totals will increase between 4 and 11% by the 2050s and 5 to 13% by the 2080s (baseline of 49.7 inches, mid-range projection) (NYSERDA 2014). The heaviest 1% of daily rainfalls have increased by approximately 70% between 1958 and 2011 in the Northeast (Horton et al. 2015). Average annual precipitation is projected to increase in the region by four to 11-percent by the 2050s and five to 13-percent by the 2080s (New York City Panel on Climate Change [NPCC] 2015).

Sea level rise projections for Montauk Point in the middle range estimate (25th to 75th percentile) suggest four to eight inches of rise by the 2020s; 11 to 21 inches by the 2050s; and 18 to 39 inches by the 2080s (based on the 2000-2004 baseline). Scenarios in the high estimate suggest 10 inches by the 2020s; 30 inches by the 2050s; and 58 inches by the 2080s. As decades progress, the expansion of the range is driven by uncertainty in land-based ice mass change, ocean thermal expansion, and regional ocean dynamics (NYSERDA 2014).

Table 5.4.8-5 displays the projected seasonal precipitation change for the New York City and Long Island ClimAID Region (NYSERDA, 2011).

Table 5.4.8-5. Projected Seasonal Precipitation Change in Region 4, 2050s (% change)

Winter	Spring	Summer	Fall
0 to +15	0 to +10	-5 to +10	-5 to +10

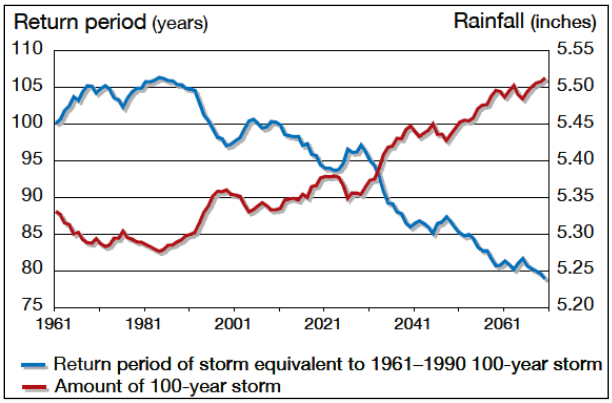
Source: NYSERDA 2011

The projected increase in precipitation is expected to fall in heavy downpours and less in light rains. The increase in heavy downpours has the potential to affect drinking water; heighten the risk of riverine flooding; flood key rail lines, roadways and transportation hugs; and increase delays and hazards related to extreme weather events (NYSERDA 2011).

Increasing air temperatures intensify the water cycle by increasing evaporation and precipitation. This can cause an increase in rain totals during events with longer dry periods in between those events. These changes can have a variety of effects on the State's water resources (NYSERDA 2011).

Figure 5.4.8-14 displays the projected rainfall and frequency of extreme storms in New York State. The amount of rainfall in a 100-year event is projected to increase, while the number of years between such storms (return period) is projected to decrease. Rainstorms are projected to become more severe and more frequent (NYSERDA 2011).

Figure 5.4.8-14. Projected Rainfall and Frequency of Extreme Storms



Source: NYSERDA, 2011

Dams are designed partly based on assumptions about a river's flow behavior, expressed as hydrographs. Changes in weather patterns can have significant effects on the hydrograph used for the design of a dam. If the hygrograph changes, it is conceivable that the dam can lose some or its entire designed margin of safety, also known as freeboard. Loss of designed margin of safety may cause floodwaters more readily to overtop the dam or create unintended loads. Such situations could lead to a dam failure.

Impacts of climate change can lead to shoreline erosion, coastal flooding, and water pollution; affecting man-made coastal infrastructures and coastal ecosystems. Coastal areas may be impacted by climate change in different ways. These areas are sensitive to sea level rise, changes in the frequency and intensity of storms, increase in precipitation, and warmer ocean temperatures (USEPA 2017). Temperatures are predicted to increase in Suffolk County, which lead to an increase in intensity and frequency of severe storms. This increase may lead to more weather patterns that cause flooding events.

Vulnerability Assessment

To assess Suffolk County's risk to the flood hazard, a spatial analysis was conducted using the best available spatially-delineated flood hazard areas. The 1- and 0.2-percent annual chance flood events depicted on the FEMA DFIRM were examined to determine the assets located in the hazard areas and to estimate potential loss using the FEMA Hazus model. Furthermore, 1-foot increment of sea level rise scenarios for the County from NOAA were reviewed for the 1- through 4-foot inundation areas. These results are summarized below. Refer to Section 5.2 (Methodology and Tools) for additional details on the methodology used to assess flood risk.

Impact on Life, Health and Safety

The impact of flooding on life, health and safety is dependent upon several factors including the severity of the event and whether adequate warning time is provided to residents. Exposure represents the population living in or near floodplain areas that could be impacted should a flood event occur. However, exposure is not limited to persons who reside in a defined hazard zone, but includes all individuals who may be affected by the effects of a hazard event (e.g., people are at risk while traveling in flooded areas, or their access to emergency services is compromised during an event). The degree of that impact will vary and is not strictly measurable.

Based on the spatial analysis, there are an estimated 54,380 people living in the SFHA, or 1-percent annual chance event floodplain, and an estimated 66,413 people residing in the 0.2-percent annual chance floodplain (refer to Table 5.4.8-4). These estimates are based on the U.S. Census data and do not account for fluctuations in seasonal population.

Residents living in the floodplain may displaced due to their homes flooding, requiring them to seek temporary shelter with friends and family or in emergency shelters. Based on the spatial analysis, 100-percent of the Village of Saltaire's population resides in a floodplain (either 1-percent or 0.2-percent). The Village of Ocean Beach and Village of West Hampton Dunes also have nearly all of their population living within the flood hazard areas (i.e., 99.4-percent and 99.3-percent, respectively). The Town of Brookhaven has the greatest number of residents located in the floodplain; approximately 13,464 and 14,854 people located in the 1-percent chance event and 0.2-percent chance event floodplain boundaries, respectively. For this project, the estimated potential population exposed is used as a guide for planning purposes.

Table 5.4.8-5. Estimated Population Exposed to the Flood Hazard

Jurisdiction	Total Population (ACS 5-Year 2014 – 2018)	Population in the SFHA (1% Annual Chance Event)		Population in the 0.2% Annual Chance Event Floodplain	
		Number	Percent (%) of Total	Number	Percent (%) of Total
Amityville (V)	9,452	2,558	27.1%	2,644	28.0%
Asharoken (V)	443	285	64.4%	287	64.7%
Babylon (T)	162,968	10,350	6.4%	12,910	7.9%
Babylon (V)	12,089	2,682	22.2%	2,933	24.3%
Belle Terre (V)	681	0	0.0%	0	0.0%
Bellport (V)	2,008	36	1.8%	44	2.2%
Brightwaters (V)	3,069	92	3.0%	125	4.1%
Brookhaven (T)	448,342	13,464	3.0%	14,854	3.3%
Dering Harbor (V)	0	0	0.0%	0	0.0%
East Hampton (T)	18,685	1,311	7.0%	1,664	8.9%
East Hampton (V)	1,034	46	4.4%	79	7.6%
Greenport (V)	1,945	106	5.4%	187	9.6%
Head of the Harbor (V)	1,463	3	0.2%	3	0.2%
Huntington (T)	189,840	337	0.2%	385	0.2%
Huntington Bay (V)	1,366	50	3.7%	57	4.2%
Islandia (V)	3,345	0	0.0%	0	0.0%
Islip (T)	326,416	10,367	3.2%	11,337	3.5%
Lake Grove (V)	11,130	0	0.0%	0	0.0%
Lindenhurst (V)	27,053	3,795	14.0%	4,052	15.0%
Lloyd Harbor (V)	3,676	9	0.2%	15	0.4%
Nissequogue (V)	1,574	106	6.7%	106	6.7%
North Haven (V)	919	23	2.5%	137	14.9%
Northport (V)	7,348	32	0.4%	46	0.6%
Ocean Beach (V)	24	24	99.4%	24	99.4%
Old Field (V)	812	22	2.7%	22	2.7%
Patchogue (V)	12,398	1,277	10.3%	1,466	11.8%
Poquott (V)	992	13	1.3%	13	1.3%
Port Jefferson (V)	7,871	8	0.1%	8	0.1%
Quogue (V)	803	202	25.2%	234	29.1%
Riverhead (T)	33,625	710	2.1%	1,895	5.6%
Sag Harbor (V)	2,184	126	5.8%	324	14.8%
Sagaponack (V)	260	31	11.8%	44	16.8%
Saltaire (V)	8	8	100.0%	8	100.0%
Shelter Island (T)	2,744	34	1.2%	158	5.8%
Shoreham (V)	437	0	0.0%	0	0.0%
Smithtown (T)	112,224	37	0.0%	40	0.0%
Southampton (T)	51,008	4,028	7.9%	6,453	12.7%
Southampton (V)	3,263	237	7.3%	281	8.6%

Jurisdiction	Total Population (ACS 5-Year 2014 – 2018)	Population in the SFHA (1% Annual Chance Event)		Population in the 0.2% Annual Chance Event Floodplain	
		Number	Percent (%) of Total	Number	Percent (%) of Total
Southold (T)	20,202	1,111	5.5%	2,591	12.8%
Village of the Branch (V)	1,770	0	0.0%	0	0.0%
West Hampton Dunes (V)	69	69	99.3%	69	99.3%
Westhampton Beach (V)	1,653	669	40.5%	732	44.3%
Shinnecock Tribal Nation	662	74	11.1%	137	20.6%
Unkechaug Tribal Nation	324	47	14.6%	50	15.3%
Suffolk County (Total)	**1,488,179**	**54,380**	**3.7%**	**66,413**	**4.5%**

Sources: FEMA Effective DFIRM 2009/LOMR 2019; Suffolk County GIS 2020; American Community Survey (ACS) 2018
Note: SFHA = Special Flood Hazard Area which includes both A and V zones.
T = Town; V = Village

Research has shown that some populations, while they may not have more hazard exposure, may experience exacerbated impacts and prolonged recovery if/when impacted. This is due to many factors including their physical and financial ability to react or respond during a hazard. Of the population exposed, the most vulnerable include the economically disadvantaged and the population over age 65. Economically disadvantaged populations may be more vulnerable because they are likely to evaluate their risk and make decisions to evacuate based on net economic impacts on their families. The population over age 65 is also more vulnerable because they are more likely to seek or need medical attention that may not be available due to isolation during a flood event, and they may have more difficulty evacuating. Within Suffolk County, there are approximately 239,284 people over the age of 65 and 104,660 people below the poverty level. The three jurisdictions with the greatest percent of its population in the flood hazard inundation also have more than 20-percent of its population over 65 years old.

The CDC 2016 Social Vulnerability Index (SVI) ranks U.S. Census tracts on socioeconomic status, household composition and disability, minority status and language, and housing and transportation. Suffolk County's overall score is 0.2318, indicating that its communities have low vulnerability (CDC 2016).

Using 2010 U.S. Census data, HAZUS v4.2 estimates the potential sheltering needs as a result of a 1-percent annual chance flood event. For the 1-percent flood event, HAZUS v4.2 estimates 1,079 households will be displaced, and 40 people will seek short-term sheltering. These statistics, by jurisdiction, are presented in Table 5.4.8-5. The estimated displaced population and number of persons seeking short-term sheltering differs from the number of persons exposed to the 1-percent annual chance flood, because the displaced population numbers take into consideration that not all residents will be significantly impacted enough to be displaced or to require short-term sheltering during a flood event.

Table 5.4.8-6. Estimated Population Displaced or Seeking Short-Term Shelter From the 1-Percent Annual Chance Flood Event

Jurisdiction	Total Population (ACS 5-Year 2014 - 2018)	1-Percent Annual Chance Event	
		Displaced Population*	Persons Seeking Short-Term Sheltering*
Amityville (V)	9,452	146	13
Asharoken (V)	443	14	1
Babylon (T)	162,968	168	7
Babylon (V)	12,089	14	0

Jurisdiction	Total Population (ACS 5-Year 2014 - 2018)	1-Percent Annual Chance Event	
		Displaced Population*	Persons Seeking Short-Term Sheltering*
Belle Terre (V)	681	0	0
Bellport (V)	2,008	7	0
Brightwaters (V)	3,069	3	0
Brookhaven (T)	448,342	132	2
Dering Harbor (V)	0	0	0
East Hampton (T)	18,685	12	0
East Hampton (V)	1,034	0	0
Greenport (V)	1,945	4	0
Head of the Harbor (V)	1,463	0	0
Huntington (T)	189,840	77	2
Huntington Bay (V)	1,366	21	1
Islandia (V)	3,345	0	0
Islip (T)	326,416	227	5
Lake Grove (V)	11,130	0	0
Lindenhurst (V)	27,053	60	1
Lloyd Harbor (V)	3,676	0	0
Nissequogue (V)	1,574	0	0
North Haven (V)	919	0	0
Northport (V)	7,348	73	4
Ocean Beach (V)	24	0	0
Old Field (V)	812	9	0
Patchogue (V)	12,398	31	1
Poquott (V)	992	3	0
Port Jefferson (V)	7,871	6	0
Quogue (V)	803	0	0
Riverhead (T)	33,625	10	0
Sag Harbor (V)	2,184	0	0
Sagaponack (V)	260	0	0
Saltaire (V)	8	0	0
Shelter Island (T)	2,744	2	0
Shoreham (V)	437	1	0
Smithtown (T)	112,224	14	0
Southampton (T)	51,008	1	0
Southampton (V)	3,263	1	0
Southold (T)	20,202	39	2
The Branch (V)	1,770	1	0
West Hampton Dunes (V)	69	0	0
Westhampton Beach (V)	1,653	1	0
Shinnecock Tribal Nation	662	0	0
Unkechaug Tribal Nation	324	1	0
Suffolk County (Total)	**1,488,179**	**1,079**	**40**

Source: HAZUS V4.2; American Community Survey 2018 5-year Estimates; US Census Bureau 2010; FEMA Effective DFIRM 2009/LOMR 2019
**Note: Population results are referencing 2010 Census population statistics. Results may be under-estimated.*

Total number of injuries and casualties resulting from typical riverine and tidal flooding are generally limited based on advance weather forecasting, blockades, and warnings. Injuries and deaths generally are not anticipated if proper warning and precautions occur. In contrast, warning time for flash flooding is limited. These events are frequently associated with other natural hazard events such as earthquakes, landslides, or severe weather, which limits their predictability and compounds the hazard. Populations without adequate warning of the event are highly vulnerable to this hazard.

Furthermore, to estimate population exposed and vulnerable to sea level rise hazards, a spatial analysis was conducted using the 1-foot increment NOAA sea level rise inundation areas; refer to Figure 5.4.8-8 through Figure 5.4.8-10. Table 5.4.8-6 breaks down the impact of sea level rise for the 1-, through 4-foot scenarios by Suffolk County's jurisdictions.

Based on the spatial analysis, there is an estimated range of 300 people up to 29,576 people living in the 1-foot through 4-foot sea level rise inundation hazard areas. Similar to flood risks, persons in these hazard areas may become displaced due to flooding. The Village of Saltaire, has the greatest percentage of its population located the 1-foot increment sea level rise inundation areas; approximately 2.1-percent up to 83-percent. The Town of Babylon has the greatest number of residents located in the 1-foot sea level rise inundation area (i.e., 96 persons); The Town of Brookhaven has the greatest number of residents located in the 2-foot sea level rise inundation area (i.e., 857); and the Town of Islip has the greatest number of residents located in the 3-foot and 4-foot sea level rise inundation areas (3,533 and 7,166 persons, respectively).

Table 5.4.8-7. Estimated Population Exposed to Sea Level Rise 1-foot through 4-foot Inundation Areas

Jurisdiction	Population (ACS 5-Year 2014 - 2018)	Estimated Population Exposed							
		Number in SLR 1 Foot	Percent (%) of Total Exposed	Number in SLR 2 Foot	Percent (%) of Total Exposed	Number in SLR 3 Foot	Percent (%) of Total Exposed	Number in SLR 4 Foot	Percent (%) of Total Exposed
Amityville (V)	9,452	8	0.1%	228	2.4%	894	9.5%	1,727	18.3%
Asharoken (V)	443	3	0.7%	3	0.7%	7	1.6%	22	4.9%
Babylon (T)	162,968	96	0.1%	726	0.4%	3,235	2.0%	6,690	4.1%
Babylon (V)	12,089	0	0.0%	98	0.8%	854	7.1%	1,961	16.2%
Belle Terre (V)	681	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Bellport (V)	2,008	0	0.0%	0	0.0%	9	0.5%	20	1.0%
Brightwaters (V)	3,069	0	0.0%	0	0.0%	6	0.2%	72	2.4%
Brookhaven (T)	448,342	46	0.0%	857	0.2%	2,980	0.7%	5,701	1.3%
Dering Harbor (V)	0	0	0.0%	0	0.0%	0	0.0%	0	0.0%
East Hampton (T)	18,685	6	0.0%	14	0.1%	39	0.2%	113	0.6%
East Hampton (V)	1,034	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Greenport (V)	1,945	2	0.1%	5	0.3%	47	2.4%	61	3.2%
Head of the Harbor (V)	1,463	0	0.0%	0	0.0%	3	0.2%	3	0.2%
Huntington (T)	189,840	71	0.0%	78	0.0%	94	0.0%	146	0.1%
Huntington Bay (V)	1,366	0	0.0%	0	0.0%	0	0.0%	2	0.2%
Islandia (V)	3,345	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Islip (T)	326,416	12	0.0%	659	0.2%	3,533	1.1%	7,166	2.2%
Lake Grove (V)	11,130	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Lindenhurst (V)	27,053	21	0.1%	760	2.8%	2,126	7.9%	3,135	11.6%
Lloyd Harbor (V)	3,676	0	0.0%	0	0.0%	0	0.0%	6	0.2%
Nissequogue (V)	1,574	0	0.0%	3	0.2%	16	1.0%	24	1.5%
North Haven (V)	919	0	0.0%	0	0.0%	0	0.0%	2	0.3%
Northport (V)	7,348	0	0.0%	0	0.0%	6	0.1%	9	0.1%
Ocean Beach (V)	24	0	0.0%	8	32.8%	15	63.3%	18	73.4%
Old Field (V)	812	0	0.0%	2	0.3%	7	0.8%	11	1.4%
Patchogue (V)	12,398	0	0.0%	25	0.2%	261	2.1%	597	4.8%

Jurisdiction	Population (ACS 5-Year 2014 - 2018)	Estimated Population Exposed							
		Number in SLR 1 Foot	Percent (%) of Total Exposed	Number in SLR 2 Foot	Percent (%) of Total Exposed	Number in SLR 3 Foot	Percent (%) of Total Exposed	Number in SLR 4 Foot	Percent (%) of Total Exposed
Poquott (V)	992	5	0.5%	8	0.8%	11	1.1%	13	1.3%
Port Jefferson (V)	7,871	0	0.0%	0	0.0%	0	0.0%	3	0.0%
Quogue (V)	803	0	0.1%	3	0.4%	18	2.3%	50	6.2%
Riverhead (T)	33,625	3	0.0%	15	0.0%	41	0.1%	198	0.6%
Sag Harbor (V)	2,184	0	0.0%	0	0.0%	1	0.1%	39	1.8%
Sagaponack (V)	260	0	0.0%	0	0.0%	0	0.0%	0	0.1%
Saltaire (V)	8	0	2.1%	4	46.8%	6	71.7%	7	83.0%
Shelter Island (T)	2,744	0	0.0%	1	0.0%	3	0.1%	9	0.3%
Shoreham (V)	437	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Smithtown (T)	112,224	7	0.0%	7	0.0%	10	0.0%	17	0.0%
Southampton (T)	51,008	12	0.0%	67	0.1%	413	0.8%	1,038	2.0%
Southampton (V)	3,263	0	0.0%	2	0.1%	4	0.1%	17	0.5%
Southold (T)	20,202	5	0.0%	10	0.0%	108	0.5%	406	2.0%
Village of the Branch (V)	1,770	0	0.0%	0	0.0%	0	0.0%	0	0.0%
West Hampton Dunes (V)	69	0	0.4%	4	5.1%	10	13.8%	17	24.3%
Westhampton Beach (V)	1,653	3	0.2%	47	2.9%	123	7.5%	250	15.1%
Shinnecock Tribal Nation	662	0	0.0%	0	0.0%	0	0.0%	4	0.5%
Unkechaug Tribal Nation	324	0	0.0%	0	0.0%	0	0.0%	23	6.9%
Suffolk County (Total)	**1,488,179**	**300**	**0.0%**	**3,634**	**0.2%**	**14,878**	**1.0%**	**29,576**	**2.0%**

Source: American Community Survey 5-year Estimates 2018; NOAA 2017
Notes: SLR = Sea Level Rise; T = Town; V = Village

Cascading impacts may also include exposure to pathogens such as mold. After flood events, excess moisture and standing water contribute to the growth of mold in buildings. Mold may present a health risk to building occupants, especially those with already compromised immune systems such as infants, children, the elderly and pregnant women. The degree of impact will vary and is not strictly measurable. Mold spores can grow in as short a period as 24-48 hours in wet and damaged areas of buildings that have not been properly cleaned. Very small mold spores can easily be inhaled, creating the potential for allergic reactions, asthma episodes, and other respiratory problems. Buildings should be properly cleaned and dried out to safely prevent mold growth (CDC 2019).

Molds and mildews are not the only public health risk associated with flooding. Floodwaters can be contaminated by pollutants such as sewage, human and animal feces, pesticides, fertilizers, oil, asbestos, and rusting building materials. Common public health risks associated with flood events also include:

- Unsafe food
- Contaminated drinking and washing water and poor sanitation
- Mosquitos and animals
- Carbon monoxide poisoning
- Secondary hazards associated with re-entering/cleaning flooded structures
- Mental stress and fatigue

Current loss estimation models such as Hazus are not equipped to measure public health impacts. The best level of mitigation for these impacts is to be aware that they can occur, educate the public on prevention, and be prepared to deal with these vulnerabilities in responding to flood events.

Impact on General Building Stock

Coastal and Riverine Flood

Buildings located in the floodplain are exposed to the flood hazard. Potential damage is the modeled loss that could occur to the exposed inventory measured by the structural and content replacement cost value. There are an estimated 23,414 buildings located in the SFHA with a value of approximately $32.3 billion of building and contents (based on replacement cost value). This represents approximately 3.8-percent of the County's total general building stock inventory replacement cost value (approximately $862 billion). Refer to Table 5.4.8-7 for the total number of buildings located in the 1-percent annual chance floodplain by jurisdiction. Table 5.4.8-9 and Table 5.4.8-10 break down the 1-percent annual chance A zone and V zone exposure results for residential structures and commercial structures, respectively.

There are 29,456 buildings located in the 0.2-percent annual chance floodplain with approximately $41.5 billion of building/contents in replacement cost value (or 4.8-percent of the County's total replacement cost value). The Village of Saltaire has the greatest proportion of its buildings located in the floodplain; approximately 100-percent for both the 1-percent and 0.2-percent chance flood events. The Town of Brookhaven has the greatest number of buildings located in the floodplain; approximately 4,631 and 5,087 located in the 1-percent and 0.2-percent annual chance floodplains, respectively. Refer to Table 5.4.8-8 for the total number of buildings exposed to the 0.2-percent annual chance flood event inundation.

Hazus estimates approximately $5.5 billion in building and content damage as a result of the 1-percent annual chance flood event (or 0.6-percent of the total building stock replacement cost value). Of the $5.5 billion in potential loss, approximately $4.2 billion is estimated to residential structures. Additionally, Hazus estimates approximately $5.7 billion in building and content damage as a result of the 0.2-percent annual chance flood event (or 0.7-percent of the total building stock replacement cost value). Estimated damage to residential

structures as a result of the 0.2-percent annual chance flood event is approximately $4.4 billion. Refer to Table 5.4.8-11 for the total estimated potential losses from the 1-percent and 0.2-percent annual chance flood events by jurisdiction. Table 5.4.8-12 and Table 5.4.8-13 summarize the estimated damages for residential and commercial occupancy classes, respectively.

Table 5.4.8-8. Estimated General Building Stock Exposure to the 1-Percent Annual Chance Flood Event – All Occupancies

Jurisdiction	Total # Buildings	Total Replacement Cost Value (RCV)	Total (All Occupancies)							
			A-Zone				V-Zone			
			# Buildings	Percent (%) Total	RCV	% Total	# Buildings	Percent (%) Total	RCV	Percent (%) Total
Amityville (V)	4,161	$5,519,611,238	1,062	25.5%	$831,314,419	15.1%	5	0.1%	$3,724,701	0.1%
Asharoken (V)	321	$379,192,198	145	45.2%	$151,996,902	40.1%	54	16.8%	$46,471,500	12.3%
Babylon (T)	51,514	$82,740,965,827	3,102	6.0%	$2,066,023,174	2.5%	9	0.0%	$15,735,697	0.0%
Babylon (V)	4,957	$6,110,029,951	1,068	21.5%	$961,311,522	15.7%	4	0.1%	$1,811,342	0.0%
Belle Terre (V)	316	$680,761,603	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Bellport (V)	1,206	$2,358,752,934	25	2.1%	$38,330,334	1.6%	0	0.0%	$0	0.0%
Brightwaters (V)	1,162	$1,932,120,865	33	2.8%	$72,220,748	3.7%	0	0.0%	$0	0.0%
Brookhaven (T)	154,866	$221,811,756,528	4,301	2.8%	$4,209,869,531	1.9%	330	0.2%	$309,714,347	0.1%
Dering Harbor (V)	41	$88,595,797	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
East Hampton (T)	18,243	$26,516,571,402	1,145	6.3%	$1,312,985,009	5.0%	144	0.8%	$266,234,228	1.0%
East Hampton (V)	1,938	$5,002,346,911	40	2.1%	$75,801,086	1.5%	52	2.7%	$176,606,700	3.5%
Greenport (V)	982	$1,316,147,268	64	6.5%	$128,847,599	9.8%	11	1.1%	$39,815,581	3.0%
Head of the Harbor (V)	527	$1,052,509,872	1	0.2%	$1,110,000	0.1%	0	0.0%	$0	0.0%
Huntington (T)	62,226	$82,709,382,979	104	0.2%	$193,355,866	0.2%	66	0.1%	$55,626,826	0.1%
Huntington Bay (V)	593	$642,162,208	26	4.4%	$27,935,657	4.4%	7	1.2%	$21,591,931	3.4%
Islandia (V)	1,039	$4,798,220,611	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Islip (T)	86,764	$157,009,867,271	2,838	3.3%	$3,927,124,458	2.5%	178	0.2%	$259,519,857	0.2%
Lake Grove (V)	3,693	$4,999,176,933	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Lindenhurst (V)	9,387	$9,110,586,538	1,286	13.7%	$896,477,143	9.8%	12	0.1%	$11,814,478	0.1%
Lloyd Harbor (V)	1,301	$2,057,808,899	9	0.7%	$21,869,048	1.1%	8	0.6%	$21,075,622	1.0%
Nissequogue (V)	638	$1,430,093,283	35	5.5%	$48,437,511	3.4%	15	2.4%	$24,967,288	1.7%
North Haven (V)	772	$2,221,433,929	19	2.5%	$41,620,446	1.9%	0	0.0%	$0	0.0%
Northport (V)	2,702	$2,610,724,998	8	0.3%	$17,086,069	0.7%	11	0.4%	$10,083,922	0.4%
Ocean Beach (V)	530	$483,689,958	516	97.4%	$471,777,602	97.5%	11	2.1%	$10,910,057	2.3%
Old Field (V)	391	$967,667,970	11	2.8%	$25,058,740	2.6%	6	1.5%	$12,658,556	1.3%
Patchogue (V)	3,900	$11,533,289,631	399	10.2%	$593,712,491	5.1%	1	0.0%	$1,102,881	0.0%
Poquott (V)	379	$540,263,069	0	0.0%	$0	0.0%	5	1.3%	$960,284	0.2%
Port Jefferson (V)	3,133	$10,546,648,033	35	1.1%	$762,527,512	7.2%	6	0.2%	$2,132,338	0.0%
Quogue (V)	1,785	$5,371,998,365	386	21.6%	$1,341,414,755	25.0%	32	1.8%	$117,319,915	2.2%
Riverhead (T)	16,853	$27,561,801,284	228	1.4%	$244,959,060	0.9%	86	0.5%	$54,007,542	0.2%
Sag Harbor (V)	1,887	$3,157,033,580	133	7.0%	$329,462,511	10.4%	3	0.2%	$2,526,575	0.1%
Sagaponack (V)	908	$3,548,811,980	70	7.7%	$243,222,848	6.9%	33	3.6%	$84,980,062	2.4%
Saltaire (V)	399	$406,571,331	370	92.7%	$375,832,107	92.4%	29	7.3%	$30,739,224	7.6%
Shelter Island (T)	2,729	$3,894,434,021	40	1.5%	$121,837,640	3.1%	12	0.4%	$21,695,348	0.6%
Shoreham (V)	216	$381,052,410	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Smithtown (T)	35,517	$62,086,530,012	13	0.0%	$33,319,679	0.1%	8	0.0%	$26,469,787	0.0%

Jurisdiction	Total # Buildings	Total Replacement Cost Value (RCV)	Total (All Occupancies)							
			A-Zone				V-Zone			
			# Buildings	Percent (%) Total	RCV	% Total	# Buildings	Percent (%) Total	RCV	Percent (%) Total
Southampton (T)	33,290	$69,558,169,929	2,371	7.1%	$5,168,192,818	7.4%	202	0.6%	$731,998,763	1.1%
Southampton (V)	3,500	$13,027,590,722	198	5.7%	$1,157,784,208	8.9%	61	1.7%	$291,554,507	2.2%
Southold (T)	15,123	$17,842,698,534	763	5.0%	$842,398,540	4.7%	106	0.7%	$118,839,528	0.7%
Village of the Branch (V)	624	$1,414,333,647	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
West Hampton Dunes (V)	279	$766,363,715	195	69.9%	$528,696,905	69.0%	82	29.4%	$232,853,010	30.4%
Westhampton Beach (V)	1,965	$5,590,458,778	683	34.8%	$1,908,504,060	34.1%	40	2.0%	$132,037,640	2.4%
Shinnecock Tribal Nation	378	$155,005,274	42	11.1%	$13,807,380	8.9%	0	0.0%	$0	0.0%
Unkechaug Tribal Nation	144	$55,549,783	20	13.9%	$6,105,492	11.0%	1	0.7%	$610,257	1.1%
Suffolk County (Total)	**533,279**	**$861,988,782,069**	**21,784**	**4.1%**	**$29,192,330,873**	**3.4%**	**1,630**	**0.3%**	**$3,138,190,291**	**0.4%**

Source: Suffolk County GIS, 2020; Suffolk County Real Property Tax Service, 2020; RS Means 2019; Microsoft, 2018, Open Street Map, 2019; FEMA Effective DFIRM 2009/LOMR 2019
Note: RCV = Replacement Cost Value; T = Town; V = Village; # = Number; % = Percent.

Table 5.4.8-9. Estimated General Building Stock Exposure to the 0.2-Percent Annual Chance Flood Event – All Occupancies

Jurisdiction	Total # Buildings	Total Replacement Cost Value (RCV)	Total (All Occupancies) 0.2 Percent			
			# Buildings	Percent (%) of Total	RCV	Percent (%) of Total
Amityville (V)	4,161	$5,519,611,238	1,102	26.5%	$864,803,744	15.7%
Asharoken (V)	321	$379,192,198	200	62.3%	$198,720,402	52.4%
Babylon (T)	51,514	$82,740,965,827	3,861	7.5%	$2,544,996,172	3.1%
Babylon (V)	4,957	$6,110,029,951	1,174	23.7%	$1,057,672,648	17.3%
Belle Terre (V)	316	$680,761,603	0	0.0%	$0	0.0%
Bellport (V)	1,206	$2,358,752,934	29	2.4%	$53,442,834	2.3%
Brightwaters (V)	1,162	$1,932,120,865	45	3.9%	$98,332,448	5.1%
Brookhaven (T)	154,866	$221,811,756,528	5,087	3.3%	$4,921,144,294	2.2%
Dering Harbor (V)	41	$88,595,797	1	2.4%	$3,512,422	4.0%
East Hampton (T)	18,243	$26,516,571,402	1,660	9.1%	$2,196,208,672	8.3%
East Hampton (V)	1,938	$5,002,346,911	153	7.9%	$419,131,548	8.4%
Greenport (V)	982	$1,316,147,268	110	11.2%	$254,423,046	19.3%
Head of the Harbor (V)	527	$1,052,509,872	1	0.2%	$1,110,000	0.1%

Jurisdiction	Total # Buildings	Total Replacement Cost Value (RCV)	Total (All Occupancies) 0.2 Percent			
			# Buildings	Percent (%) of Total	RCV	Percent (%) of Total
Huntington (T)	62,226	$82,709,382,979	203	0.3%	$354,163,928	0.4%
Huntington Bay (V)	593	$642,162,208	36	6.1%	$53,226,588	8.3%
Islandia (V)	1,039	$4,798,220,611	0	0.0%	$0	0.0%
Islip (T)	86,764	$157,009,867,271	3,292	3.8%	$4,736,178,047	3.0%
Lake Grove (V)	3,693	$4,999,176,933	0	0.0%	$0	0.0%
Lindenhurst (V)	9,387	$9,110,586,538	1,385	14.8%	$965,972,948	10.6%
Lloyd Harbor (V)	1,301	$2,057,808,899	19	1.5%	$45,198,270	2.2%
Nissequogue (V)	638	$1,430,093,283	50	7.8%	$73,404,799	5.1%
North Haven (V)	772	$2,221,433,929	115	14.9%	$331,402,668	14.9%
Northport (V)	2,702	$2,610,724,998	28	1.0%	$61,714,389	2.4%
Ocean Beach (V)	530	$483,689,958	527	99.4%	$482,687,658	99.8%
Old Field (V)	391	$967,667,970	17	4.3%	$37,717,296	3.9%
Patchogue (V)	3,900	$11,533,289,631	455	11.7%	$649,042,917	5.6%
Poquott (V)	379	$540,263,069	5	1.3%	$960,284	0.2%
Port Jefferson (V)	3,133	$10,546,648,033	43	1.4%	$843,287,763	8.0%
Quogue (V)	1,785	$5,371,998,365	482	27.0%	$1,794,848,307	33.4%
Riverhead (T)	16,853	$27,561,801,284	823	4.9%	$808,316,379	2.9%
Sag Harbor (V)	1,887	$3,157,033,580	319	16.9%	$804,834,365	25.5%
Sagaponack (V)	908	$3,548,811,980	155	17.1%	$541,544,659	15.3%
Saltaire (V)	399	$406,571,331	399	100.0%	$406,571,331	100.0%
Shelter Island (T)	2,729	$3,894,434,021	166	6.1%	$315,793,825	8.1%
Shoreham (V)	216	$381,052,410	0	0.0%	$0	0.0%
Smithtown (T)	35,517	$62,086,530,012	24	0.1%	$62,565,903	0.1%
Southampton (T)	33,290	$69,558,169,929	4,104	12.3%	$8,842,737,350	12.7%
Southampton (V)	3,500	$13,027,590,722	301	8.6%	$1,645,557,073	12.6%
Southold (T)	15,123	$17,842,698,534	1,911	12.6%	$2,026,300,699	11.4%
Village of the Branch (V)	624	$1,414,333,647	0	0.0%	$0	0.0%
West Hampton Dunes (V)	279	$766,363,715	277	99.3%	$761,549,915	99.4%

Jurisdiction	Total # Buildings	Total Replacement Cost Value (RCV)	Total (All Occupancies) 0.2 Percent			
			# Buildings	Percent (%) of Total	RCV	Percent (%) of Total
Westhampton Beach (V)	1,965	$5,590,458,778	797	40.6%	$2,244,268,246	40.1%
Shinnecock Tribal Nation	378	$155,005,274	78	20.6%	$29,476,671	19.0%
Unkechaug Tribal Nation	144	$55,549,783	22	15.3%	$7,156,288	12.9%
Suffolk County (Total)	**533,279**	**$861,988,782,069**	**29,456**	**5.5%**	**$41,539,976,795**	**4.8%**

Source: Suffolk County GIS, 2020; Suffolk County Real Property Tax Service, 2020; RS Means 2019; Microsoft, 2018, Open Street Map, 2019; FEMA Effective DFIRM 2009/LOMR 2019
Note: RCV = Replacement Cost Value; T = Town; V = Village; # = Number; % = Percent.

Table 5.4.8-10. Estimated General Building Stock Exposure to the 1-percent Annual Chance Flood Event A Zones and V Zones – Residential Occupancy Class

Jurisdiction	Total # Buildings (Residential Structures Only)	Total RCV (Residential Structures Only)	Residential							
			A-Zone				V-Zone			
			# Buildings	Percent (%) of Total	RCV	Percent (%) of Total	# Buildings	Percent (%) of Total	RCV	Percent (%) of Total
Amityville (V)	3,765	$2,677,034,715	1,015	27.0%	$690,323,276	25.8%	4	0.1%	$1,599,322	0.1%
Asharoken (V)	306	$309,723,849	143	46.7%	$143,798,104	46.4%	54	17.6%	$46,471,500	15.0%
Babylon (T)	47,601	$37,805,971,445	3,017	6.3%	$1,812,337,668	4.8%	6	0.0%	$5,643,743	0.0%
Babylon (V)	4,674	$3,721,632,038	1,034	22.1%	$746,294,428	20.1%	3	0.1%	$428,613	0.0%
Belle Terre (V)	308	$574,382,099	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Bellport (V)	1,103	$1,246,957,322	20	1.8%	$33,771,466	2.7%	0	0.0%	$0	0.0%
Brightwaters (V)	1,101	$1,636,477,851	33	3.0%	$72,220,748	4.4%	0	0.0%	$0	0.0%
Brookhaven (T)	145,482	$131,579,686,012	4,060	2.8%	$3,024,104,571	2.3%	309	0.2%	$275,127,554	0.2%
Dering Harbor (V)	38	$85,926,597	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
East Hampton (T)	16,895	$22,123,305,576	1,057	6.3%	$1,113,523,762	5.0%	128	0.8%	$233,053,753	1.1%
East Hampton (V)	1,664	$3,775,618,550	34	2.0%	$70,605,023	1.9%	40	2.4%	$131,466,058	3.5%
Greenport (V)	792	$513,424,937	38	4.8%	$39,520,384	7.7%	5	0.6%	$12,991,066	2.5%
Head of the Harbor (V)	501	$994,305,482	1	0.2%	$1,110,000	0.1%	0	0.0%	$0	0.0%
Huntington (T)	58,657	$43,584,264,666	59	0.1%	$38,411,463	0.1%	45	0.1%	$31,550,832	0.1%
Huntington Bay (V)	571	$577,036,776	20	3.5%	$17,181,000	3.0%	1	0.2%	$1,675,200	0.3%

Jurisdiction	Total # Buildings (Residential Structures Only)	Total RCV (Residential Structures Only)	Residential							
			A-Zone				V-Zone			
			# Buildings	Percent (%) of Total	RCV	Percent (%) of Total	# Buildings	Percent (%) of Total	RCV	Percent (%) of Total
Islandia (V)	836	$1,115,020,450	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Islip (T)	80,759	$81,703,947,484	2,412	3.0%	$2,579,506,402	3.2%	153	0.2%	$122,813,482	0.2%
Lake Grove (V)	3,568	$3,641,103,329	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Lindenhurst (V)	8,932	$5,807,736,760	1,242	13.9%	$740,656,905	12.8%	11	0.1%	$8,519,065	0.1%
Lloyd Harbor (V)	1,207	$1,628,119,135	3	0.2%	$2,658,440	0.2%	0	0.0%	$0	0.0%
Nissequogue (V)	594	$1,175,270,674	31	5.2%	$42,015,300	3.6%	9	1.5%	$9,561,900	0.8%
North Haven (V)	765	$2,188,952,173	19	2.5%	$41,620,446	1.9%	0	0.0%	$0	0.0%
Northport (V)	2,538	$1,766,689,132	1	0.0%	$4,476,560	0.3%	10	0.4%	$4,165,638	0.2%
Ocean Beach (V)	488	$355,960,148	476	97.5%	$345,788,648	97.1%	9	1.8%	$9,169,200	2.6%
Old Field (V)	368	$827,472,696	8	2.2%	$12,850,846	1.6%	2	0.5%	$1,340,999	0.2%
Patchogue (V)	3,426	$3,481,727,613	353	10.3%	$328,255,819	9.4%	0	0.0%	$0	0.0%
Poquott (V)	377	$538,933,042	0	0.0%	$0	0.0%	5	1.3%	$960,284	0.2%
Port Jefferson (V)	2,828	$3,526,412,239	3	0.1%	$126,385,286	3.6%	0	0.0%	$0	0.0%
Quogue (V)	1,626	$4,788,523,539	379	23.3%	$1,312,182,659	27.4%	30	1.8%	$116,522,541	2.4%
Riverhead (T)	13,063	$8,457,162,933	196	1.5%	$115,053,903	1.4%	80	0.6%	$39,575,690	0.5%
Sag Harbor (V)	1,735	$2,429,954,691	100	5.8%	$167,134,951	6.9%	0	0.0%	$0	0.0%
Sagaponack (V)	802	$3,281,675,287	65	8.1%	$224,771,776	6.8%	30	3.7%	$76,983,444	2.3%
Saltaire (V)	389	$358,584,145	360	92.5%	$327,844,921	91.4%	29	7.5%	$30,739,224	8.6%
Shelter Island (T)	2,447	$3,069,859,677	24	1.0%	$34,964,014	1.1%	6	0.2%	$6,481,712	0.2%
Shoreham (V)	208	$304,837,132	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Smithtown (T)	33,289	$33,922,545,499	9	0.0%	$16,079,461	0.0%	2	0.0%	$4,446,000	0.0%
Southampton (T)	30,275	$58,185,295,609	2,213	7.3%	$4,758,070,764	8.2%	178	0.6%	$661,427,180	1.1%
Southampton (V)	3,042	$10,005,287,830	176	5.8%	$1,044,738,544	10.4%	45	1.5%	$259,257,441	2.6%
Southold (T)	12,724	$8,887,595,011	619	4.9%	$391,614,518	4.4%	81	0.6%	$59,595,424	0.7%
Village of the Branch (V)	566	$620,280,382	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
West Hampton Dunes (V)	276	$757,346,499	193	69.9%	$521,591,501	68.9%	81	29.3%	$230,941,197	30.5%
Westhampton Beach (V)	1,717	$4,360,742,995	659	38.4%	$1,856,106,417	42.6%	36	2.1%	$120,581,172	2.8%

Jurisdiction	Total # Buildings (Residential Structures Only)	Total RCV (Residential Structures Only)	Residential							
			A-Zone				V-Zone			
			# Buildings	Percent (%) of Total	RCV	Percent (%) of Total	# Buildings	Percent (%) of Total	RCV	Percent (%) of Total
Shinnecock Tribal Nation	378	$155,005,274	42	11.1%	$13,807,380	8.9%	0	0.0%	$0	0.0%
Unkechaug Tribal Nation	144	$55,549,783	20	13.9%	$6,105,492	11.0%	1	0.7%	$610,257	1.1%
Suffolk County (Total)	**492,825**	**$498,603,339,078**	**20,134**	**4.1%**	**$22,817,482,846**	**4.6%**	**1,393**	**0.3%**	**$2,503,699,493**	**0.5%**

Source: Suffolk County GIS, 2020; Suffolk County Real Property Tax Service, 2020; RS Means 2019; Microsoft, 2018, Open Street Map, 2019; FEMA Effective DFIRM 2009/LOMR 2019
Note: RCV = Replacement Cost Value; T = Town; V = Village; # = Number; % = Percent.

Table 5.4.8-11. Estimated General Building Stock Exposure to the 1-Percent Annual Chance Flood Event A Zones and V Zones – Commercial Occupancy Class

Jurisdiction	Total # Buildings (Commercial Buildings Only)	Total RCV (Commercial Buildings Only)	Commercial							
			A-Zone				V-Zone			
			# Buildings	Percent (%) of Total	RCV	Percent (%) of Total	# Buildings	% Total	RCV	Percent (%) of Total
Amityville (V)	269	$1,261,345,017	43	16.0%	$82,770,061	6.6%	0	0.0%	$0	0.0%
Asharoken (V)	1	$4,739,792	1	100.0%	$4,739,792	100.0%	0	0.0%	$0	0.0%
Babylon (T)	1,791	$15,018,313,183	65	3.6%	$212,328,437	1.4%	2	0.1%	$9,423,103	0.1%
Babylon (V)	224	$1,240,929,775	32	14.3%	$213,820,308	17.2%	1	0.4%	$1,382,729	0.1%
Belle Terre (V)	8	$106,379,504	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Bellport (V)	78	$829,384,322	2	2.6%	$3,218,063	0.4%	0	0.0%	$0	0.0%
Brightwaters (V)	57	$280,097,954	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Brookhaven (T)	7,090	$61,712,084,701	185	2.6%	$1,050,496,535	1.7%	11	0.2%	$19,803,853	0.0%
Dering Harbor (V)	3	$2,669,200	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
East Hampton (T)	958	$3,034,436,574	75	7.8%	$157,556,158	5.2%	16	1.7%	$33,180,475	1.1%
East Hampton (V)	235	$834,078,184	6	2.6%	$5,196,063	0.6%	12	5.1%	$45,140,642	5.4%
Greenport (V)	166	$701,851,072	26	15.7%	$89,327,214	12.7%	6	3.6%	$26,824,515	3.8%
Head of the Harbor (V)	7	$10,751,892	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Huntington (T)	2,557	$25,445,494,925	37	1.4%	$143,939,384	0.6%	12	0.5%	$19,014,293	0.1%
Huntington Bay (V)	20	$58,620,484	5	25.0%	$10,262,582	17.5%	5	25.0%	$13,903,858	23.7%

Jurisdiction	Total # Buildings (Commercial Buildings Only)	Total RCV (Commercial Buildings Only)	Commercial							
			A-Zone				V-Zone			
			# Buildings	Percent (%) of Total	RCV	Percent (%) of Total	# Buildings	% Total	RCV	Percent (%) of Total
Islandia (V)	174	$3,133,470,096	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Islip (T)	4,549	$49,538,530,623	358	7.9%	$1,172,808,339	2.4%	15	0.3%	$127,937,252	0.3%
Lake Grove (V)	96	$1,027,429,603	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Lindenhurst (V)	312	$1,670,814,650	41	13.1%	$143,458,582	8.6%	1	0.3%	$3,295,412	0.2%
Lloyd Harbor (V)	29	$77,842,811	2	6.9%	$12,041,020	15.5%	6	20.7%	$18,850,629	24.2%
Nissequogue (V)	22	$117,742,765	3	13.6%	$4,740,619	4.0%	6	27.3%	$15,405,388	13.1%
North Haven (V)	5	$30,992,151	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Northport (V)	122	$583,997,995	0	0.0%	$0	0.0%	1	0.8%	$5,918,284	1.0%
Ocean Beach (V)	29	$80,277,047	27	93.1%	$78,536,190	97.8%	2	6.9%	$1,740,857	2.2%
Old Field (V)	16	$55,117,276	3	18.8%	$12,207,894	22.1%	4	25.0%	$11,317,557	20.5%
Patchogue (V)	418	$7,558,168,954	44	10.5%	$261,182,112	3.5%	1	0.2%	$1,102,881	0.0%
Poquott (V)	0	$0	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Port Jefferson (V)	264	$6,375,766,901	32	12.1%	$636,142,225	10.0%	5	1.9%	$1,936,592	0.0%
Quogue (V)	127	$450,492,359	4	3.1%	$24,008,605	5.3%	1	0.8%	$579,322	0.1%
Riverhead (T)	1,503	$9,640,830,120	27	1.8%	$111,326,634	1.2%	2	0.1%	$3,892,077	0.0%
Sag Harbor (V)	111	$411,835,278	32	28.8%	$161,210,290	39.1%	2	1.8%	$2,177,411	0.5%
Sagaponack (V)	21	$50,116,312	1	4.8%	$8,634,240	17.2%	1	4.8%	$4,507,198	9.0%
Saltaire (V)	2	$8,025,182	2	100.0%	$8,025,182	100.0%	0	0.0%	$0	0.0%
Shelter Island (T)	171	$519,323,458	14	8.2%	$83,230,793	16.0%	5	2.9%	$13,566,702	2.6%
Shoreham (V)	5	$26,798,668	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Smithtown (T)	1,814	$23,425,818,138	2	0.1%	$5,104,078	0.0%	0	0.0%	$0	0.0%
Southampton (T)	1,857	$7,153,922,289	117	6.3%	$312,966,242	4.4%	21	1.1%	$69,470,240	1.0%
Southampton (V)	388	$2,263,001,672	19	4.9%	$107,716,321	4.8%	15	3.9%	$31,773,709	1.4%
Southold (T)	1,176	$4,862,181,714	95	8.1%	$388,459,247	8.0%	20	1.7%	$56,169,486	1.2%
Village of the Branch (V)	42	$465,714,857	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
West Hampton Dunes (V)	1	$4,228,248	1	100.0%	$4,228,248	100.0%	0	0.0%	$0	0.0%
Westhampton Beach (V)	207	$784,539,918	20	9.7%	$44,313,301	5.6%	4	1.9%	$11,456,468	1.5%

Jurisdiction	Total # Buildings (Commercial Buildings Only)	Total RCV (Commercial Buildings Only)	Commercial							
			A-Zone				V-Zone			
			# Buildings	Percent (%) of Total	RCV	Percent (%) of Total	# Buildings	% Total	RCV	Percent (%) of Total
Shinnecock Tribal Nation	0	$0	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Unkechaug Tribal Nation	0	$0	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Suffolk County (Total)	**26,925**	**$230,858,155,662**	**1,321**	**4.9%**	**$5,553,994,762**	**2.4%**	**177**	**0.7%**	**$549,770,932**	**0.2%**

Source: Suffolk County GIS, 2020; Suffolk County Real Property Tax Service, 2020; RS Means 2019; Microsoft, 2018, Open Street Map, 2019; FEMA Effective DFIRM 2009/LOMR 2019
Note: RCV = Replacement Cost Value; T = Town; V = Village; # = Number; % = Percent.

Table 5.4.8-12. Estimated General Building Stock Potential Loss to the 1-Percent and 0.2-Percent Annual Chance Flood Events – All Occupancies

Jurisdiction	Total Replacement Cost Value (RCV)	All Occupancies			
		1-Percent Annual Chance Event		0.2-Percent Annual Chance Event	
		Estimated Loss (RCV)	Percent (%) of Total	Estimated Loss (RCV)	Percent (%) of Total
Amityville (V)	$5,519,611,238	$116,577,316	2.1%	$116,916,537	2.1%
Asharoken (V)	$379,192,198	$42,453,903	11.2%	$42,464,061	11.2%
Babylon (T)	$82,740,965,827	$234,736,262	0.3%	$239,826,646	0.3%
Babylon (V)	$6,110,029,951	$84,812,982	1.4%	$85,732,834	1.4%
Belle Terre (V)	$680,761,603	$0	0.0%	$0	0.0%
Bellport (V)	$2,358,752,934	$5,440,501	0.2%	$5,440,501	0.2%
Brightwaters (V)	$1,932,120,865	$791,588	0.0%	$1,613,266	0.1%
Brookhaven (T)	$221,811,756,528	$805,526,103	0.4%	$809,121,265	0.4%
Dering Harbor (V)	$88,595,797	$0	0.0%	$0	0.0%
East Hampton (T)	$26,516,571,402	$299,744,180	1.1%	$313,616,647	1.2%
East Hampton (V)	$5,002,346,911	$16,220,616	0.3%	$18,483,370	0.4%
Greenport (V)	$1,316,147,268	$20,986,728	1.6%	$22,325,218	1.7%
Head of the Harbor (V)	$1,052,509,872	$21,616	0.0%	$21,616	0.0%
Huntington (T)	$82,709,382,979	$43,433,107	0.1%	$44,797,806	0.1%
Huntington Bay (V)	$642,162,208	$13,864,751	2.2%	$13,864,751	2.2%
Islandia (V)	$4,798,220,611	$0	0.0%	$0	0.0%
Islip (T)	$157,009,867,271	$522,391,843	0.3%	$524,412,372	0.3%
Lake Grove (V)	$4,999,176,933	$0	0.0%	$0	0.0%
Lindenhurst (V)	$9,110,586,538	$105,325,684	1.2%	$105,851,706	1.2%
Lloyd Harbor (V)	$2,057,808,899	$16,470,961	0.8%	$16,470,961	0.8%
Nissequogue (V)	$1,430,093,283	$5,960,671	0.4%	$5,960,671	0.4%
North Haven (V)	$2,221,433,929	$2,269,924	0.1%	$11,137,747	0.5%
Northport (V)	$2,610,724,998	$7,987,343	0.3%	$8,036,043	0.3%
Ocean Beach (V)	$483,689,958	$117,463,101	24.3%	$117,463,101	24.3%
Old Field (V)	$967,667,970	$13,392,437	1.4%	$13,392,437	1.4%
Patchogue (V)	$11,533,289,631	$59,937,903	0.5%	$60,584,017	0.5%

Jurisdiction	Total Replacement Cost Value (RCV)	All Occupancies			
		1-Percent Annual Chance Event		0.2-Percent Annual Chance Event	
		Estimated Loss (RCV)	Percent (%) of Total	Estimated Loss (RCV)	Percent (%) of Total
Poquott (V)	$540,263,069	$825,521	0.2%	$825,521	0.2%
Port Jefferson (V)	$10,546,648,033	$19,814,921	0.2%	$19,814,921	0.2%
Quogue (V)	$5,371,998,365	$259,067,646	4.8%	$272,026,578	5.1%
Riverhead (T)	$27,561,801,284	$37,998,313	0.1%	$48,594,838	0.2%
Sag Harbor (V)	$3,157,033,580	$32,543,038	1.0%	$41,913,991	1.3%
Sagaponack (V)	$3,548,811,980	$89,340,452	2.5%	$92,205,582	2.6%
Saltaire (V)	$406,571,331	$95,067,865	23.4%	$95,067,865	23.4%
Shelter Island (T)	$3,894,434,021	$19,075,338	0.5%	$22,022,722	0.6%
Shoreham (V)	$155,005,274	$0	0.0%	$2,856,661	1.8%
Smithtown (T)	$381,052,410	$4,318,934	1.1%	$0	0.0%
Southampton (T)	$62,086,530,012	$1,256,938,338	2.0%	$4,394,814	0.0%
Southampton (V)	$69,558,169,929	$325,348,245	0.5%	$1,340,836,775	1.9%
Southold (T)	$13,027,590,722	$167,834,829	1.3%	$334,835,691	2.6%
The Branch (V)	$17,842,698,534	$0	0.0%	$195,688,067	1.1%
West Hampton Dunes (V)	$55,549,783	$310,194,258	558.4%	$1,170,813	2.1%
Westhampton Beach (V)	$1,414,333,647	$331,121,251	23.4%	$0	0.0%
Shinnecock Tribal Nation	$5,590,458,778	$2,275,868	0.0%	$333,025,046	6.0%
Unkechaug Tribal Nation	$766,363,715	$1,170,813	0.2%	$310,194,258	40.5%
Suffolk County (Total)	**$861,988,782,069**	**$5,488,745,148**	**0.6%**	**$5,693,007,714**	**0.7%**

Source: HAZUS v4.2; Suffolk County GIS, 2020; Suffolk County Real Property Tax Service, 2020; RS Means 2019; Microsoft, 2018, Open Street Map, 2019; FEMA Effective DFIRM 2009/LOMR 2019
Note: RCV = Replacement Cost Value; T = Town; V = Village; # = Number; % = Percent.

Table 5.4.8-13. Estimated General Building Stock Potential Loss to the 1-Percent Annual Chance Flood Event – Residential Occupancy Class

Jurisdiction	Total RCV (Residential Only)	Residential Losses Only			
		1% Annual Chance Event		0.2% Annual Chance Event	
		Estimated Loss (RCV)	Percent (%) of Total	Estimated Loss (RCV)	Percent (%) of Total
Amityville (V)	$2,677,034,715	$88,665,702	3.3%	$89,004,924	3.3%
Asharoken (V)	$309,723,849	$40,948,661	13.2%	$40,958,819	13.2%
Babylon (T)	$37,805,971,445	$195,105,391	0.5%	$200,195,774	0.5%
Babylon (V)	$3,721,632,038	$67,354,041	1.8%	$68,273,893	1.8%
Belle Terre (V)	$574,382,099	$0	0.0%	$0	0.0%
Bellport (V)	$1,246,957,322	$3,969,616	0.3%	$3,969,616	0.3%
Brightwaters (V)	$1,636,477,851	$791,588	0.0%	$1,613,266	0.1%
Brookhaven (T)	$131,579,686,012	$510,121,725	0.4%	$512,965,026	0.4%
Dering Harbor (V)	$85,926,597	$0	0.0%	$0	0.0%
East Hampton (T)	$22,123,305,576	$247,389,495	1.1%	$255,757,944	1.2%
East Hampton (V)	$3,775,618,550	$13,582,653	0.4%	$15,523,871	0.4%
Greenport (V)	$513,424,937	$3,949,055	0.8%	$4,646,470	0.9%
Head of the Harbor (V)	$994,305,482	$21,616	0.0%	$21,616	0.0%
Huntington (T)	$43,584,264,666	$12,190,235	0.0%	$12,392,383	0.0%
Huntington Bay (V)	$577,036,776	$2,100,909	0.4%	$2,100,909	0.4%
Islandia (V)	$1,115,020,450	$0	0.0%	$0	0.0%
Islip (T)	$81,703,947,484	$265,044,509	0.3%	$266,878,635	0.3%
Lake Grove (V)	$3,641,103,329	$0	0.0%	$0	0.0%
Lindenhurst (V)	$5,807,736,760	$82,001,104	1.4%	$82,527,126	1.4%
Lloyd Harbor (V)	$1,628,119,135	$229,124	0.0%	$229,124	0.0%
Nissequogue (V)	$1,175,270,674	$2,897,305	0.2%	$2,897,305	0.2%
North Haven (V)	$2,188,952,173	$2,269,924	0.1%	$11,137,747	0.5%
Northport (V)	$1,766,689,132	$1,497,720	0.1%	$1,497,720	0.1%
Ocean Beach (V)	$355,960,148	$69,596,194	19.6%	$69,596,194	19.6%
Old Field (V)	$827,472,696	$2,820,165	0.3%	$2,820,165	0.3%
Patchogue (V)	$3,481,727,613	$31,388,968	0.9%	$32,035,081	0.9%

Jurisdiction	Total RCV (Residential Only)	Residential Losses Only			
		1% Annual Chance Event		0.2% Annual Chance Event	
		Estimated Loss (RCV)	Percent (%) of Total	Estimated Loss (RCV)	Percent (%) of Total
Poquott (V)	$538,933,042	$825,521	0.2%	$825,521	0.2%
Port Jefferson (V)	$3,526,412,239	$2,435,356	0.1%	$2,435,356	0.1%
Quogue (V)	$4,788,523,539	$253,927,493	5.3%	$266,886,424	5.6%
Riverhead (T)	$8,457,162,933	$15,717,573	0.2%	$23,250,526	0.3%
Sag Harbor (V)	$2,429,954,691	$15,409,526	0.6%	$23,746,081	1.0%
Sagaponack (V)	$3,281,675,287	$85,439,429	2.6%	$88,302,366	2.7%
Saltaire (V)	$358,584,145	$81,886,270	22.8%	$81,886,270	22.8%
Shelter Island (T)	$3,069,859,677	$5,194,753	0.2%	$8,142,137	0.3%
Shoreham (V)	$304,837,132	$0	0.0%	$0	0.0%
Smithtown (T)	$33,922,545,499	$2,557,319	0.0%	$2,616,204	0.0%
Southampton (T)	$58,185,295,609	$1,119,205,489	1.9%	$1,186,533,264	2.0%
Southampton (V)	$10,005,287,830	$271,082,555	2.7%	$280,567,864	2.8%
Southold (T)	$8,887,595,011	$64,944,591	0.7%	$81,236,093	0.9%
The Branch (V)	$620,280,382	$0	0.0%	$0	0.0%
West Hampton Dunes (V)	$757,346,499	$305,104,814	40.3%	$305,104,814	40.3%
Westhampton Beach (V)	$4,360,742,995	$327,464,115	7.5%	$328,963,610	7.5%
Shinnecock Tribal Nation	$155,005,274	$2,275,868	1.5%	$2,856,661	1.8%
Unkechaug Tribal Nation	$55,549,783	$1,170,813	2.1%	$1,170,813	2.1%
Suffolk County (Total)	**$498,603,339,078**	**$4,198,577,185**	**0.8%**	**$4,361,567,612**	**0.9%**

Source: HAZUS v4.2; Suffolk County GIS, 2020; Suffolk County Real Property Tax Service, 2020; RS Means 2019; Microsoft, 2018, Open Street Map, 2019; FEMA Effective DFIRM 2009/LOMR 2019
Note: RCV = Replacement Cost Value; T = Town; V = Village.

Table 5.4.8-14. Estimated General Building Stock Potential Loss to the 1-Percent Annual Chance Flood Event – Commercial Occupancy Class

Jurisdiction	Total RCV (Commercial Only)	Commercial Losses Only			
		1% Annual Chance Event		0.2% Annual Chance Event	
		Estimated Loss (RCV)	Percent (%) of Total	Estimated Loss (RCV)	Percent (%) of Total
Amityville (V)	$1,261,345,017	$21,514,460	1.7%	$21,514,460	1.7%
Asharoken (V)	$4,739,792	$1,505,242	31.8%	$1,505,242	31.8%
Babylon (T)	$15,018,313,183	$33,365,189	0.2%	$33,365,189	0.2%
Babylon (V)	$1,240,929,775	$17,381,339	1.4%	$17,381,339	1.4%
Belle Terre (V)	$106,379,504	$0	0.0%	$0	0.0%
Bellport (V)	$829,384,322	$965,303	0.1%	$965,303	0.1%
Brightwaters (V)	$280,097,954	$0	0.0%	$0	0.0%
Brookhaven (T)	$61,712,084,701	$253,814,797	0.4%	$254,566,658	0.4%
Dering Harbor (V)	$2,669,200	$0	0.0%	$0	0.0%
East Hampton (T)	$3,034,436,574	$45,862,815	1.5%	$49,560,743	1.6%
East Hampton (V)	$834,078,184	$2,637,964	0.3%	$2,959,499	0.4%
Greenport (V)	$701,851,072	$17,037,672	2.4%	$17,678,748	2.5%
Head of the Harbor (V)	$10,751,892	$0	0.0%	$0	0.0%
Huntington (T)	$25,445,494,925	$27,397,239	0.1%	$27,472,920	0.1%
Huntington Bay (V)	$58,620,484	$9,400,990	16.0%	$9,400,990	16.0%
Islandia (V)	$3,133,470,096	$0	0.0%	$0	0.0%
Islip (T)	$49,538,530,623	$226,241,837	0.5%	$226,394,182	0.5%
Lake Grove (V)	$1,027,429,603	$0	0.0%	$0	0.0%
Lindenhurst (V)	$1,670,814,650	$22,492,922	1.3%	$22,492,922	1.3%
Lloyd Harbor (V)	$77,842,811	$12,293,693	15.8%	$12,293,693	15.8%
Nissequogue (V)	$117,742,765	$2,380,914	2.0%	$2,380,914	2.0%
North Haven (V)	$30,992,151	$0	0.0%	$0	0.0%
Northport (V)	$583,997,995	$3,631,914	0.6%	$3,680,614	0.6%
Ocean Beach (V)	$80,277,047	$27,271,833	34.0%	$27,271,833	34.0%
Old Field (V)	$55,117,276	$10,572,271	19.2%	$10,572,271	19.2%
Patchogue (V)	$7,558,168,954	$28,478,404	0.4%	$28,478,404	0.4%

Jurisdiction	Total RCV (Commercial Only)	Commercial Losses Only			
		1% Annual Chance Event		0.2% Annual Chance Event	
		Estimated Loss (RCV)	Percent (%) of Total	Estimated Loss (RCV)	Percent (%) of Total
Poquott (V)	$0	$0	0.0%	$0	0.0%
Port Jefferson (V)	$6,375,766,901	$17,267,776	0.3%	$17,267,776	0.3%
Quogue (V)	$450,492,359	$4,772,071	1.1%	$4,772,071	1.1%
Riverhead (T)	$9,640,830,120	$15,614,634	0.2%	$16,964,137	0.2%
Sag Harbor (V)	$411,835,278	$16,516,289	4.0%	$17,354,124	4.2%
Sagaponack (V)	$50,116,312	$2,107,888	4.2%	$2,107,888	4.2%
Saltaire (V)	$8,025,182	$2,580,218	32.2%	$2,580,218	32.2%
Shelter Island (T)	$519,323,458	$13,627,373	2.6%	$13,627,373	2.6%
Shoreham (V)	$26,798,668	$0	0.0%	$0	0.0%
Smithtown (T)	$23,425,818,138	$28,099	0.0%	$45,094	0.0%
Southampton (T)	$7,153,922,289	$123,055,726	1.7%	$138,468,585	1.9%
Southampton (V)	$2,263,001,672	$51,478,655	2.3%	$51,480,791	2.3%
Southold (T)	$4,862,181,714	$89,125,305	1.8%	$99,690,855	2.1%
The Branch (V)	$465,714,857	$0	0.0%	$0	0.0%
West Hampton Dunes (V)	$4,228,248	$2,402,048	56.8%	$2,402,048	56.8%
Westhampton Beach (V)	$784,539,918	$2,177,338	0.3%	$2,580,926	0.3%
Shinnecock Tribal Nation	$0	$0	0.0%	$0	0.0%
Unkechaug Tribal Nation	$0	$0	0.0%	$0	0.0%
Suffolk County (Total)	**$230,858,155,662**	**$1,105,000,218**	**0.5%**	**$1,139,277,809**	**0.5%**

Source: Hazus v4.2; Suffolk County GIS, 2020; Suffolk County Real Property Tax Service, 2020; RS Means 2019; Microsoft, 2018, Open Street Map, 2019; FEMA Effective DFIRM 2009/LOMR 2019
Note: RCV = Replacement Cost Value; T = Town; V = Village

Sea Level Rise

Exposure to the sea level rise 1-foot increment inundation areas includes those buildings located in the modeled sea level rise flood zones. There are an estimated 167 buildings, 1,805 buildings, 6,163 buildings, and 11,722 buildings located in the 1-, 2-, 3-, and 4-foot sea level rise inundation areas, respectively in Suffolk County. The total estimated replacement cost value of structures located in the sea level rise inundation areas range from $265 million to $13 billion. This represents approximately 1.5-percent of the County's total replacement cost value at the greatest inundation extent (i.e., 4-foot inundation area). Refer to Table 5.4.8-14 and Table 5.4.8-15 for a summary of the sea level rise building exposure analysis by jurisdiction.

Table 5.4.8-15. Estimated Building Stock Exposure in Sea Level Rise 1-Foot and 2-Foot Inundation Areas

Jurisdiction	Number of Buildings	Total RCV	All Occupancies							
			Number of Buildings SLR 1 Foot	Percent (%) of Total	RCV in SLR 1 Foot	Percent (%) of Total	Number of Buildings SLR 2 Foot	Percent (%) of Total	RCV in SLR 2 Foot	Percent (%) of Total
Amityville (V)	4,161	$5,519,611,238	6	0.1%	$3,650,750	0.1%	106	2.5%	$68,525,140	1.2%
Asharoken (V)	321	$379,192,198	2	0.6%	$1,166,400	0.3%	2	0.6%	$1,166,400	0.3%
Babylon (T)	51,514	$82,740,965,827	35	0.1%	$18,075,820	0.0%	232	0.5%	$135,089,474	0.2%
Babylon (V)	4,957	$6,110,029,951	0	0.0%	$0	0.0%	43	0.9%	$35,478,747	0.6%
Belle Terre (V)	316	$680,761,603	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Bellport (V)	1,206	$2,358,752,934	0	0.0%	$0	0.0%	3	0.2%	$3,654,886	0.2%
Brightwaters (V)	1,162	$1,932,120,865	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Brookhaven (T)	154,866	$221,811,756,528	20	0.0%	$19,719,608	0.0%	310	0.2%	$415,569,176	0.2%
Dering Harbor (V)	41	$88,595,797	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
East Hampton (T)	18,243	$26,516,571,402	7	0.0%	$6,314,387	0.0%	17	0.1%	$11,221,600	0.0%
East Hampton (V)	1,938	$5,002,346,911	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Greenport (V)	982	$1,316,147,268	4	0.4%	$20,447,993	1.6%	5	0.5%	$20,754,890	1.6%
Head of the Harbor (V)	527	$1,052,509,872	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Huntington (T)	62,226	$82,709,382,979	28	0.0%	$28,158,233	0.0%	30	0.0%	$28,616,173	0.0%
Huntington Bay (V)	593	$642,162,208	1	0.2%	$1,497,835	0.2%	1	0.2%	$1,497,835	0.2%
Islandia (V)	1,039	$4,798,220,611	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Islip (T)	86,764	$157,009,867,271	10	0.0%	$93,873,943	0.1%	261	0.3%	$451,929,884	0.3%
Lake Grove (V)	3,693	$4,999,176,933	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Lindenhurst (V)	9,387	$9,110,586,538	7	0.1%	$2,357,914	0.0%	259	2.8%	$141,162,450	1.5%
Lloyd Harbor (V)	1,301	$2,057,808,899	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Nissequogue (V)	638	$1,430,093,283	0	0.0%	$0	0.0%	1	0.2%	$960,000	0.1%
North Haven (V)	772	$2,221,433,929	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Northport (V)	2,702	$2,610,724,998	1	0.0%	$5,918,284	0.2%	1	0.0%	$5,918,284	0.2%
Ocean Beach (V)	530	$483,689,958	0	0.0%	$0	0.0%	181	34.2%	$173,632,983	35.9%

Jurisdiction	Number of Buildings	Total RCV	All Occupancies							
			Number of Buildings SLR 1 Foot	Percent (%) of Total	RCV in SLR 1 Foot	Percent (%) of Total	Number of Buildings SLR 2 Foot	Percent (%) of Total	RCV in SLR 2 Foot	Percent (%) of Total
Old Field (V)	391	$967,667,970	0	0.0%	$0	0.0%	1	0.3%	$1,222,200	0.1%
Patchogue (V)	3,900	$11,533,289,631	0	0.0%	$0	0.0%	9	0.2%	$12,749,152	0.1%
Poquott (V)	379	$540,263,069	2	0.5%	$460,928	0.1%	3	0.8%	$691,181	0.1%
Port Jefferson (V)	3,133	$10,546,648,033	1	0.0%	$300,436	0.0%	1	0.0%	$300,436	0.0%
Quogue (V)	1,785	$5,371,998,365	1	0.1%	$4,278,000	0.1%	7	0.4%	$18,024,257	0.3%
Riverhead (T)	16,853	$27,561,801,284	1	0.0%	$393,298	0.0%	7	0.0%	$3,025,404	0.0%
Sag Harbor (V)	1,887	$3,157,033,580	1	0.1%	$1,096,096	0.0%	1	0.1%	$1,096,096	0.0%
Sagaponack (V)	908	$3,548,811,980	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Saltaire (V)	399	$406,571,331	8	2.0%	$8,490,300	2.1%	186	46.6%	$186,094,563	45.8%
Shelter Island (T)	2,729	$3,894,434,021	0	0.0%	$0	0.0%	4	0.1%	$6,926,310	0.2%
Shoreham (V)	216	$381,052,410	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Smithtown (T)	35,517	$62,086,530,012	3	0.0%	$3,250,100	0.0%	3	0.0%	$3,250,100	0.0%
Southampton (T)	33,290	$69,558,169,929	14	0.0%	$26,498,602	0.0%	51	0.2%	$75,528,896	0.1%
Southampton (V)	3,500	$13,027,590,722	0	0.0%	$0	0.0%	2	0.1%	$8,212,800	0.1%
Southold (T)	15,123	$17,842,698,534	10	0.1%	$12,229,758	0.1%	13	0.1%	$13,888,808	0.1%
Village of the Branch (V)	624	$1,414,333,647	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Westhampton Beach (V)	1,965	$5,590,458,778	4	0.2%	$5,140,616	0.1%	51	2.6%	$86,616,313	1.5%
West Hampton Dunes (V)	279	$766,363,715	1	0.4%	$1,699,200	0.2%	14	5.0%	$31,122,900	4.1%
Shinnecock Tribal Nation	378	$155,005,274	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Unkechaug Tribal Nation	144	$55,549,783	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Suffolk County (Total)	**533,279**	**$861,988,782,069**	**167**	**0.0%**	**$265,018,500**	**0.0%**	**1,805**	**0.3%**	**$1,943,927,341**	**0.2%**

Source: Suffolk County GIS, 2020; Suffolk County Real Property Tax Service, 2020; RS Means 2019; Microsoft, 2018, Open Street Map, 2019; NOAA 2017
Note: RCV = Replacement Cost Value; T = Town; V = Village; % = Percent; SLR = Sea Level Rise

Table 5.4.8-16. Estimated Building Stock Exposure in Sea Level Rise 3-Foot and 4-Foot Inundation Areas

Jurisdiction	Number of Buildings	Total RCV	All Occupancies							
			Number of Buildings SLR 3 Foot	Percent (%) of Total	RCV in SLR 3 Foot	Percent (%) of Total	Number of Buildings SLR 4 Foot	Percent (%) of Total	RCV in SLR 4 Foot	Percent (%) of Total
Amityville (V)	4,161	$5,519,611,238	386	9.3%	$281,761,314	5.1%	729	17.5%	$546,069,853	9.9%
Asharoken (V)	321	$379,192,198	5	1.6%	$3,418,200	0.9%	15	4.7%	$9,768,300	2.6%
Babylon (T)	51,514	$82,740,965,827	983	1.9%	$664,888,755	0.8%	2,012	3.9%	$1,309,013,815	1.6%
Babylon (V)	4,957	$6,110,029,951	349	7.0%	$256,020,753	4.2%	785	15.8%	$661,235,271	10.8%
Belle Terre (V)	316	$680,761,603	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Bellport (V)	1,206	$2,358,752,934	10	0.8%	$6,846,165	0.3%	16	1.3%	$16,552,434	0.7%
Brightwaters (V)	1,162	$1,932,120,865	2	0.2%	$2,953,200	0.2%	26	2.2%	$48,386,674	2.5%
Brookhaven (T)	154,866	$221,811,756,528	1,080	0.7%	$1,244,022,785	0.6%	2,018	1.3%	$2,021,787,456	0.9%
Dering Harbor (V)	41	$88,595,797	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
East Hampton (T)	18,243	$26,516,571,402	45	0.2%	$28,166,124	0.1%	129	0.7%	$102,069,753	0.4%
East Hampton (V)	1,938	$5,002,346,911	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Greenport (V)	982	$1,316,147,268	23	2.3%	$27,739,266	2.1%	43	4.4%	$67,852,663	5.2%
Head of the Harbor (V)	527	$1,052,509,872	1	0.2%	$1,110,000	0.1%	1	0.2%	$1,110,000	0.1%
Huntington (T)	62,226	$82,709,382,979	41	0.1%	$45,264,913	0.1%	71	0.1%	$72,516,609	0.1%
Huntington Bay (V)	593	$642,162,208	1	0.2%	$1,497,835	0.2%	4	0.7%	$12,995,317	2.0%
Islandia (V)	1,039	$4,798,220,611	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Islip (T)	86,764	$157,009,867,271	1,154	1.3%	$1,817,723,972	1.2%	2,185	2.5%	$3,260,164,186	2.1%
Lake Grove (V)	3,693	$4,999,176,933	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Lindenhurst (V)	9,387	$9,110,586,538	731	7.8%	$462,366,564	5.1%	1,073	11.4%	$712,748,618	7.8%
Lloyd Harbor (V)	1,301	$2,057,808,899	2	0.2%	$5,195,286	0.3%	11	0.8%	$24,313,699	1.2%
Nissequogue (V)	638	$1,430,093,283	6	0.9%	$6,890,100	0.5%	11	1.7%	$10,178,697	0.7%
North Haven (V)	772	$2,221,433,929	0	0.0%	$0	0.0%	2	0.3%	$3,260,981	0.1%
Northport (V)	2,702	$2,610,724,998	4	0.1%	$6,793,601	0.3%	8	0.3%	$10,916,629	0.4%

Jurisdiction	Number of Buildings	Total RCV	All Occupancies							
			Number of Buildings SLR 3 Foot	Percent (%) of Total	RCV in SLR 3 Foot	Percent (%) of Total	Number of Buildings SLR 4 Foot	Percent (%) of Total	RCV in SLR 4 Foot	Percent (%) of Total
Ocean Beach (V)	530	$483,689,958	347	65.5%	$350,135,310	72.4%	396	74.7%	$386,211,364	79.8%
Old Field (V)	391	$967,667,970	3	0.8%	$1,628,397	0.2%	5	1.3%	$5,500,789	0.6%
Patchogue (V)	3,900	$11,533,289,631	92	2.4%	$107,001,308	0.9%	206	5.3%	$347,359,820	3.0%
Poquott (V)	379	$540,263,069	4	1.1%	$807,748	0.1%	5	1.3%	$960,284	0.2%
Port Jefferson (V)	3,133	$10,546,648,033	2	0.1%	$496,182	0.0%	19	0.6%	$357,170,935	3.4%
Quogue (V)	1,785	$5,371,998,365	38	2.1%	$105,724,267	2.0%	102	5.7%	$313,056,609	5.8%
Riverhead (T)	16,853	$27,561,801,284	17	0.1%	$7,708,884	0.0%	85	0.5%	$84,814,572	0.3%
Sag Harbor (V)	1,887	$3,157,033,580	4	0.2%	$3,520,175	0.1%	44	2.3%	$70,319,244	2.2%
Sagaponack (V)	908	$3,548,811,980	0	0.0%	$0	0.0%	1	0.1%	$3,216,000	0.1%
Saltaire (V)	399	$406,571,331	286	71.7%	$282,425,859	69.5%	330	82.7%	$329,722,659	81.1%
Shelter Island (T)	2,729	$3,894,434,021	9	0.3%	$20,711,501	0.5%	22	0.8%	$64,694,211	1.7%
Shoreham (V)	216	$381,052,410	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Smithtown (T)	35,517	$62,086,530,012	4	0.0%	$10,050,500	0.0%	6	0.0%	$12,394,339	0.0%
Southampton (T)	33,290	$69,558,169,929	267	0.8%	$412,796,842	0.6%	672	2.0%	$1,068,897,610	1.5%
Southampton (V)	3,500	$13,027,590,722	4	0.1%	$12,109,200	0.1%	17	0.5%	$50,981,543	0.4%
Southold (T)	15,123	$17,842,698,534	93	0.6%	$81,226,569	0.5%	329	2.2%	$312,198,076	1.7%
Village of the Branch (V)	624	$1,414,333,647	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Westhampton Beach (V)	1,965	$5,590,458,778	132	6.7%	$261,231,507	4.7%	265	13.5%	$601,636,340	10.8%
West Hampton Dunes (V)	279	$766,363,715	38	13.6%	$81,484,368	10.6%	67	24.0%	$151,253,868	19.7%
Shinnecock Tribal Nation	378	$155,005,274	0	0.0%	$0	0.0%	2	0.5%	$179,200	0.1%
Unkechaug Tribal Nation	144	$55,549,783	0	0.0%	$0	0.0%	10	6.9%	$2,736,410	4.9%
Suffolk County (Total)	**533,279**	**$861,988,782,069**	**6,163**	**1.2%**	**$6,601,717,452**	**0.8%**	**11,722**	**2.2%**	**$13,054,244,829**	**1.5%**

Source: Suffolk County GIS, 2020; Suffolk County Real Property Tax Service, 2020; RS Means 2019; Microsoft, 2018, Open Street Map, 2019; NOAA 2017
Note: RCV = Replacement Cost Value; T = Town; V = Village; % = Percent; SLR = Sea Level Rise

NFIP Statistics

FEMA Region 2 provided a list of NFIP policies, past claims, and repetitive loss properties (RL) in Suffolk County. According to FEMA, a RL property is a NFIP-insured structure that has had at least two paid flood losses of more than $1,000 in any 10-year period since 1978. A SRL property is a NFIP-insured structure that has had four or more separate claim payments made under a standard flood insurance policy, with the amount of each claim exceeding $5,000 and with the cumulative amount of such claims payments exceeding $20,000; or at least two separate claims payments made under a standard flood insurance policy with the cumulative amount of such claim payments exceed the fair market value of the insured building on the day before each loss (FEMA 2018). Table 5.4.8-16 shows that there are more NFIP claims than policies in Suffolk County reported. This is likely because properties submitted more than one flood loss claim under their NFIP policy.

Table 5.4.8-16 and Figure 5.4.8-15 through Figure 5.4.8-17 summarizes the NFIP policies, claims and repetitive loss statistics for Suffolk County.

The location of the properties with policies, claims and repetitive flooding were geocoded with the understanding that there are varying tolerances between how closely the longitude and latitude coordinates correspond to the location of the property address, or that the indication of some locations are more accurate than others.

Table 5.4.8-17. Repetitive Loss Properties and NFIP Data for Suffolk County

Jurisdiction	Number of Repetitive Loss Properties	Number of Policies	Number of Claims	Total Losses Claimed
Amityville (V)	245	982	1,538	$87,084,710
Asharoken (V)	22	163	242	$6,464,375
Babylon (T)	574	2,852	4,505	$182,615,400
Babylon (V)	240	1,240	1,827	$97,313,420
Belle Terre (V)	1	11	4	$47,050
Bellport (V)	6	116	48	$951,376
Brightwaters (V)	9	155	132	$3,710,927
Brookhaven (T)	447	4,612	4,331	$113,909,647
Dering Harbor (V)	0	11	2	$0
East Hampton (T)	59	2,630	744	$7,180,126
East Hampton (V)	4	372	68	$1,205,494
Greenport (V)	6	199	148	$2,654,191
Head of the Harbor (V)	0	8	4	$17,188
Huntington (T)	43	650	543	$6,897,675
Huntington Bay (V)	13	57	89	$2,156,020
Islandia (V)	0	4	0	$0
Islip (T)	564	5,445	5,419	$207,937,329

Jurisdiction	Number of Repetitive Loss Properties	Number of Policies	Number of Claims	Total Losses Claimed
Lake Grove (V)	2	10	1	$2,299
Lindenhurst (V)	400	1,121	2,728	$95,799,300
Lloyd Harbor (V)	1	69	31	$339,441
Nissequogue (V)	4	48	41	$693,469
North Haven (V)	3	168	55	$426,743
Northport (V)	4	70	77	$1,135,475
Ocean Beach (V)	153	449	983	$48,810,971
Old Field (V)	2	44	19	$171,545
Patchogue (V)	43	353	378	$13,986,588
Poquott (V)	1	14	2	$61,322
Port Jefferson (V)	8	56	66	$1,212,781
Quogue (V)	45	540	346	$8,096,153
Riverhead (T)	74	538	750	$12,603,709
Sag Harbor (V)	14	366	130	$1,923,315
Sagaponack (V)	0	192	36	$1,861,319
Saltaire (V)	13	316	383	$15,180,594
Shelter Island (T)	10	249	104	$1,804,536
Shoreham (V)	0	0	5	$1,033
Smithtown (T)	20	220	300	$1,163,470
Southampton (T)	350	4,129	3,094	$77,402,156
Southampton (V)	18	620	224	$3,385,694
Southold (T)	92	1,596	1,058	$16,295,306
Village of the Branch (V)	0	7	3	$2,129
West Hampton Dunes (V)	97	221	88	$1,227,009
Westhampton Beach (V)	94	761	1,213	$32,608,609
Shinnecock Tribal Nation	0	0	0	$0
Unkechaug Tribal Nation	0	0	0	$0
Suffolk County (Total)	**3,681**	**31,664**	**31,759**	**$1,056,339,893**

Source: FEMA Region 2, 2020
Note: NFIP = National Flood Insurance Program, V = Village, T = Town

Figure 5.4.8-15. NFIP Repetitive Loss Areas in Suffolk County - West

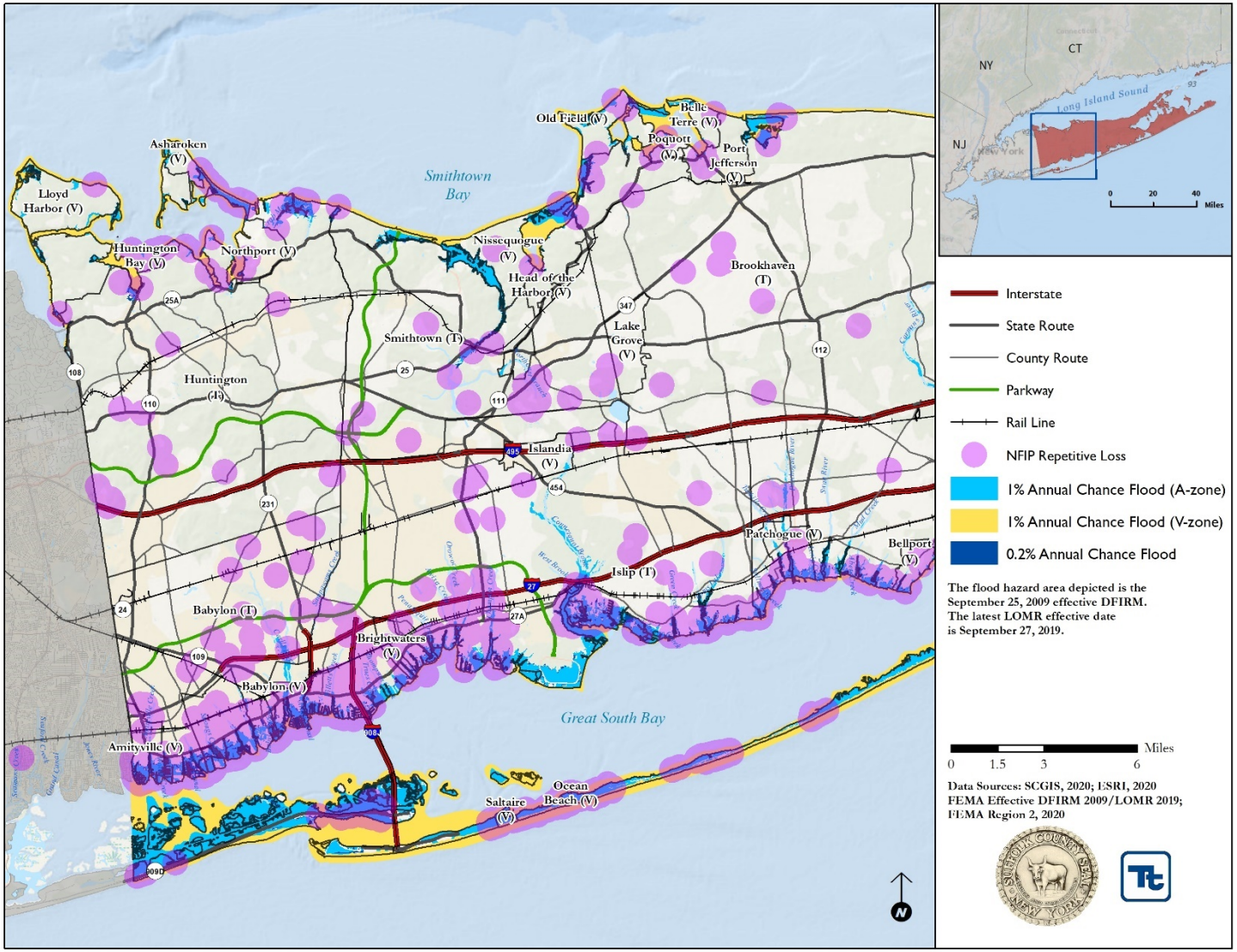


Figure 5.4.8-16. NFIP Repetitive Loss Areas in Suffolk County - Central

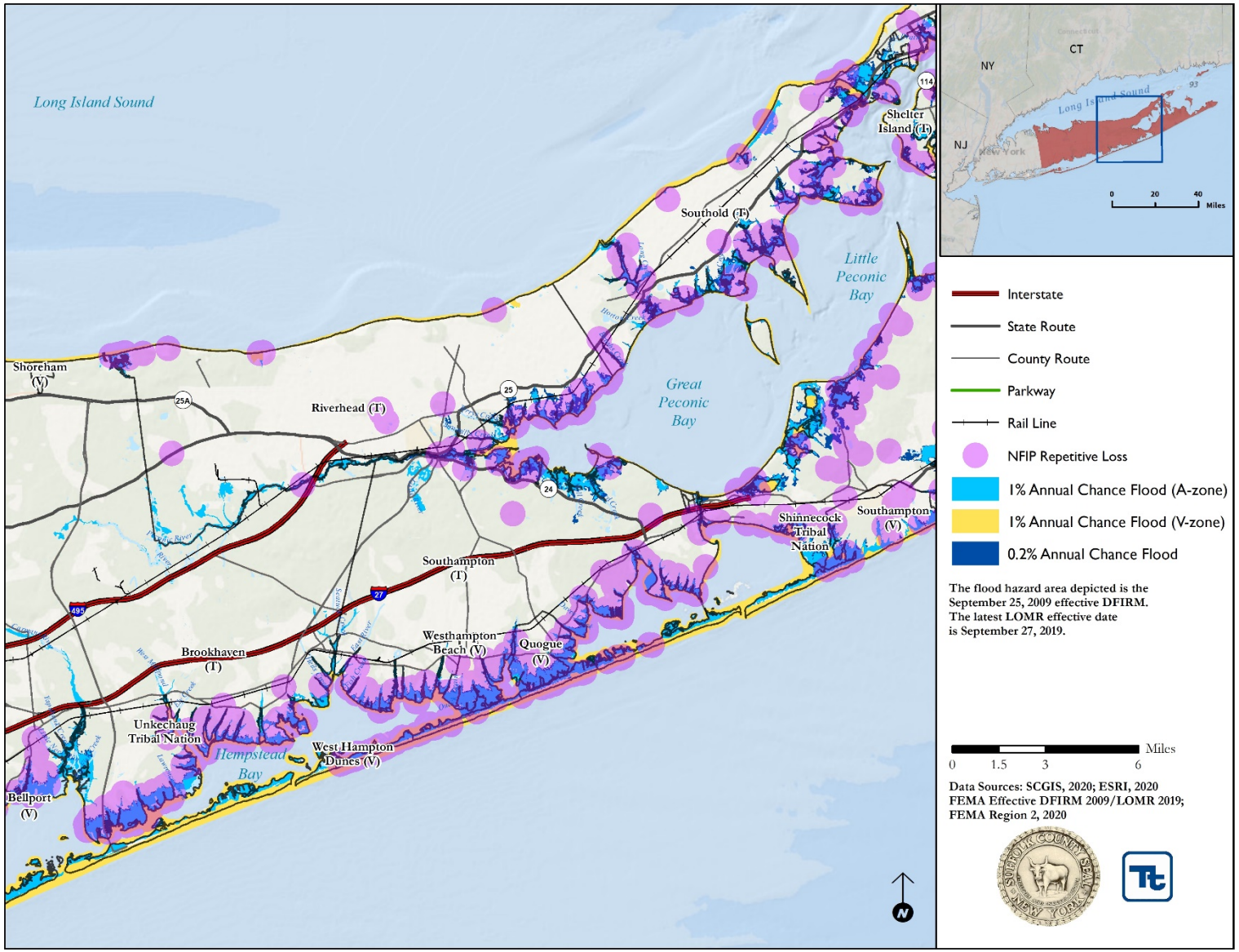
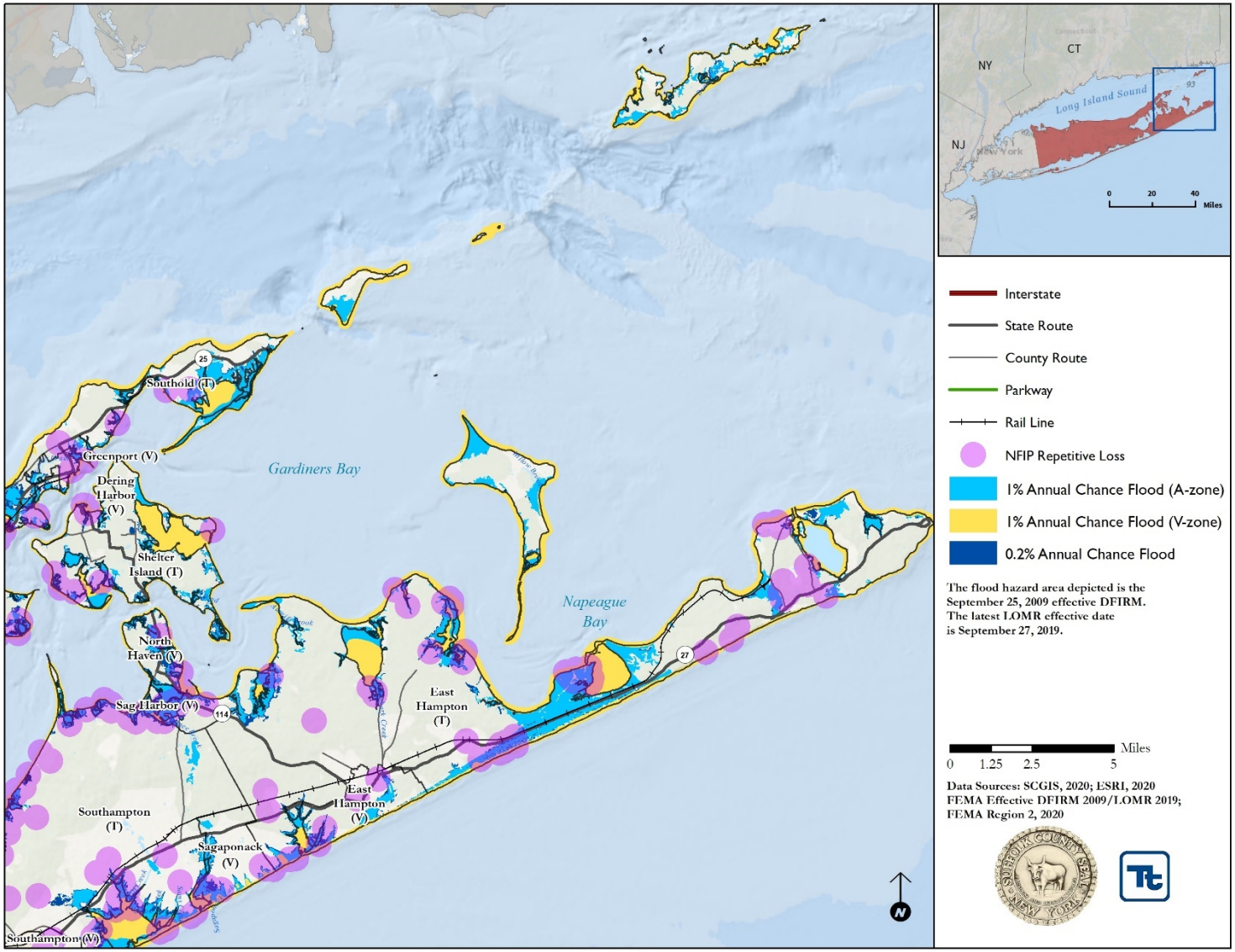


Figure 5.4.8-17. NFIP Repetitive Loss Areas in Suffolk County - East



Impact on Land Uses

An exposure analysis was completed to determine the number and area of residential and non-residential parcels located in the flood hazard areas. To estimate exposure for developed residential and non-residential parcels to the 1- and 0.2-percent annual chance flood events, the floodplain boundaries were overlaid upon the 2020 parcel data in GIS (Suffolk County GIS 2020) and used to calculate the estimated number and area of residential and non-residential parcels exposed to this hazard. Refer to Table 5.4.8-19 and Table 5.4.8-20 for a complete summary of this analysis.

The analysis shows a majority of the residential parcels exposed to the 1-percent and 0.2-percent annual chance flood hazard inundation areas are located in the Town of Brookhaven (i.e., 10,020 parcels and 6,002 acres; 10,671 parcels and 6,237 acres, respectively). Four of the jurisdictions have 100-percent of their residential parcels exposed to the 1-percent and 0.2-percent annual chance flood inundation area (i.e., Village of Saltaire, Village of West Hampton Dunes, Shinnecock Tribal Nation, and Unkechaug Tribal Nation). Across Suffolk County, approximately 7.6-percent of all residential parcels and approximately 5.9-percent of the total residential land use area are within the 1-percent annual chance floodplain. Furthermore, approximately 8.6-percent of all residential parcels and 7-percent of residential land use area in the County are within the 0.2-percent annual chance flood hazard area.

A majority of the non-residential parcels exposed to the 1-percent and 0.2-percent hazard inundation areas are located in the Town of Brookhaven (i.e., 246 parcels) and the Town of Southold (i.e., 289 parcels), respectively. Furthermore, the jurisdiction with the greatest amount of non-residential land use area exposed to the 1-percent and 0.2-percent flood hazard inundation areas is the Village of Port Jefferson (i.e., 13,073 acres and 13,074 acres, respectively). Four of the jurisdictions have 100-percent of their non-residential parcels exposed to the 1-percent and 0.2-percent annual chance flood inundation area (i.e., Village of Asharoken, Village of Ocean Beach, Village of Saltaire, and Village of Westhampton Beach). Across Suffolk County, approximately 7.9-percent of all non-residential parcels and approximately 5.9-percent of the total non-residential land use area are within the 1-percent annual chance flood hazard area. Furthermore, approximately 9-percent of all non-residential parcels and 6-percent of non-residential land use area in the County are within the 0.2-percent annual chance flood hazard area.

Table 5.4.8-18. Residential Parcels Exposed to the 1-Percent and 0.2-Percent Annual Chance Flood Events

Jurisdiction	Total Residential Land Use Area	Total Number of Residential (Res) Parcels	1% Annual Chance Event				0.2% Annual Chance Event			
			Total Number of Res Parcels	Percent (%) of Total	Total Number of Land Use Area	Percent (%) of Total	Total Number of Res Parcels	Percent (%) of Total	Total Number of Land Use Area	Percent (%) of Total
Amityville (V)	1,117	4,478	1,555	34.7%	386	34.5%	1,583	35.4%	399	35.8%
Asharoken (V)	489	496	447	90.1%	298	61.0%	449	90.5%	299	61.1%
Babylon (T)	14,790	68,329	5,513	8.1%	1,456	9.8%	6,198	9.1%	1,624	11.0%
Babylon (V)	1,416	6,260	1,890	30.2%	359	25.3%	1,988	31.8%	396	27.9%
Belle Terre (V)	641	503	44	8.7%	15	2.3%	44	8.7%	15	2.3%
Bellport (V)	846	1,678	124	7.4%	71	8.4%	124	7.4%	76	9.0%
Brightwaters (V)	617	1,810	192	10.6%	32	5.2%	198	10.9%	41	6.6%
Brookhaven (T)	139,001	220,201	10,020	4.6%	6,002	4.3%	10,671	4.8%	6,237	4.5%
Dering Harbor (V)	85	49	18	36.7%	5	6.4%	23	46.9%	7	8.7%
East Hampton (T)	25,734	24,892	3,480	14.0%	2,784	10.8%	3,957	15.9%	3,188	12.4%
East Hampton (V)	2,591	2,255	289	12.8%	325	12.5%	390	17.3%	448	17.3%
Greenport (V)	235	1,076	142	13.2%	27	11.7%	229	21.3%	39	16.5%
Head of the Harbor (V)	1,729	792	53	6.7%	38	2.2%	53	6.7%	39	2.3%
Huntington (T)	48,293	96,396	866	0.9%	137	0.3%	908	0.9%	154	0.3%
Huntington Bay (V)	790	955	204	21.4%	72	9.1%	217	22.7%	75	9.5%
Islandia (V)	520	1,316	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Islip (T)	44,324	127,732	7,259	5.7%	1,781	4.0%	7,600	5.9%	1,932	4.4%
Lake Grove (V)	1,921	5,664	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Lindenhurst (V)	2,297	12,934	1,975	15.3%	263	11.5%	2,057	15.9%	288	12.5%
Lloyd Harbor (V)	4,869	2,020	284	14.1%	172	3.5%	284	14.1%	181	3.7%
Nissequogue (V)	2,450	963	198	20.6%	184	7.5%	201	20.9%	187	7.6%
North Haven (V)	1,575	1,145	338	29.5%	240	15.3%	491	42.9%	453	28.8%
Northport (V)	1,551	4,108	142	3.5%	20	1.3%	142	3.5%	21	1.4%
Ocean Beach (V)	83	758	757	99.9%	83	99.6%	757	99.9%	83	99.6%
Old Field (V)	1,337	555	212	38.2%	189	14.1%	222	40.0%	194	14.5%
Patchogue (V)	1,232	4,495	781	17.4%	203	16.5%	841	18.7%	219	17.8%

Jurisdiction	Total Residential Land Use Area	Total Number of Residential (Res) Parcels	1% Annual Chance Event				0.2% Annual Chance Event			
			Total Number of Res Parcels	Percent (%) of Total	Total Number of Land Use Area	Percent (%) of Total	Total Number of Res Parcels	Percent (%) of Total	Total Number of Land Use Area	Percent (%) of Total
Poquott (V)	354	585	95	16.2%	15	4.2%	95	16.2%	15	4.2%
Port Jefferson (V)	1,701	4,085	34	0.8%	2	0.1%	36	0.9%	2	0.1%
Quogue (V)	2,720	2,341	885	37.8%	1,023	37.6%	952	40.7%	1,120	41.2%
Riverhead (T)	56,169	17,544	1,652	9.4%	499	0.9%	2,379	13.6%	856	1.5%
Sag Harbor (V)	889	2,420	396	16.4%	103	11.6%	616	25.5%	176	19.8%
Sagaponack (V)	1,933	968	218	22.5%	336	17.4%	253	26.1%	428	22.1%
Saltaire (V)	125	612	612	100.0%	125	100.0%	612	100.0%	125	100.0%
Shelter Island (T)	5,450	3,660	998	27.3%	1,505	27.6%	1,134	31.0%	1,717	31.5%
Shoreham (V)	304	333	20	6.0%	7	2.2%	20	6.0%	7	2.2%
Smithtown (T)	23,938	56,019	190	0.3%	124	0.5%	199	0.4%	127	0.5%
Southampton (T)	53,107	43,292	7,223	16.7%	4,202	7.9%	9,078	21.0%	5,597	10.5%
Southampton (V)	3,607	3,942	529	13.4%	815	22.6%	578	14.7%	902	25.0%
Southold (T)	18,108	19,975	5,839	29.2%	2,562	14.1%	7,075	35.4%	3,622	20.0%
The Branch (V)	521	974	75	7.7%	13	2.5%	84	8.6%	17	3.3%
West Hampton Dunes (V)	183	438	438	100.0%	183	99.7%	438	100.0%	183	99.7%
Westhampton Beach (V)	1,730	2,428	1,257	51.8%	916	53.0%	1,308	53.9%	982	56.8%
Shinnecock Tribal Nation	815	2	2	100.0%	323	39.6%	2	100.0%	398	48.8%
Unkechaug Tribal Nation	56	1	1	100.0%	16	28.8%	1	100.0%	16	29.3%
Suffolk County (Total)	**472,242**	**751,479**	**57,247**	**7.6%**	**27,910**	**5.9%**	**64,487**	**8.6%**	**32,882**	**7.0%**

Source: FEMA Effective DFIRM 2009/LOMR 2019; Suffolk County GIS 2020
Note: % = Percent; Res = Residential; T = Town; V = Village

Table 5.4.8-19. Non-Residential Parcels Exposed to the 1-Percent and 0.2-Percent Annual Chance Flood Events

Jurisdiction	Total Non-Residential Land Use Area	Total Number of Non-Residential (Non-Res) Parcels	1% Annual Chance Event				0.2% Annual Chance Event			
			Total Number of Non-Res Parcels	Percent (%) of Total	Total Number of Land Use Area	Percent (%) of Total	Total Number of Non-Res Parcels	Percent (%) of Total	Total Number of Land Use Area	Percent (%) of Total
Amityville (V)	260	337	56	16.6%	34	13.2%	56	16.6%	35	13.3%
Asharoken (V)	457	3	3	100.0%	71	15.5%	3	100.0%	72	15.7%
Babylon (T)	11,845	3,116	77	2.5%	2,450	20.7%	81	2.6%	2,494	21.1%
Babylon (V)	239	224	48	21.4%	66	27.7%	50	22.3%	69	29.1%
Belle Terre (V)	20	6	2	33.3%	2	11.4%	2	33.3%	2	11.4%
Bellport (V)	15,448	73	4	5.5%	3,414	22.1%	4	5.5%	3,417	22.1%
Brightwaters (V)	37	47	3	6.4%	1	3.2%	3	6.4%	2	4.4%
Brookhaven (T)	37,830	5,317	246	4.6%	4,376	11.6%	249	4.7%	4,484	11.9%
Dering Harbor (V)	3	2	0	0.0%	0	0.0%	0	0.0%	0	0.0%
East Hampton (T)	6,777	723	133	18.4%	1,390	20.5%	165	22.8%	1,496	22.1%
East Hampton (V)	371	145	11	7.6%	80	21.5%	16	11.0%	104	28.0%
Greenport (V)	311	113	40	35.4%	65	20.8%	45	39.8%	91	29.4%
Head of the Harbor (V)	70	9	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Huntington (T)	13,196	2,320	72	3.1%	1,819	13.8%	89	3.8%	1,853	14.0%
Huntington Bay (V)	56	12	8	66.7%	12	21.8%	9	75.0%	12	22.2%
Islandia (V)	518	154	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Islip (T)	19,885	3,874	226	5.8%	3,883	19.5%	230	5.9%	3,990	20.1%
Lake Grove (V)	248	85	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Lindenhurst (V)	1,987	380	51	13.4%	131	6.6%	52	13.7%	140	7.0%
Lloyd Harbor (V)	2,641	25	12	48.0%	815	30.9%	12	48.0%	818	31.0%
Nissequogue (V)	1,216	12	10	83.3%	877	72.1%	10	83.3%	877	72.1%
North Haven (V)	39	6	3	50.0%	20	53.0%	4	66.7%	25	63.7%
Northport (V)	168	114	12	10.5%	24	14.4%	14	12.3%	28	16.9%
Ocean Beach (V)	8	41	41	100.0%	8	100.0%	41	100.0%	8	100.0%
Old Field (V)	231	12	10	83.3%	145	62.7%	10	83.3%	146	63.1%

Jurisdiction	Total Non-Residential Land Use Area	Total Number of Non-Residential (Non-Res) Parcels	1% Annual Chance Event				0.2% Annual Chance Event			
			Total Number of Non-Res Parcels	Percent (%) of Total	Total Number of Land Use Area	Percent (%) of Total	Total Number of Non-Res Parcels	Percent (%) of Total	Total Number of Land Use Area	Percent (%) of Total
Patchogue (V)	315	396	75	18.9%	91	28.9%	75	18.9%	94	29.8%
Poquott (V)	2	1	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Port Jefferson (V)	337,102	261	68	26.1%	13,073	3.9%	70	26.8%	13,074	3.9%
Quogue (V)	45,754	95	16	16.8%	2,411	5.3%	18	18.9%	2,416	5.3%
Riverhead (T)	25,165	1,312	114	8.7%	771	3.1%	149	11.4%	996	4.0%
Sag Harbor (V)	168	105	50	47.6%	36	21.6%	58	55.2%	63	37.3%
Sagaponack (V)	398	45	9	20.0%	40	10.1%	13	28.9%	47	11.7%
Saltaire (V)	9	10	10	100.0%	9	100.0%	10	100.0%	9	100.0%
Shelter Island (T)	1,586	172	37	21.5%	338	21.3%	38	22.1%	429	27.0%
Shoreham (V)	22	6	1	16.7%	1	2.6%	1	16.7%	1	2.6%
Smithtown (T)	7,195	1,646	17	1.0%	414	5.8%	18	1.1%	442	6.1%
Southampton (T)	28,341	1,545	181	11.7%	2,217	7.8%	238	15.4%	2,542	9.0%
Southampton (V)	389	320	8	2.5%	64	16.5%	9	2.8%	65	16.8%
Southold (T)	208,417	963	232	24.1%	5,810	2.8%	289	30.0%	6,014	2.9%
The Branch (V)	117	42	0	0.0%	0	0.0%	0	0.0%	0	0.0%
West Hampton Dunes (V)	1	3	3	100.0%	1	100.0%	3	100.0%	1	100.0%
Westhampton Beach (V)	267	173	36	20.8%	40	15.2%	47	27.2%	47	17.6%
Shinnecock Tribal Nation	0	0	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Unkechaug Tribal Nation	0	0	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Suffolk County (Total)	**769,107**	**24,245**	**1,925**	**7.9%**	**45,002**	**5.9%**	**2,181**	**9.0%**	**46,402**	**6.0%**

Source: FEMA Effective DFIRM 2009/LOMR 2019; Suffolk County GIS 2020
Note: % = Percent; Non-Res = Non-Residential; T = Town; V = Village

Impact on Critical Facilities

Coastal and Riverine Flooding

It is important to determine the critical facilities and infrastructure that may be at risk to flooding, and who may be impacted should damage occur. Critical services during and after a flood event may not be available if critical facilities and community lifelines are directly damaged or transportation routes to access them are impacted. Roads that are blocked or damaged can isolate residents and can prevent access throughout the planning area to many service providers needing to reach vulnerable populations or to make repairs to critical infrastructure and lifelines.

Critical facility and lifeline exposure to the flood hazard was examined. In addition, Hazus was used to estimate the flood loss potential to critical facilities located in the FEMA mapped floodplains. Table 5.4.8-20 and Table 5.4.8-21 summarize the number of critical facilities and lifelines located in the 1-percent and 0.2-percent annual chance flood inundation areas by jurisdiction, respectively. Figure 5.4.8-18 and Figure 5.4.8-19 display the distribution of these facilities in the flood boundaries. Of the 300 critical facilities located in the 1-percent annual chance floodplain, 59 were identified as transportation facilities. Table 5.4.8-22 summarizes the critical facilities categorized by the FEMA lifelines that are exposed to the 1-percent and 0.2-percent flood inundation areas.

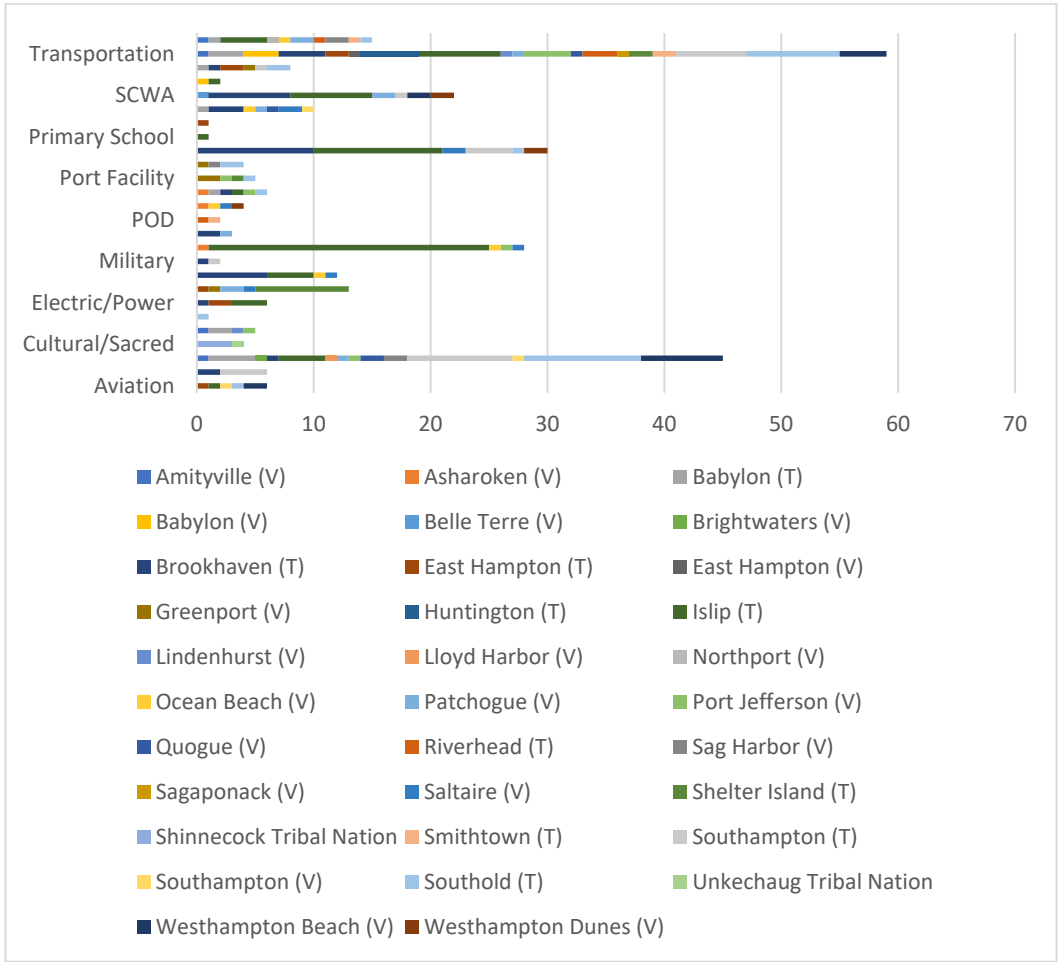
Table 5.4.8-20. Number of Critical Facilities and Lifelines Located in the 1-Percent Annual Chance Flood Boundary

Jurisdiction	Total Critical Facilities Located in the Jurisdiction	Total Lifelines Located in Jurisdiction	1-Percent Annual Chance Flood Event			
			Number of Critical Facilities Exposed	Percent (%) of Total Critical Facilities	Number of Lifelines Exposed	Percent (%) of Total Lifelines
Amityville (V)	85	62	4	4.7%	3	4.8%
Asharoken (V)	4	3	3	75.0%	2	66.7%
Babylon (T)	1,029	741	13	1.3%	8	1.1%
Babylon (V)	93	64	4	4.3%	4	6.3%
Belle Terre (V)	6	5	1	16.7%	1	20.0%
Bellport (V)	35	25	0	0.0%	0	0.0%
Brightwaters (V)	14	11	1	7.1%	1	9.1%
Brookhaven (T)	2,798	2,272	39	1.4%	34	1.5%
Dering Harbor (V)	2	2	0	0.0%	0	0.0%
East Hampton (T)	234	204	9	3.8%	7	3.4%
East Hampton (V)	37	23	1	2.7%	1	4.3%
Greenport (V)	33	20	5	15.2%	4	20.0%
Head of the Harbor (V)	11	9	0	0.0%	0	0.0%
Huntington (T)	961	664	5	0.5%	5	0.8%
Huntington Bay (V)	2	2	0	0.0%	0	0.0%
Islandia (V)	70	62	0	0.0%	0	0.0%
Islip (T)	2,275	1,740	68	3.0%	66	3.8%
Lake Grove (V)	50	38	0	0.0%	0	0.0%
Lindenhurst (V)	104	62	2	1.9%	1	1.6%
Lloyd Harbor (V)	16	12	1	6.3%	1	8.3%

Jurisdiction	Total Critical Facilities Located in the Jurisdiction	Total Lifelines Located in Jurisdiction	1-Percent Annual Chance Flood Event			
			Number of Critical Facilities Exposed	Percent (%) of Total Critical Facilities	Number of Lifelines Exposed	Percent (%) of Total Lifelines
Nissequogue (V)	7	4	0	0.0%	0	0.0%
North Haven (V)	3	1	0	0.0%	0	0.0%
Northport (V)	40	24	1	2.5%	1	4.2%
Ocean Beach (V)	5	4	5	100.0%	4	100.0%
Old Field (V)	4	3	0	0.0%	0	0.0%
Patchogue (V)	92	63	10	10.9%	9	14.3%
Poquott (V)	2	2	0	0.0%	0	0.0%
Port Jefferson (V)	95	71	9	9.5%	7	9.9%
Quogue (V)	19	13	4	21.1%	3	23.1%
Riverhead (T)	428	346	5	1.2%	5	1.4%
Sag Harbor (V)	37	24	5	13.5%	5	20.8%
Sagaponack (V)	3	3	1	33.3%	1	33.3%
Saltaire (V)	8	6	8	100.0%	6	100.0%
Shelter Island (T)	41	32	11	26.8%	11	34.4%
Shoreham (V)	7	5	0	0.0%	0	0.0%
Smithtown (T)	708	542	4	0.6%	4	0.7%
Southampton (T)	667	580	26	3.9%	25	4.3%
Southampton (V)	63	44	3	4.8%	2	4.5%
Southold (T)	275	230	28	10.2%	25	10.9%
Village of the Branch (V)	38	23	0	0.0%	0	0.0%
West Hampton Dunes (V)	5	5	5	100.0%	5	100.0%
Westhampton Beach (V)	47	39	15	31.9%	15	38.5%
Shinnecock Tribal Nation	22	22	3	13.6%	3	13.6%
Unkechaug Tribal Nation	11	10	1	9.1%	1	10.0%
Suffolk County (Total)	**10,486**	**8,117**	**300**	**2.9%**	**270**	**3.3%**

Source: FEMA Effective DFIRM 2009/LOMR 2019; Suffolk County GIS 2020

Figure 5.4.8-18. Distribution of Critical Facilities in the 1-Percent Annual Chance Floodplain by Type and Jurisdiction



Source: Suffolk County GIS 2020; Notes: SCWA = Suffolk County Water Authority, POD = Point of Distribution, OPWDD = Office for People with Development Disabilities, EMS = Emergency Medical Services, DPW = Department of Public Works, DOT = Department of Transportation; V = Village; T = Town

Table 5.4.8-21. Number of Critical Facilities and Lifelines Located in the 0.2-Percent Annual Chance Floodplain

Jurisdiction	Total Critical Facilities Located in the Jurisdiction	Total Lifelines Located in the Jurisdiction	0.2-Percent Annual Chance Flood			
			Number of Critical Facilities Exposed	Percent (%) of Total Critical Facilities	Number of Lifelines Exposed	Percent (%) of Total Lifelines
Amityville (V)	85	62	4	4.7%	3	4.8%
Asharoken (V)	4	3	3	75.0%	2	66.7%
Babylon (T)	1,029	741	14	1.4%	9	1.2%
Babylon (V)	93	64	4	4.3%	4	6.3%
Belle Terre (V)	6	5	1	16.7%	1	20.0%
Bellport (V)	35	25	0	0.0%	0	0.0%
Brightwaters (V)	14	11	1	7.1%	1	9.1%
Brookhaven (T)	2,798	2,272	39	1.4%	34	1.5%
Dering Harbor (V)	2	2	0	0.0%	0	0.0%
East Hampton (T)	234	204	13	5.6%	10	4.9%
East Hampton (V)	37	23	2	5.4%	2	8.7%
Greenport (V)	33	20	8	24.2%	7	35.0%
Head of the Harbor (V)	11	9	0	0.0%	0	0.0%
Huntington (T)	961	664	9	0.9%	9	1.4%
Huntington Bay (V)	2	2	0	0.0%	0	0.0%
Islandia (V)	70	62	0	0.0%	0	0.0%
Islip (T)	2,275	1,740	59	2.6%	57	3.3%
Lake Grove (V)	50	38	0	0.0%	0	0.0%
Lindenhurst (V)	104	62	2	1.9%	1	1.6%
Lloyd Harbor (V)	16	12	1	6.3%	1	8.3%
Nissequogue (V)	7	4	0	0.0%	0	0.0%
North Haven (V)	3	1	0	0.0%	0	0.0%
Northport (V)	40	24	1	2.5%	1	4.2%
Ocean Beach (V)	5	4	5	100.0%	4	100.0%
Old Field (V)	4	3	0	0.0%	0	0.0%
Patchogue (V)	92	63	11	12.0%	10	15.9%
Poquott (V)	2	2	0	0.0%	0	0.0%
Port Jefferson (V)	95	71	9	9.5%	7	9.9%
Quogue (V)	19	13	4	21.1%	3	23.1%
Riverhead (T)	428	346	27	6.3%	26	7.5%
Sag Harbor (V)	37	24	9	24.3%	9	37.5%
Sagaponack (V)	3	3	1	33.3%	1	33.3%
Saltaire (V)	8	6	8	100.0%	6	100.0%
Shelter Island (T)	41	32	13	31.7%	13	40.6%
Shoreham (V)	7	5	0	0.0%	0	0.0%
Smithtown (T)	708	542	4	0.6%	4	0.7%

Jurisdiction	Total Critical Facilities Located in the Jurisdiction	Total Lifelines Located in the Jurisdiction	0.2-Percent Annual Chance Flood			
			Number of Critical Facilities Exposed	Percent (%) of Total Critical Facilities	Number of Lifelines Exposed	Percent (%) of Total Lifelines
Southampton (T)	667	580	54	8.1%	52	9.0%
Southampton (V)	63	44	3	4.8%	2	4.5%
Southold (T)	275	230	35	12.7%	31	13.5%
Village of the Branch (V)	38	23	0	0.0%	0	0.0%
West Hampton Dunes (V)	5	5	5	100.0%	5	100.0%
Westhampton Beach (V)	47	39	15	31.9%	15	38.5%
Shinnecock Tribal Nation	22	22	4	18.2%	4	18.2%
Unkechaug Tribal Nation	11	10	1	9.1%	1	10.0%
Suffolk County (Total)	**10,486**	**8,117**	**369**	**3.5%**	**335**	**4.1%**

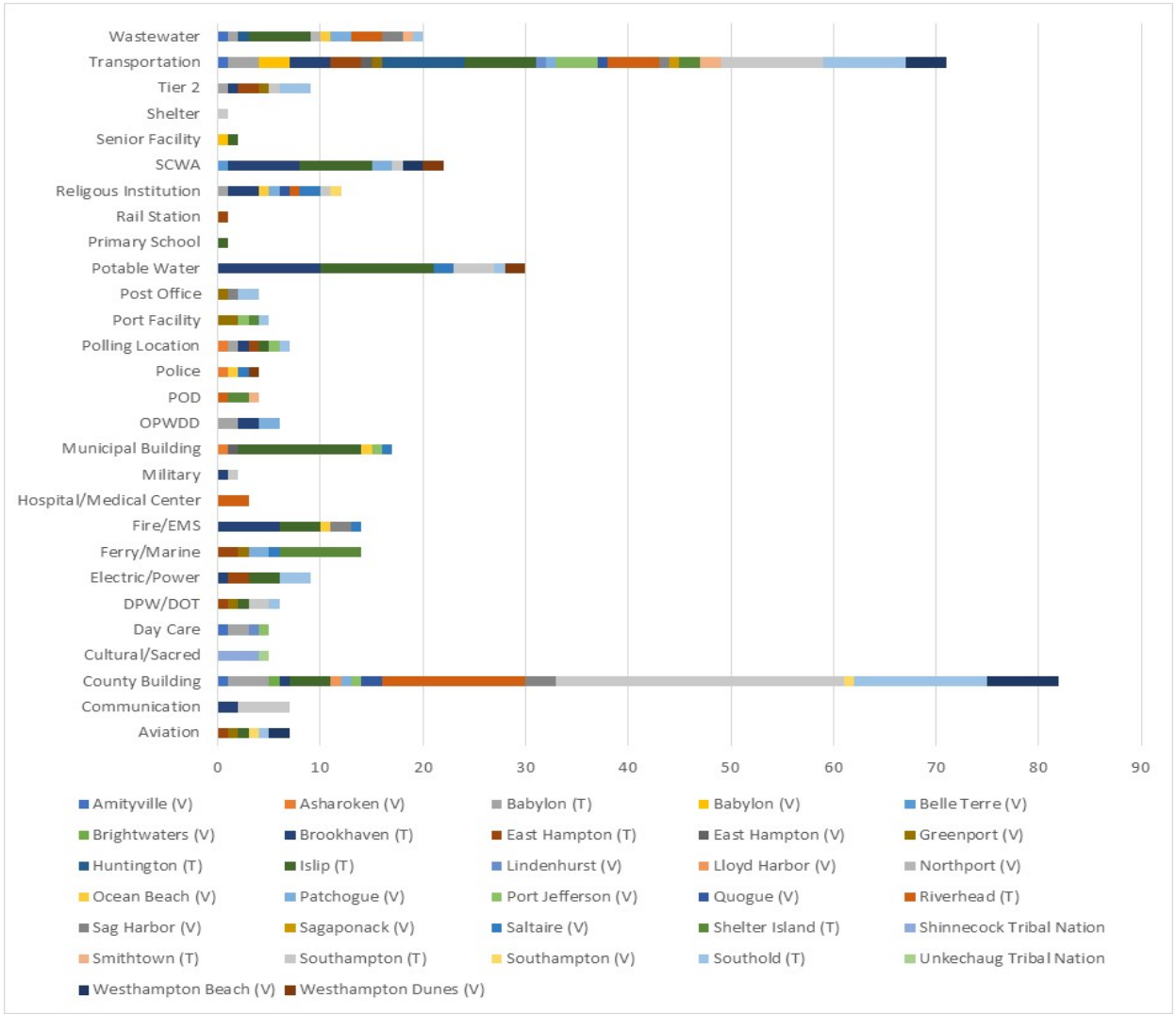
Source: FEMA Effective DFIRM 2009/LOMR 2019; Suffolk County GIS 2020

Table 5.4.8-22. Lifelines Exposed to the 1-Percent and 0.2-Percent Annual Chance Flood Events

FEMA Lifeline Categories	Total Lifelines in County	1-Percent Annual Chance Flood			0.2-Percent Annual Chance Flood Event Exposure
		1-Percent Annual Chance Flood Event Exposure (A and V Zones)	A Zone Only Exposure	V Zone Only Exposure	
Communication	126	6	6	0	7
Energy	397	21	21	0	29
Food, Water, Shelter	1,458	52	45	7	53
Health and Medical	1,081	7	7	0	15
Safety and Security	1,956	100	90	23	131
Transportation	3,099	84	67	17	101
Total	**8,117**	**270**	**236**	**47**	**336**

Source: FEMA 2020; Suffolk County GIS 2020; FEMA Effective DFIRM 2009/LOMR 2019

Figure 5.4.8-19. Distribution of Critical Facilities in the 0.2-Percent Annual Chance Floodplain by Type and Jurisdiction



Source: Suffolk County GIS 2020; Notes: SCWA = Suffolk County Water Authority, POD = Point of Distribution, OPWDD = Office for People with Development Disabilities, EMS = Emergency Medical Services, DPW = Department of Public Works, DOT = Department of Transportation; V = Village; T = Town

Figure 5.4.8-20 through Figure 5.4.8-22 display the major roadways that may be impacted by the 1- and 0.2-percent annual chance flood events. Of the 614.7 miles of major transportation evacuation routes in the County, 18.1 miles are exposed to the 1-percent annual chance flood inundation area and 25.5 miles are exposed to the 0.2-percent annual chance flood inundation area. Flooded roadways, whether from flood events or nuisance/urban flooding can delay evacuation, isolate populations, hinder emergency services and lead to economic impacts due to commuter delays and business closings because they are inaccessible. In addition to roads, other infrastructure such as bridges may be impacted, washed out or blocked by flood waters or debris.

Debris from flood events may also affect culverts and sewer systems by creating bottlenecks in the wastewater system, which could not only cause or exacerbate localized urban flooding, but also cause wastewater to spill into homes and neighborhoods or contaminate local rivers and streams.

In cases where short-term functionality is impacted by a hazard, critical facilities of neighboring municipalities may need to increase support response functions during a disaster event. Mitigation planning should consider means to reduce impact to critical facilities and ensure sufficient emergency and school services remain when a significant event occurs. Actions addressing shared services agreements are included in Section 9 (Jurisdictional Annexes) of this plan.

Additionally, critical facility parcels were assessed for exposure to the flood hazard area. These parcels were identified by the Town of Smithtown, the Suffolk County Water Authority, the Unkechaug Tribal Nation, and the Shinnecock Tribal Nation. More specifically, the Tribal Nations provided the location of sacred land. Hazus does not estimate loss at the parcel level. Therefore, an exposure analysis was conducted to identify the amount of land exposed in the floodplain. Table 5.4.8-23 and Table 5.4.8-24 below summarize results of the exposure analysis.

Table 5.4.8-23. Suffolk County Water Authority Critical Asset Exposure Analysis

Jurisdiction	Total Acres of SCWA Critical Properties	Acres Exposed		Percent (%) Exposed	
		1% Annual Chance Flood Event	0.2% Annual Chance Flood Event	1% Annual Chance Flood Event	0.2% Annual Chance Flood Event
Amityville (V)	1	0	0	0.0%	0.0%
Babylon (T)	76	2	2	2.9%	2.9%
Babylon (V)	10	0	0	0.0%	0.0%
Belle Terre (V)	0.5	0.01	0.01	2.4%	2.4%
Brookhaven (T)	465	3	3	0.6%	0.6%
East Hampton (T)	951	0	0	0.0%	0.0%
Greenport (V)	1	0	0	0.0%	0.0%
Huntington (T)	91	0	1	0.0%	1.4%
Islandia (V)	23	0	0	0.0%	0.0%
Islip (T)	234	1	1	0.5%	0.5%
Lake Grove (V)	5	0	0	0.0%	0.0%
Lindenhurst (V)	0	0	0	0.0%	0.0%
Lloyd Harbor (V)	10	0	0	0.0%	0.0%
Northport (V)	8	0	0	0.0%	0.0%

Jurisdiction	Total Acres of SCWA Critical Properties	Acres Exposed		Percent (%) Exposed	
		1% Annual Chance Flood Event	0.2% Annual Chance Flood Event	1% Annual Chance Flood Event	0.2% Annual Chance Flood Event
Patchogue (V)	12	9	9	78.5%	78.5%
Port Jefferson (V)	6	0	0	0.0%	0.0%
Riverhead (T)	17	0	0	0.0%	0.0%
Sag Harbor (V)	0	0	0	0.0%	0.0%
Shoreham (V)	1	0	0	0.0%	0.0%
Smithtown (T)	100	0	0	0.0%	0.0%
Southampton (T)	278	18	18	6.3%	6.6%
Southampton (V)	3	0	0	0.0%	0.0%
Southold (T)	257	0	0	0.0%	0.0%
Westhampton Beach (V)	0.3	0.2	0.2	56.2%	56.2%
West Hampton Dunes (V)	2	2	2	100.0%	100.0%
Suffolk County (Total)	**2,552**	**35**	**37**	**1.4%**	**1.5%**

Source: FEMA Effective DFIRM 2009/LOMR 2019; Suffolk County Water Authority 2014; Suffolk County GIS 2020
Notes: % = Percent; SCWA = Suffolk County Water Authority

Table 5.4.8-24. Tribal Nation Sacred Land Exposure Analysis

Entity/Type	Tribal Nation	Total Acres of Sacred Land	Acres Exposed		Percent (%) Exposed	
			1% Annual Chance Flood Event	0.2% Annual Chance Flood Event	1% Annual Chance Flood Event	0.2% Annual Chance Flood Event
Cemetery and historical preservation	Shinnecock	0	0	0	0.0%	0.0%
Westwoods	Shinnecock	79	3	3	3.7%	4.2%
Sacred Burial Ground	Shinnecock	9	8	9	91.2%	98.0%
Area of Flooding and Cemetery	Shinnecock	28	28	28	99.8%	99.8%
Pow Wow grounds	Unkechaug	1	0.1	0.1	8.6%	8.6%
Shoreline Protection	Unkechaug	0.2	0.2	0.2	100.0%	100.0%
Cemetery and historical preservation	Unkechaug	1	0.2	0.2	15.2%	15.2%

Source: Shinnecock and Unkechaug Tribal Nations 2020; FEMA Effective DFIRM 2009/LOMR 2019

Figure 5.4.8-20. Major Roadways and Evacuation Routes Located in the 1-Percent and 0.2-Percent Annual Chance Floodplains – West Suffolk

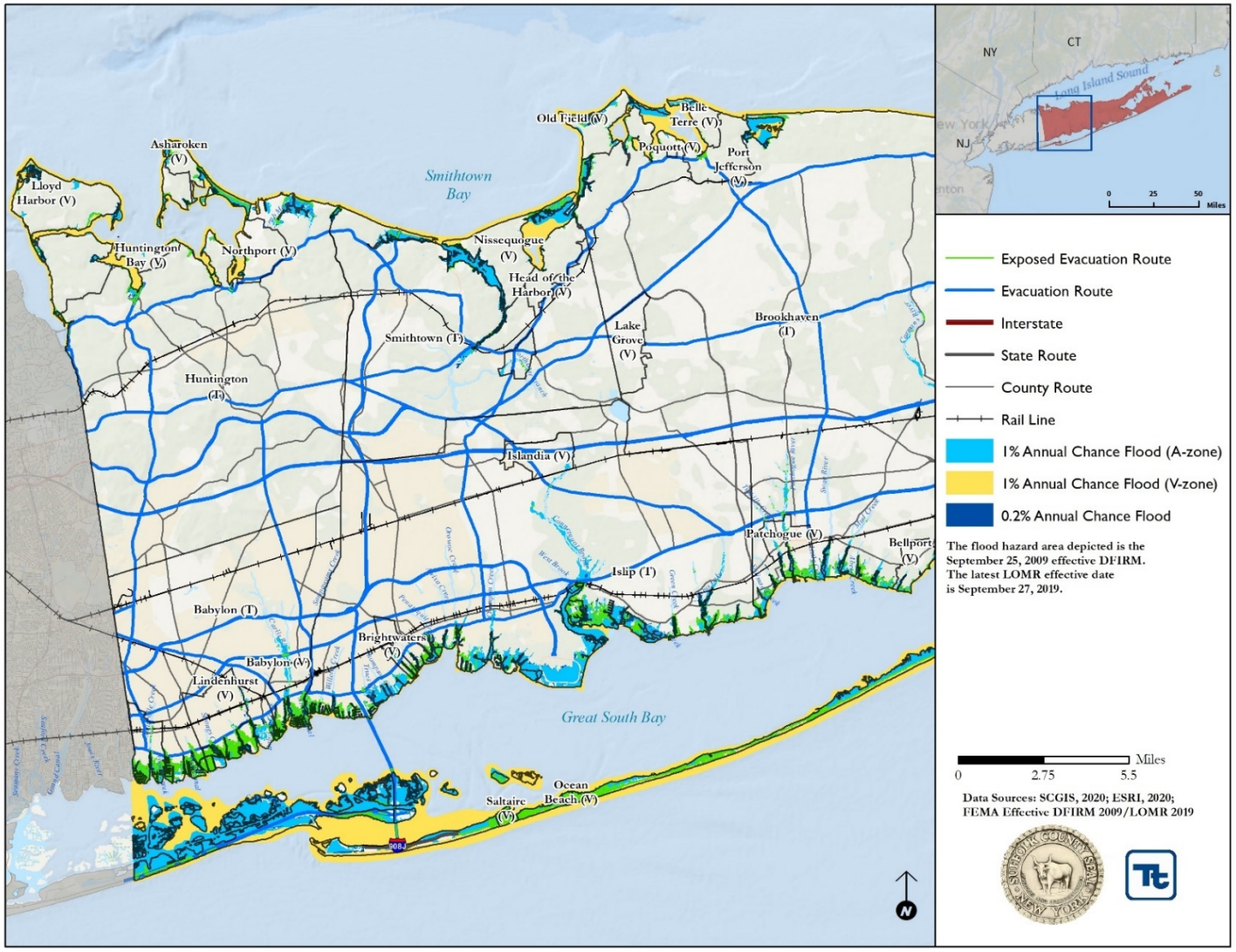


Figure 5.4.8-21. Major Roadways and Evacuation Routes Located in the 1-Percent and 0.2-Percent Annual Chance Floodplains – Central Suffolk

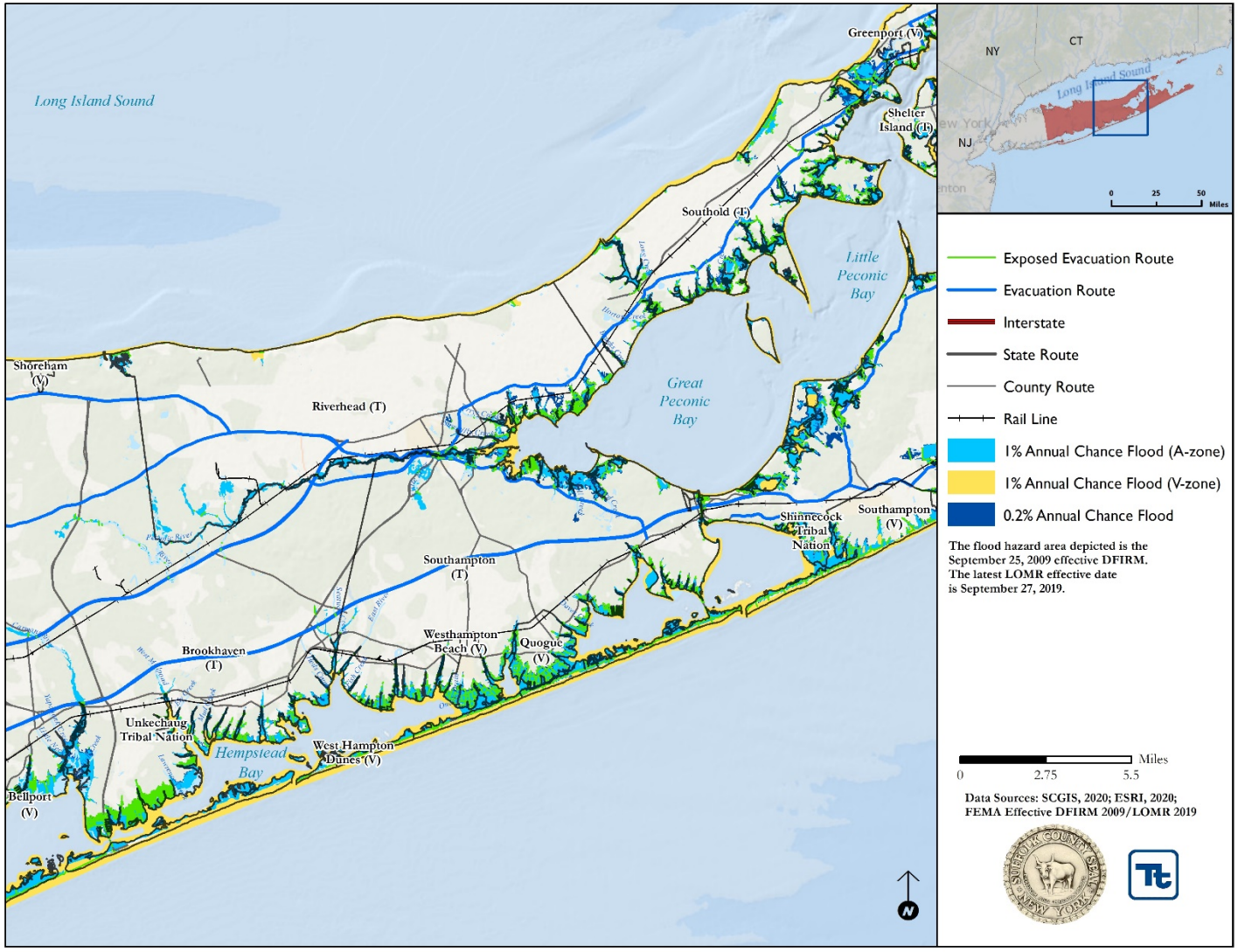
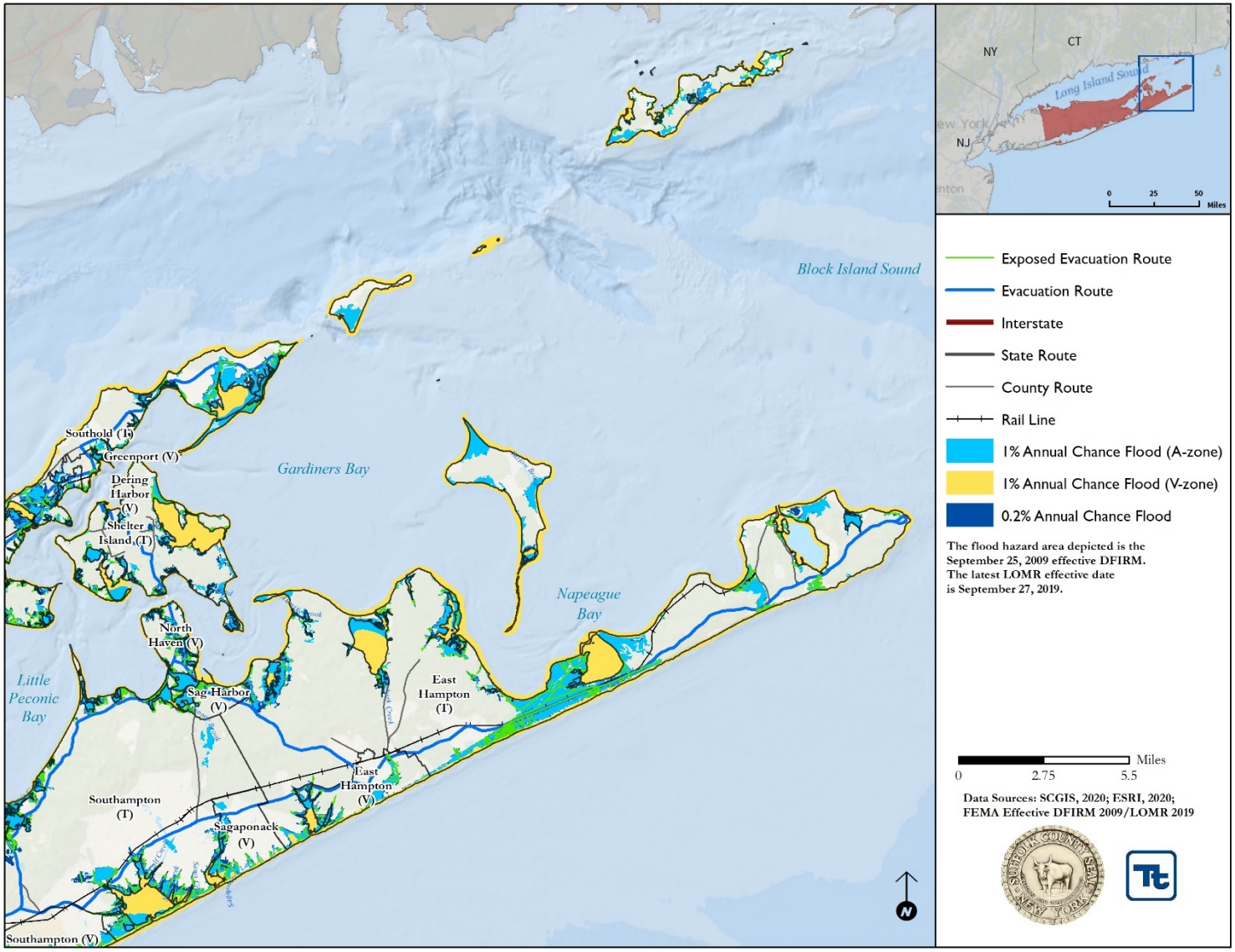


Figure 5.4.8-22. Major Roadways and Evacuation Routes Located in the 1-Percent and 0.2-Percent Annual Chance Floodplains – East Suffolk



Sea Level Rise

It is important to determine the critical facilities, infrastructure and lifelines that may be at risk to flooding due to changes in sea level rise, and who may be impacted should damage occur and land be permanently lost. Similar to flood risks, critical services could become disrupted if sea level rise breaches the area a structure or major transportation route is built on. Roads that become blocked or damaged from residual impacts from sea level rise can isolate residents and may prevent access throughout the planning area to many service providers needing to reach vulnerable populations or to make repairs.

Critical facility and lifeline exposure to the sea level rise hazard was examined. Table 5.4.8-25 and Table 5.4.8-26 summarize the number of critical facilities and lifelines exposed to the 1- through 4-foot sea level rise inundation areas by jurisdiction, respectively. Figure 5.4.8-23 displays the distribution of critical facilities in the most extreme sea level rise inundation area (i.e., 4-foot inundation area). Up to 172 critical facilities may become exposed to the most extreme sea level rise inundation area (i.e., 4-foot sea level rise). In all four scenarios, transportation facilities are at the greatest risk of becoming exposed to these hazard areas.

Figure 5.4.8-24 through Figure 5.4.8-26 displays the major roadways that may be impacted by the 1-foot increment sea level rise inundation areas. Out of the 614.7 miles of major transportation evacuation routes in the County, 5 miles, 5.1 miles, 5.6 miles, and 7.4 miles are exposed to the 1-, 2-, 3-, and 4-foot sea level rise inundation areas.

Table 5.4.8-25. Number of Critical Facilities Located in the 1-Foot and 2-Foot Sea Level Rise Inundation Areas

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifelines Exposed to Sea Level Rise							
			Critical Facilities in SLR 1 Foot	% of Total Critical Facilities	Lifelines in SLR 1 Foot	% of Total Lifelines	Critical Facilities in SLR 2 Foot	% of Total Critical Facilities	Lifelines in SLR 2 Foot	% of Total Lifelines
Amityville (V)	85	62	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Asharoken (V)	4	3	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Babylon (T)	1,029	741	0	0.0%	0	0.0%	1	0.1%	1	0.1%
Babylon (V)	93	64	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Belle Terre (V)	6	5	1	16.7%	1	1.6%	1	16.7%	1	16.7%
Bellport (V)	35	25	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Brightwaters (V)	14	11	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Brookhaven (T)	2,798	2,272	19	0.7%	8	12.9%	9	0.3%	8	0.3%
Dering Harbor (V)	2	2	0	0.0%	0	0.0%	0	0.0%	0	0.0%
East Hampton (T)	234	204	6	2.6%	0	0.0%	0	0.0%	0	0.0%
East Hampton (V)	37	23	3	8.1%	0	0.0%	0	0.0%	0	0.0%
Greenport (V)	33	20	1	3.0%	1	1.6%	2	6.1%	1	3.0%
Head of the Harbor (V)	11	9	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Huntington (T)	961	664	14	1.5%	0	0.0%	0	0.0%	0	0.0%
Huntington Bay (V)	2	2	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Islandia (V)	70	62	0	0.0%	0	0.0%	0	0.0%	0	0.0%

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifelines Exposed to Sea Level Rise							
			Critical Facilities in SLR 1 Foot	% of Total Critical Facilities	Lifelines in SLR 1 Foot	% of Total Lifelines	Critical Facilities in SLR 2 Foot	% of Total Critical Facilities	Lifelines in SLR 2 Foot	% of Total Lifelines
Islip (T)	2,275	1,740	12	0.5%	12	19.4%	13	0.6%	13	0.6%
Lake Grove (V)	50	38	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Lindenhurst (V)	104	62	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Lloyd Harbor (V)	16	12	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Nissequogue (V)	7	4	0	0.0%	0	0.0%	0	0.0%	0	0.0%
North Haven (V)	3	1	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Northport (V)	40	24	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Ocean Beach (V)	5	4	0	0.0%	0	0.0%	3	60.0%	2	40.0%
Old Field (V)	4	3	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Patchogue (V)	92	63	1	1.1%	1	1.6%	2	2.2%	2	2.2%
Poquott (V)	2	2	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Port Jefferson (V)	95	71	6	6.3%	0	0.0%	0	0.0%	0	0.0%
Quogue (V)	19	13	3	15.8%	3	4.8%	3	15.8%	3	15.8%
Riverhead (T)	428	346	14	3.3%	2	3.2%	2	0.5%	2	0.5%
Sag Harbor (V)	37	24	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Sagaponack (V)	3	3	0	0.0%	0	0.0%	1	33.3%	1	33.3%
Saltaire (V)	8	6	1	12.5%	1	1.6%	2	25.0%	1	12.5%
Shelter Island (T)	41	32	9	22.0%	9	14.5%	9	22.0%	9	22.0%
Shoreham (V)	7	5	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Smithtown (T)	708	542	4	0.6%	2	3.2%	2	0.3%	2	0.3%
Southampton (T)	667	580	12	1.8%	11	17.7%	12	1.8%	11	1.6%
Southampton (V)	63	44	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Southold (T)	275	230	8	2.9%	7	11.3%	8	2.9%	8	2.9%
Village of the Branch (V)	38	23	0	0.0%	0	0.0%	0	0.0%	0	0.0%
West Hampton Dunes (V)	5	5	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Westhampton Beach (V)	47	39	10	21.3%	10	16.1%	10	21.3%	10	21.3%
Shinnecock Tribal Nation	22	22	1	4.5%	1	1.6%	1	4.5%	1	4.5%
Unkechaug Tribal Nation	11	10	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Suffolk County (Total)	**10,486**	**8,117**	**125**	**1.2%**	**69**	**111.3%**	**81**	**0.8%**	**76**	**0.7%**

Source: NOAA 2017; Suffolk County GIS 2020
Notes: % = Percent; SLR = Sea Level Rise; V = Village; T = Town

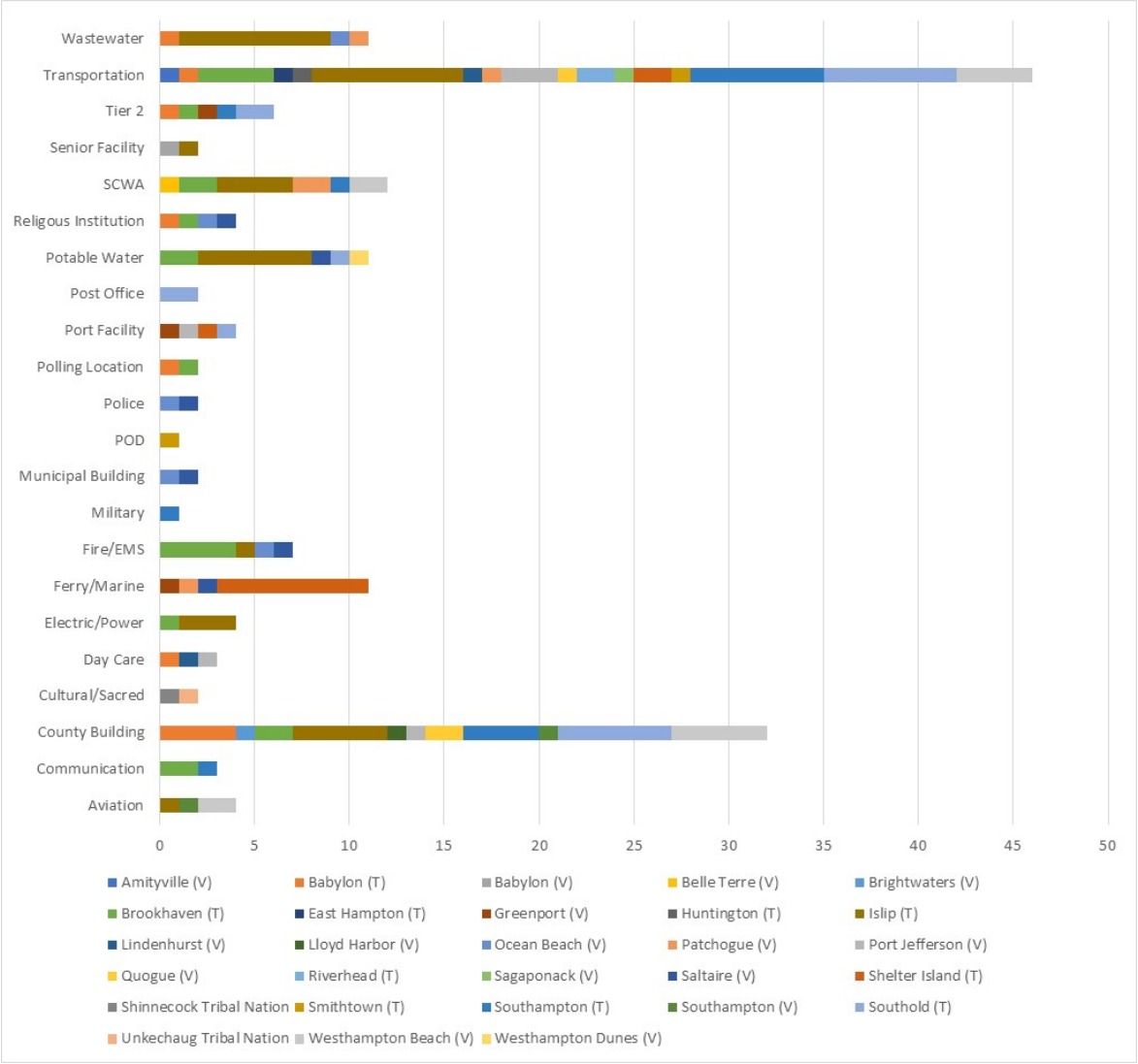
Table 5.4.8-26. Number of Critical Facilities and Lifelines Located in the 3-Foot and 4-Foot Sea Level Rise Inundation Areas

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Exposed to Sea Level Rise							
			Critical Facilities in SLR 3 Foot	% of Total Critical Facilities	Lifelines in SLR 3 Foot	% of Total Lifelines	Critical Facilities in SLR 4 Foot	% of Total Critical Facilities	Lifelines in SLR 4 Foot	% of Total Lifelines
Amityville (V)	85	62	0	0.0%	0	0.0%	1	1.2%	1	1.2%
Asharoken (V)	4	3	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Babylon (T)	1,029	741	4	0.4%	2	0.2%	10	1.0%	6	0.6%
Babylon (V)	93	64	0	0.0%	0	0.0%	1	1.1%	1	1.1%
Belle Terre (V)	6	5	1	16.7%	1	16.7%	1	16.7%	1	16.7%
Bellport (V)	35	25	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Brightwaters (V)	14	11	1	7.1%	1	7.1%	1	7.1%	1	7.1%
Brookhaven (T)	2,798	2,272	13	0.5%	12	0.4%	20	0.7%	17	0.6%
Dering Harbor (V)	2	2	0	0.0%	0	0.0%	0	0.0%	0	0.0%
East Hampton (T)	234	204	0	0.0%	0	0.0%	1	0.4%	1	0.4%
East Hampton (V)	37	23	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Greenport (V)	33	20	2	6.1%	1	3.0%	3	9.1%	2	6.1%
Head of the Harbor (V)	11	9	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Huntington (T)	961	664	0	0.0%	0	0.0%	1	0.1%	1	0.1%
Huntington Bay (V)	2	2	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Islandia (V)	70	62	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Islip (T)	2,275	1,740	18	0.8%	18	0.8%	37	1.6%	37	1.6%
Lake Grove (V)	50	38	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Lindenhurst (V)	104	62	0	0.0%	0	0.0%	2	1.9%	1	1.0%
Lloyd Harbor (V)	16	12	0	0.0%	0	0.0%	1	6.3%	1	6.3%
Nissequogue (V)	7	4	0	0.0%	0	0.0%	0	0.0%	0	0.0%
North Haven (V)	3	1	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Northport (V)	40	24	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Ocean Beach (V)	5	4	5	100.0%	4	80.0%	5	100.0%	4	80.0%
Old Field (V)	4	3	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Patchogue (V)	92	63	4	4.3%	4	4.3%	5	5.4%	5	5.4%
Poquott (V)	2	2	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Port Jefferson (V)	95	71	5	5.3%	4	4.2%	6	6.3%	5	5.3%
Quogue (V)	19	13	3	15.8%	3	15.8%	3	15.8%	3	15.8%
Riverhead (T)	428	346	2	0.5%	2	0.5%	2	0.5%	2	0.5%
Sag Harbor (V)	37	24	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Sagaponack (V)	3	3	1	33.3%	1	33.3%	1	33.3%	1	33.3%
Saltaire (V)	8	6	5	62.5%	4	50.0%	6	75.0%	5	62.5%
Shelter Island (T)	41	32	10	24.4%	10	24.4%	11	26.8%	11	26.8%
Shoreham (V)	7	5	0	0.0%	0	0.0%	0	0.0%	0	0.0%

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Exposed to Sea Level Rise							
			Critical Facilities in SLR 3 Foot	% of Total Critical Facilities	Lifelines in SLR 3 Foot	% of Total Lifelines	Critical Facilities in SLR 4 Foot	% of Total Critical Facilities	Lifelines in SLR 4 Foot	% of Total Lifelines
Smithtown (T)	708	542	2	0.3%	2	0.3%	2	0.3%	2	0.3%
Southampton (T)	667	580	14	2.1%	13	1.9%	15	2.2%	14	2.1%
Southampton (V)	63	44	1	1.6%	1	1.6%	2	3.2%	2	3.2%
Southold (T)	275	230	10	3.6%	10	3.6%	19	6.9%	17	6.2%
Village of the Branch (V)	38	23	0	0.0%	0	0.0%	0	0.0%	0	0.0%
West Hampton Dunes (V)	5	5	0	0.0%	0	0.0%	1	20.0%	1	20.0%
Westhampton Beach (V)	47	39	10	21.3%	10	21.3%	13	27.7%	13	27.7%
Shinnecock Tribal Nation	22	22	1	4.5%	1	4.5%	1	4.5%	1	4.5%
Unkechaug Tribal Nation	11	10	1	9.1%	1	9.1%	1	9.1%	1	9.1%
Suffolk County (Total)	**10,486**	**8,117**	**113**	**1.1%**	**105**	**1.0%**	**172**	**1.6%**	**157**	**1.5%**

Source: NOAA 2017; Suffolk County GIS 2020
Notes: % = Percent; SLR = Sea Level Rise; V = Village; T = Town

Figure 5.4.8-23. Distribution of Critical Facilities in the 4-foot Sea Level Rise Inundation Area by Type and Jurisdiction



Source: Suffolk County GIS 2020; Notes: SCWA = Suffolk County Water Authority, POD = Point of Distribution, OPWDD = Office for People with Development Disabilities, EMS = Emergency Medical Services, DPW = Department of Public Works, DOT = Department of Transportation; V = Village; T = Town

Figure 5.4.8-24. Major Roadways and Evacuation Routes Located in the 1-Foot Increment Sea Level Rise Inundation Areas in Suffolk County – West

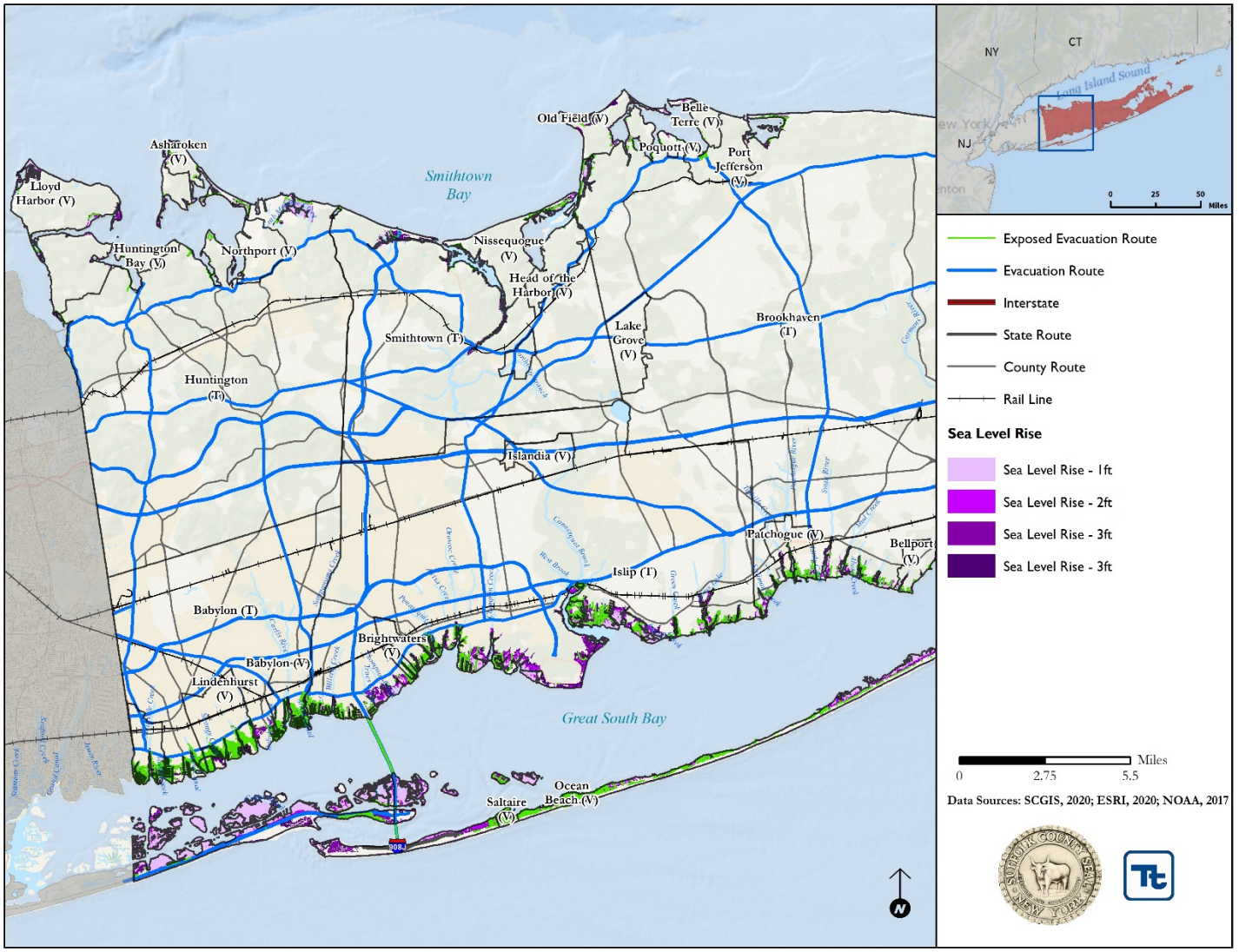


Figure 5.4.8-25. Major Roadways and Evacuation Routes Located in the 1-Foot Increment Sea Level Rise Inundation Areas in Suffolk County – Central

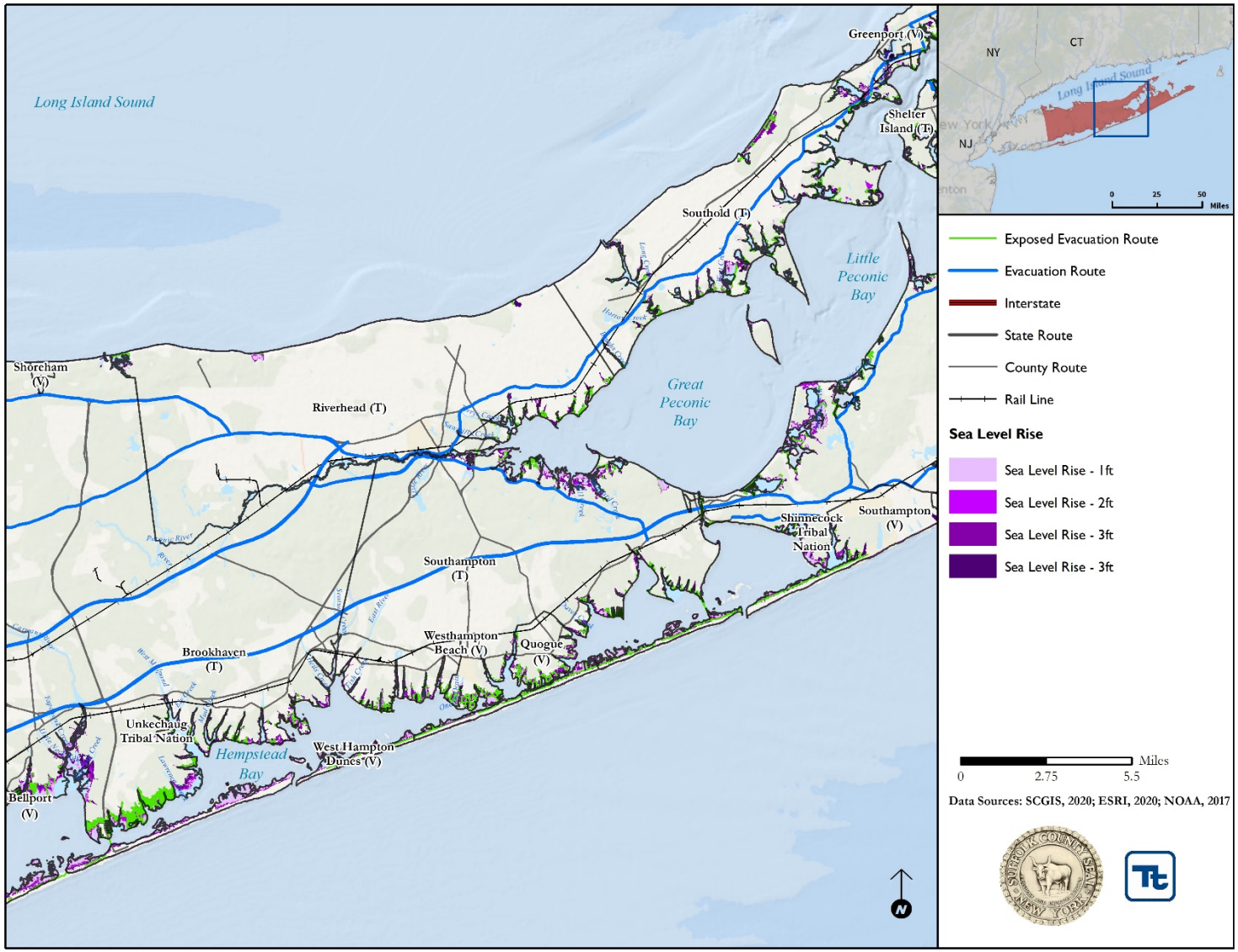
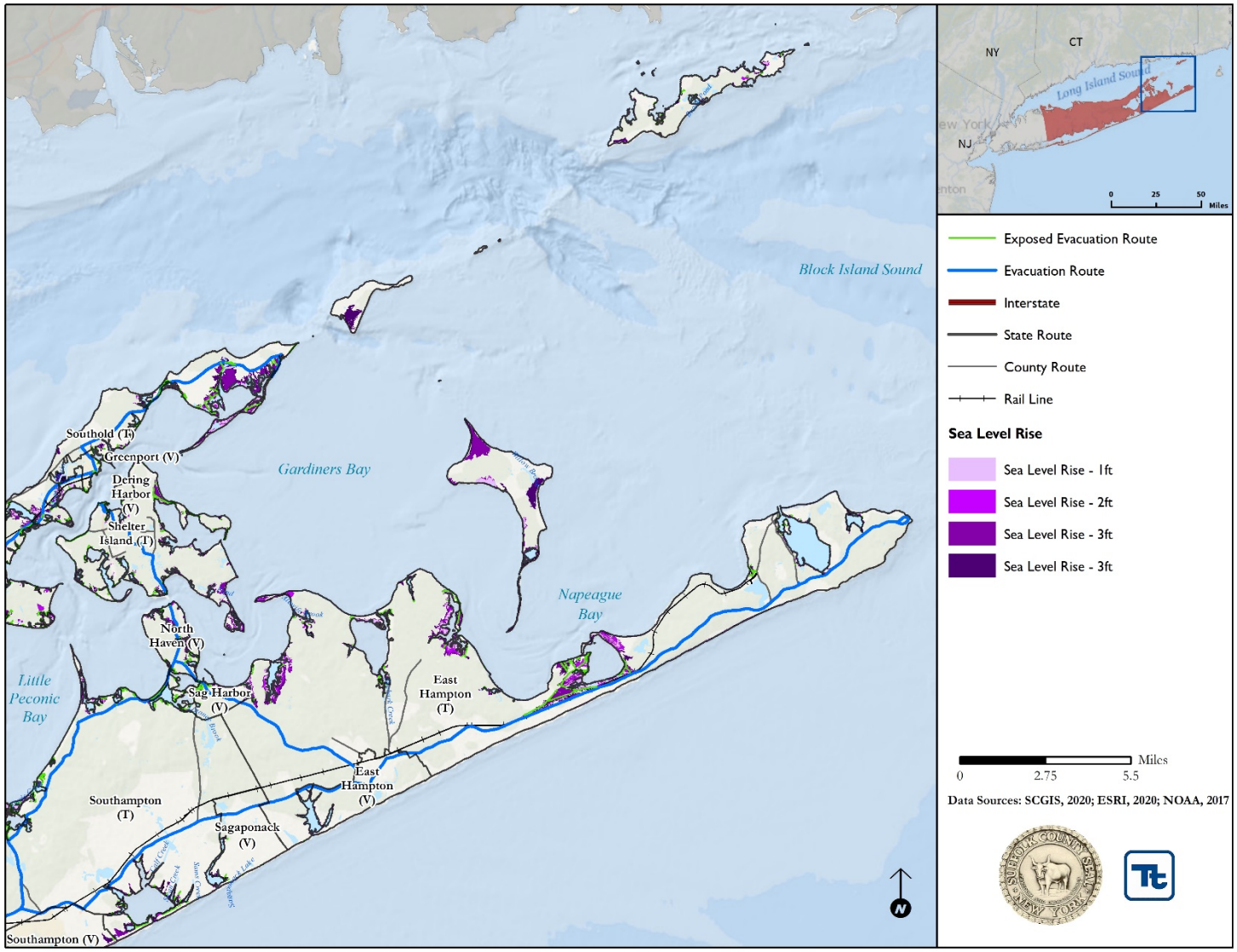


Figure 5.4.8-26. Major Roadways and Evacuation Routes Located in the 1-Foot Increment Sea Level Rise Inundation Areas in Suffolk County – East



Impact on the Economy

Flood events can significantly impact the local and regional economy. This includes but is not limited to general building stock damages and associated tax loss, impacts to utilities and infrastructure, business interruption, and impacts on tourism. In areas that are directly flooded, renovations of commercial and industrial buildings may be necessary, disrupting associated services. Refer to the 'Impact on Buildings' subsection earlier which discusses direct impacts to buildings in Suffolk County.

Flooding can cause extensive damage to public utilities and disruptions to delivery of services. Loss of power and communications may occur and drinking water and wastewater treatment facilities may be temporarily out of operation. As presented in Table 5.4.8-21, 300 critical facilities are exposed and potentially vulnerable to the 1-percent annual chance flood event. Of these 300 facilities, 270 are considered lifelines to the County.

Debris management may also be a large expense after a flood event. Hazus estimates the amount of structural debris generated during a flood event. The model breaks down debris into three categories: (1) finishes (dry wall, insulation, etc.); (2) structural (wood, brick, etc.); and (3) foundations (concrete slab and block, rebar, etc.). These distinctions are necessary because of the different types of equipment needed to handle debris. Table 5.4.8-27 summarizes the countywide debris estimates for the 1-percent annual chance flood event. This table only estimates structural debris generated by flooding and does not include non-structural debris or additional potential damage and debris possibly generated by wind that may be associated with a flood event or storm that causes flooding.

Table 5.4.8-27. Estimated Debris Generated from the 1-Percent Annual Chance Flood Event

Jurisdiction	1-Percent Annual Chance Flood Event			
	Total (tons)	Finish (tons)	Structure (tons)	Foundation (tons)
Amityville (V)	0	0	0	0
Asharoken (V)	0	0	0	0
Babylon (T)	0	0	0	0
Babylon (V)	0	0	0	0
Belle Terre (V)	0	0	0	0
Bellport (V)	0	0	0	0
Brightwaters (V)	0	0	0	0
Brookhaven (T)	1,355	459	549	347
Dering Harbor (V)	39	13	16	11
East Hampton (T)	931	380	325	227
East Hampton (V)	5	2	2	1
Greenport (V)	0	0	0	0
Head of the Harbor (V)	0	0	0	0
Huntington (T)	1	0	0	0
Huntington Bay (V)	0	0	0	0
Islandia (V)	0	0	0	0
Islip (T)	1	1	0	0
Lake Grove (V)	0	0	0	0
Lindenhurst (V)	0	0	0	0
Lloyd Harbor (V)	0	0	0	0
Nissequogue (V)	0	0	0	0

Jurisdiction	1-Percent Annual Chance Flood Event			
	Total (tons)	Finish (tons)	Structure (tons)	Foundation (tons)
North Haven (V)	73	40	20	13
Northport (V)	0	0	0	0
Ocean Beach (V)	0	0	0	0
Old Field (V)	0	0	0	0
Patchogue (V)	1	1	0	0
Poquott (V)	0	0	0	0
Port Jefferson (V)	0	0	0	0
Quogue (V)	27	15	6	5
Riverhead (T)	818	371	271	177
Sag Harbor (V)	34	19	9	6
Sagaponack (V)	1	1	0	0
Saltaire (V)	0	0	0	0
Shelter Island (T)	645	207	263	175
Shoreham (V)	0	0	0	0
Smithtown (T)	0	0	0	0
Southampton (T)	1,615	844	461	310
Southampton (V)	27	14	8	5
Southold (T)	1,767	594	703	470
The Branch (V)	0	0	0	0
West Hampton Dunes (V)	20	14	3	2
Westhampton Beach (V)	5	4	0	0
Shinnecock Tribal Nation	1	0	0	0
Unkechaug Tribal Nation	31	11	13	8
Suffolk County (Total)	**7,399**	**2,991**	**2,650**	**1,758**

Source: HAZUS 4.2
Notes: V = Village, T = Town; % = Percent

Impact on the Environment

As Suffolk County and its jurisdictions grow, flood events may increase in frequency and/or severity as land use changes, more structures are built, and impervious surfaces expand. Furthermore, flood extents for the 1-percent and 0.2-percent annual flood events will continue to evolve alongside natural occurrences such as sea level rise, climate change, and/or severity of coastal storms. These flood events will inevitably impact Suffolk County's natural and local environment.

Overall, the acreage of natural land makes up 37-percent of the County's total land area. Severe flooding cannot only influence the habitat of these natural land areas, it can be disruptive to species that reside in these natural habitats. Table 5.4.8-28 summarizes the number of acres residential, non-residential, and natural land use types are exposed to the 1-percent and 0.2-percent annual chance flood inundation areas.

Table 5.4.8-28. Natural Land Area by Jurisdiction Exposed to Flood Inundation Areas

Land Use Type	Total Acres of Land Use Type in the County	1% Annual Chance Flood Event		0.2% Annual Chance Flood Event	
		Acres	Percent (%) of Total	Acres	Percent (%) of Total
Residential Land	198,428	12,716	6.4%	15,059	7.6%
Non-Residential Land	377,375	39,431	10.4%	44,146	11.7%
Natural Land	213,666	43,832	20.5%	46,721	21.9%
Total County Land	**575,803**	**52,148**	**9.1%**	**59,205**	**10.3%**

Source: NLCD 2016; Suffolk County GIS 2020
Notes: Assumed Natural Land includes barren land, forests, and wetlands; This analysis does not include any areas of water Non-Residential area = Agriculture, Barren, Developed – Open Space, Forest, Wetlands; This analysis does not incorporate areas delineated as water; Residential parcels = Developed – low intensity, Developed – medium intensity, and Developed – high intensity

Cascading Impacts on Other Hazards

Flood events can exacerbate the impacts of coastal erosion, disease outbreak, groundwater contamination, and shallow groundwater flooding. Flooding may cause a loss in protective shoreline dunes, loss of stabilizing plant material caused by inundation, and erosion (NYC 2019). Furthermore, flooding may increase the transmission of water-borne diseases such as typhoid fever, cholera, and hepatitis A (World Health Organization 2020).

Flooding that causes contamination of drinking water facilities, including groundwater drinking water sources, may enhance the risk of disease outbreaks based on the number of persons that come in contact with these resources, particularly those with open wounds. Standing water that occurs as a result of a flood event may become a breeding site for vector-borne diseases, like West Nile virus (World Health Organization 2020). Runoff from flood events may also exacerbate groundwater flooding if groundwater resources accumulate flood runoff. Urban drainage systems that discharge flood water into shallow groundwater systems can alter the overall risk for communities that are built in shallow groundwater hazard areas. More information about these hazards of concern can be found in Section 5.4.1 (Coastal Erosion), Section 5.4.3 (Disease Outbreak), Section 5.4.9 (Groundwater Contamination), and Section 5.4.15 (Shallow Groundwater Flooding).

Future Changes That May Impact Vulnerability

Understanding future changes that affect vulnerability can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. Several factors are examined in this section to assess hazard vulnerability.

Suffolk County falls within the North Atlantic Coast Comprehensive Study (NACCS) area, which established a plan to identify risk management strategies to mitigate future flood risks (USACE 2015). The NACCS was established shortly after Hurricane Sandy struck the north Atlantic states. As a result, a New York-New Jersey Harbor and Tributaries Coastal Storm Risk Management Report was created for vulnerable communities to address concerns identified by the NACCS (USACE 2019). This risk management report reviews different case studies to determine future risk and potential mitigation based on flood management designs for the New York Metropolitan Area, which encompasses Suffolk County. The designs range from no action to shoreline stabilization and storm surge barriers strategies (refer to Table 5.4.8-29). The USACE is reviewing these alternatives to determine the best management strategy for reducing future flood risks. The outcome of the selected alternative may impact future development, changes in the population, and effects from climate change. As of April 2020, the NACCS program has been postponed until additional federal funds become available (USACE 2020). Once funds become available, the coastal storm risk management feasibility study will continue.

Table 5.4.8-29. Alternatives Suggested in the New York-New Jersey Harbor and Tributaries Coastal Storm Risk Management Report

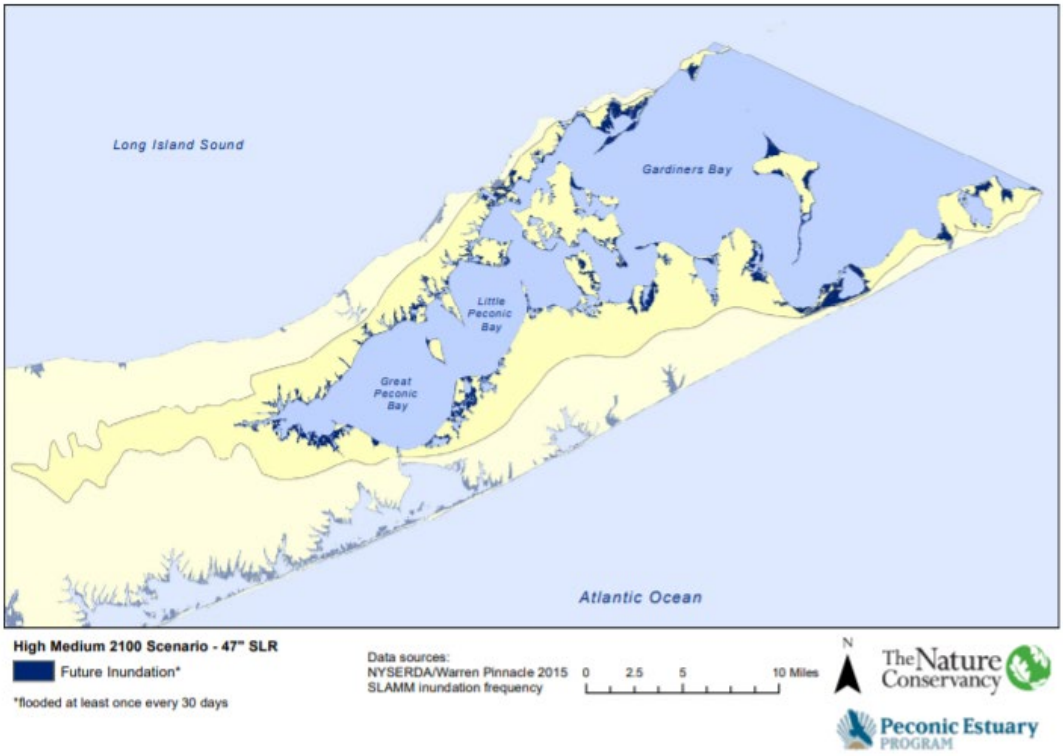
Alt	Areas Benefited by Alternative	Areas Not Benefiting from Alternative	Main Environmental Concerns	Notes
1	None	Entire study area.	Entire study area remains as vulnerable as it will be with the currently ongoing efforts to coastal flooding impacts.	Assumes all ongoing studies/projects by USACE and funded efforts by others (e.g., RBD) are implemented to extent currently considered feasible/actionable.
2	Nearly all of the study area	Part of the eastern shorelines Bronx & Westchester Counties.	Tidal exchange in Hudson River Estuary, migration of estuary resources through Bight and Long Island Sound, cultural resources impacts.	Fewest number of alternative features (see Table 11).
3.a	Much of the study area	Shorelines around Raritan, Sandy Hook, and Lower Bay.	Tidal exchange in Hudson River Estuary, migration of estuary resources through Bight and LIS.	Addresses severe coastal storm risk in nearly all of NYC, inner NJ, and Hudson River. Relatively few alternative features.
3.b	Inland NJ areas (including port, oil terminals and Newark airport) and backside of SI by barrier, high risk areas of NJ & upstate NY along HR & NYC	Segments of NY (including NYC) and NJ (along HR) that initially appear to not have high risk/exposure.	Tidal exchange in Kills/Newark Bay, migration of estuary resources to Newark Bay, impacts to CERCLA-listed sites, impacts to cultural and social resources from perimeter measures in NJ along HR and NYC.	Only relatively higher risk areas in NY (including NYC) and NJ (along HR) have alternative features (Table 11).
4	Only relatively higher risk sections of shoreline or smaller tributary basins in study area.	Relatively moderate and low risk areas.	Tidal exchange in Hackensack River, Gowanus Canal, and Newtown Creek; CERCLA-listed sites; impacts to cultural and social resources from perimeter measures in NJ along HR and NYC.	Only relatively higher risk areas in NY (including NYC) and NJ have features. Major port facilities (incl. oil terminals, etc.), Newark and LaGuardia airports remain at risk. Many alternative features (Table 11).
5	Only relatively higher risk sections of shoreline or smaller tributary basins in study area.	Relatively moderate and low risk areas.	Coastal zone and wetland impacts to cultural and social resources from perimeter	Only relatively higher risk areas in NY (including NYC) and NJ have features when feasible without in-water

Alt	Areas Benefited by Alternative	Areas Not Benefiting from Alternative	Main Environmental Concerns	Notes
			measures in NJ, upstate Hudson in NY, and NYC.	measures. Major facilities (including oil terminals etc.), Newark and LaGuardia airports remain at risk. Several alternative features (Table 11).

Source: USACE 2015 (Table 12)

A recent study was published for the Peconic Estuary Program in 2019 summarizing climate vulnerability and action plans (Peconic Estuary Program 2019). This program discusses the risks facing the Peconic Estuary and proposes an action plan to protect, preserve, and mitigate future impacts to the estuary. The estuary is located in the eastern central communities within the County. One of the many strategies to protect the estuary is identifying critical lands and conserving this land, rather than promoting development. Future inundation areas were also assessed based on projected sea level rise conditions in the County. Three sea level rise scenarios were assessed referencing the New York State Community Risk and Resiliency Act (CRRA) sea level rise projects, which is based on the 2014 ClimAID update. By 2100, the CRRA predicts that the inundation area caused by sea level rise will increase by 47 inches (refer to Figure 5.4.8-27). As a result, these areas projected to be inundated by 2100 may become tidal marshes or fresh marsh/swamp lands. The Peconic Estuary Program used these results to inform areas of high priority for protection due to the multiple benefits they provide including providing habitat and water quality protection, groundwater protection, buffers to other protected land, etc. With these areas identified, development and population changes may be impacted. Policies setting a buffer around these high priority locations may require updates to existing development plans.

Figure 5.4.8-27. Inundation 2100 High-Medium Scenario (47″ Sea Level Rise Projections)



Projected Development

As discussed in Section 4, areas targeted for future growth and development have been identified across the County. Any areas of growth located in the FEMA delineated floodplains or future sea level rise inundation areas could be potentially impacted by flooding. There are 13 new development projects identified by the participating jurisdictions that are located in the 1-percent annual chance flood A-zone, seven new development projects located in the 1-percent annual chance flood V-zone, and 14 new development projects located in the 0.2-percent annual chance flood zone. There are six new development projects located in the sea level rise 1-foot hazard area and nine new development projects located in the sea level rise 4-foot hazard area. The results of this exposure analysis were shared with plan participants.

It is recommended that the County and municipal partners implement design strategies that mitigate against the risk of flooding. Proposed updates to the New York State Coastal Management Program may provide guidance about how to improve resilience of the shorelines and management of these community's natural and economic resources (New York State 2020).

Please refer to Figure 5.4.8-28 through Figure 5.4.8-33 to view the new development locations throughout the County and their proximity to the flood hazard areas and projected sea level rise inundation areas.

Projected Changes in Population

According to the Suffolk County Economic Development and Planning Department's February 2017 Annual Report update, the population of the County is growing. The report indicates that slow population growth is expected to continue in the future. Any growth can create changes in density throughout the County. Higher density can, not only create issues for local residents during evacuation of a natural hazard event but can also impact tourists that travel to or through Suffolk County for vacation. Historically, flood and storm events with associated surge have severely impacted transportation corridors as well as infrastructure. Refer to Section 4 (County Profile) which includes a discussion on population trends for the County.

Climate Change

As discussed above, most studies project that the State of New York will see an increase in average annual temperatures and precipitation. Annual precipitation amounts in the region are projected to increase, primarily in the form of heavy rainfalls, which have the potential to increase the risk to flash flooding and riverine flooding, and flood critical transportation corridors and infrastructure. Increases in precipitation may alter and expand the floodplain boundaries and runoff patterns, resulting in the exposure of populations, buildings, and critical facilities and infrastructure that were previously outside the floodplain. This increase in exposure would result in an increased risk to life and health, an increase in structural losses, a diversion of additional resources to response and recovery efforts, and an increase in business closures affected by future flooding events due to loss of service or access.

Furthermore, impacts from changes in climate such as the frequency and intensity of weather events have an impact on the flood extents in Suffolk County. Both globally and at the local scale, climate change has the potential to alter the prevalence and severity of extremes such as flood events. While predicting changes of flood events under a changing climate is difficult, understanding vulnerabilities to potential changes is a critical part of estimating future climate change impacts on human health, society and the environment (U.S. Environmental Protection Agency [EPA], 2006). Modeled 1-foot increment sea level rise inundation areas were reviewed in this HMP to better understand the County's future risk.

Change of Vulnerability Since 2014 HMP

Since the 2014 HMP was drafted, updated inventory data has become available to assess the flood hazard in Suffolk County. This data includes the 5-Year 2014-2018 American Community Survey population estimates, and general building stock and critical facility data with RS Means 2019 building valuations.

FEMA has not released an updated DFIRM for Suffolk County; however, LOMRs have been submitted with the last received in 2019 at the time of this plan draft. Both the effective DFIRM and LOMR was referenced in the creation of the maps for this updated HMP. NOAA's 2017 modeled 1-foot increment sea level rise data was also used to assess potential change in future flood inundation risk. Last, an updated version of FEMA's Hazus flood module (version 4.2) was used to estimate potential losses.

Overall, this vulnerability assessment uses a more accurate and updated asset inventory which provides more accurate estimated exposure to the flood hazard.

Figure 5.4.8-28. New Development and Flood Boundaries in Suffolk County - West

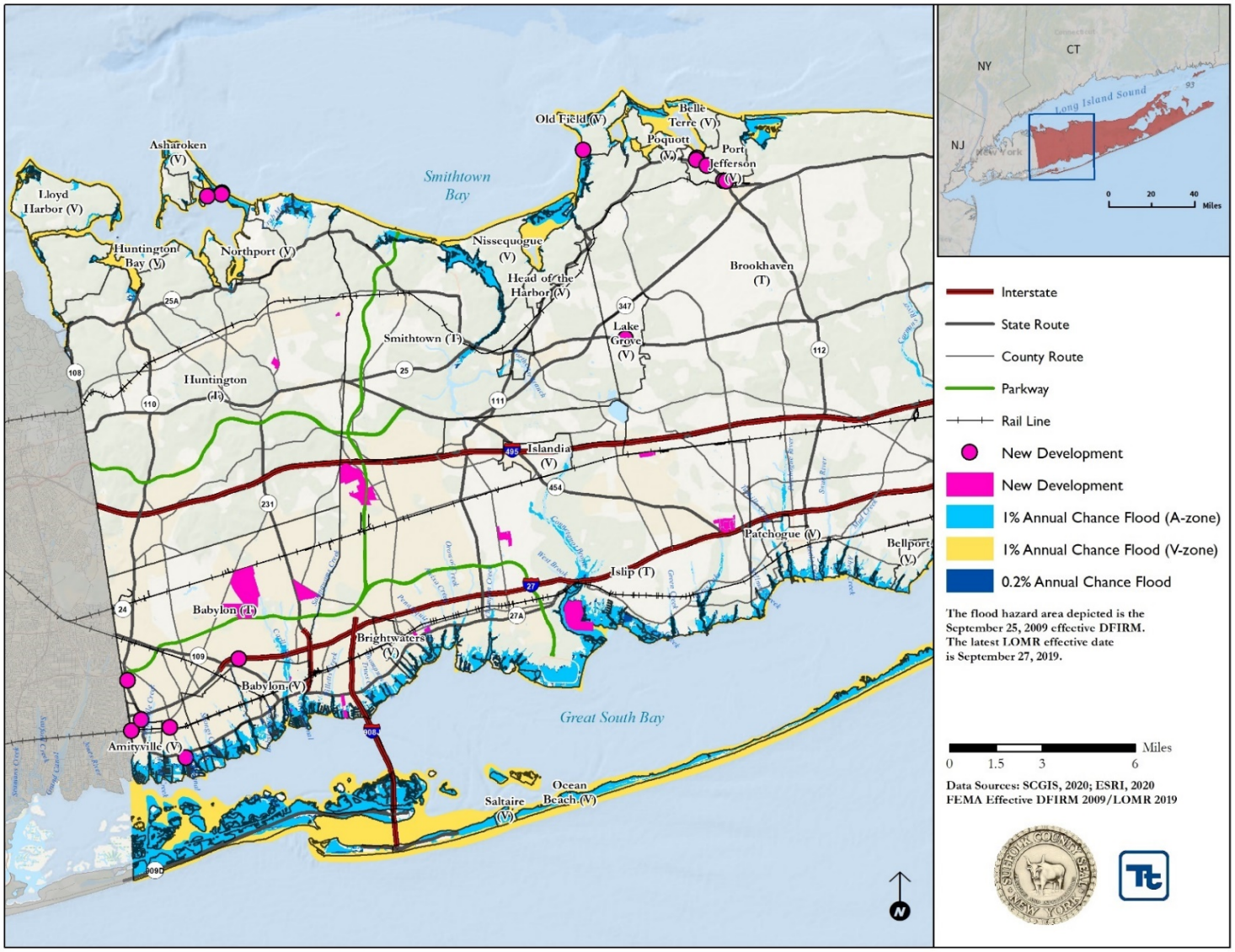


Figure 5.4.8-29. New Development and Flood Boundaries in Suffolk County - Central

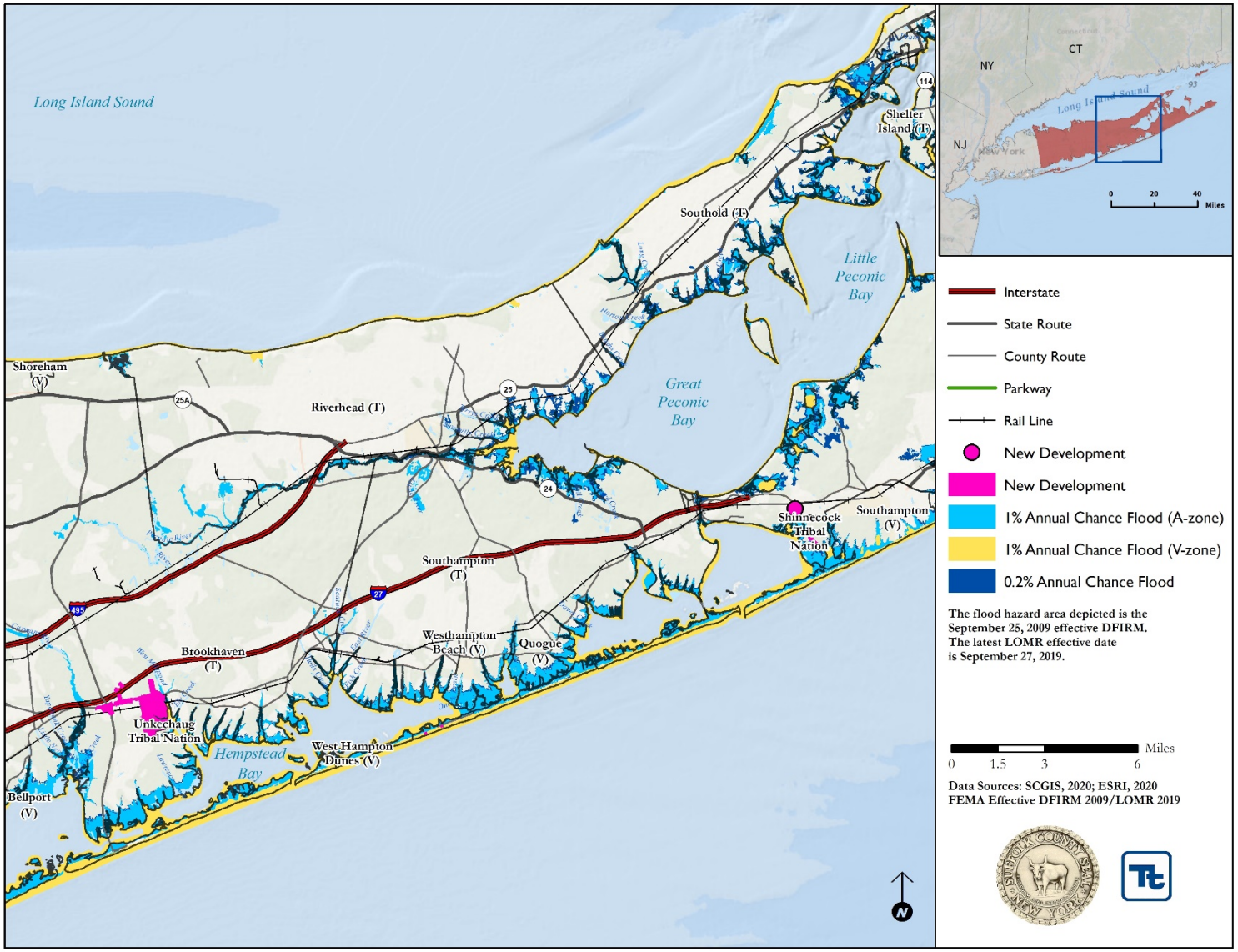


Figure 5.4.8-30. New Development and Flood Boundaries in Suffolk County - East

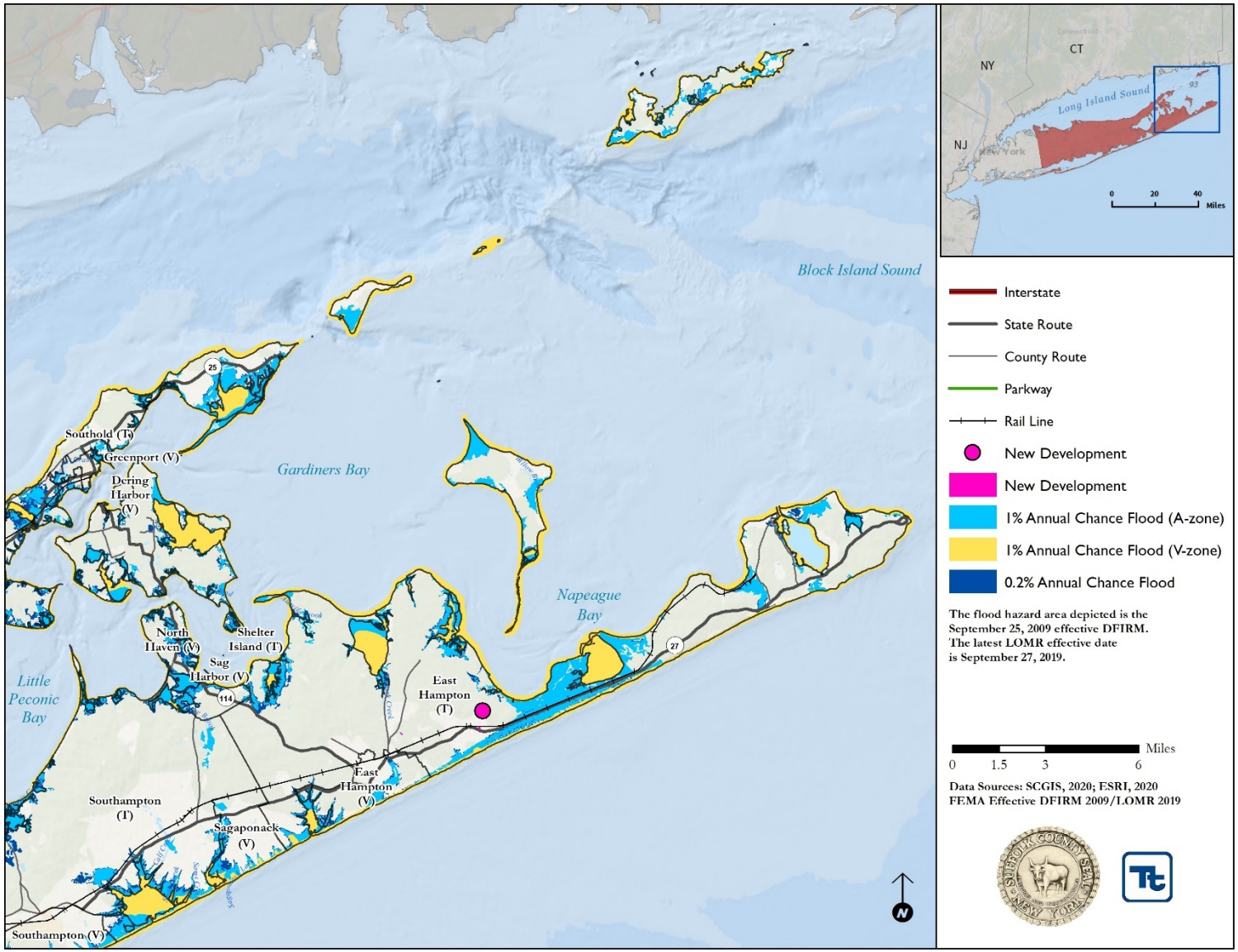


Figure 5.4.8-31. New Development and Sea Level Rise in Suffolk County - West

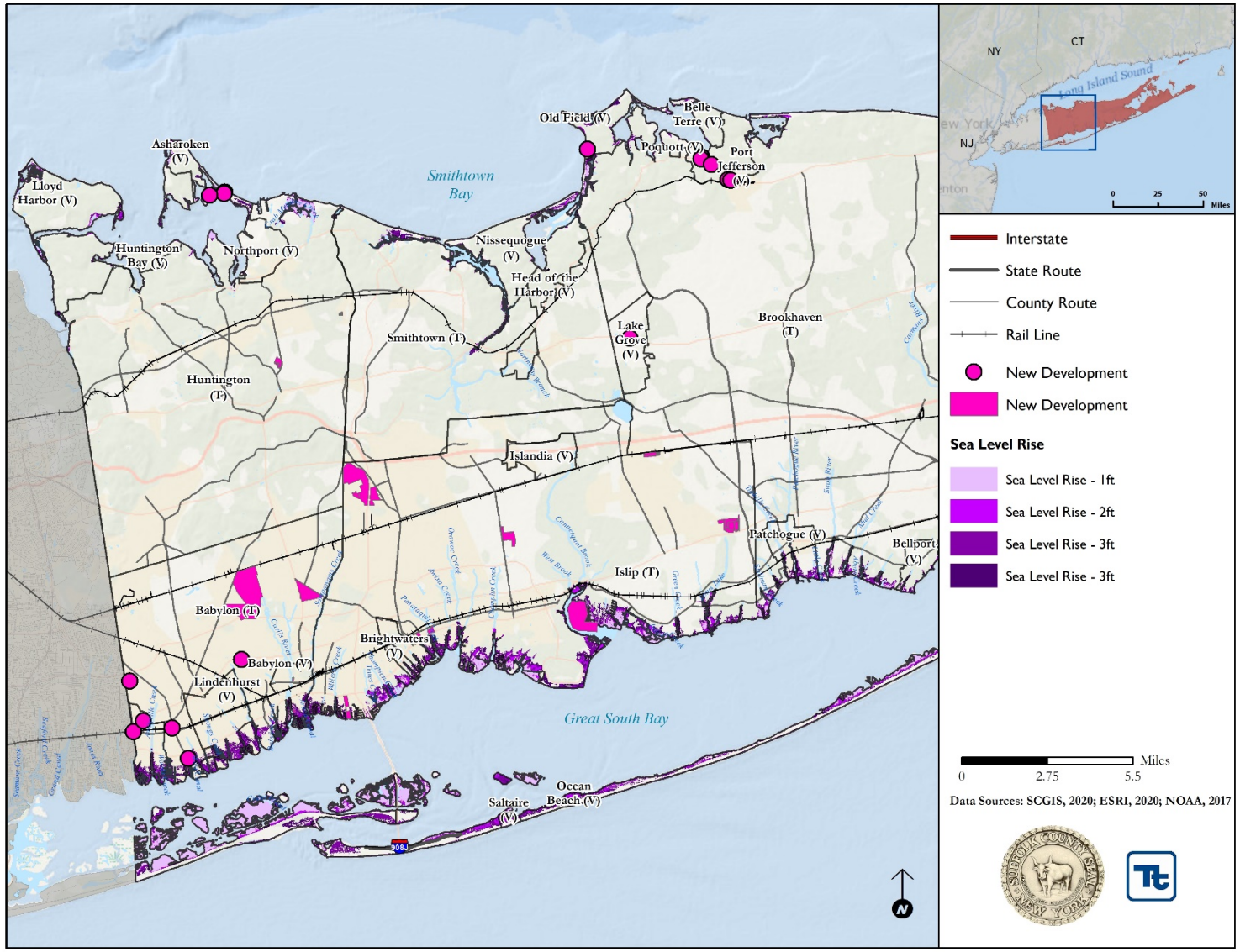


Figure 5.4.8-32. New Development and Sea Level Rise in Suffolk County - Central

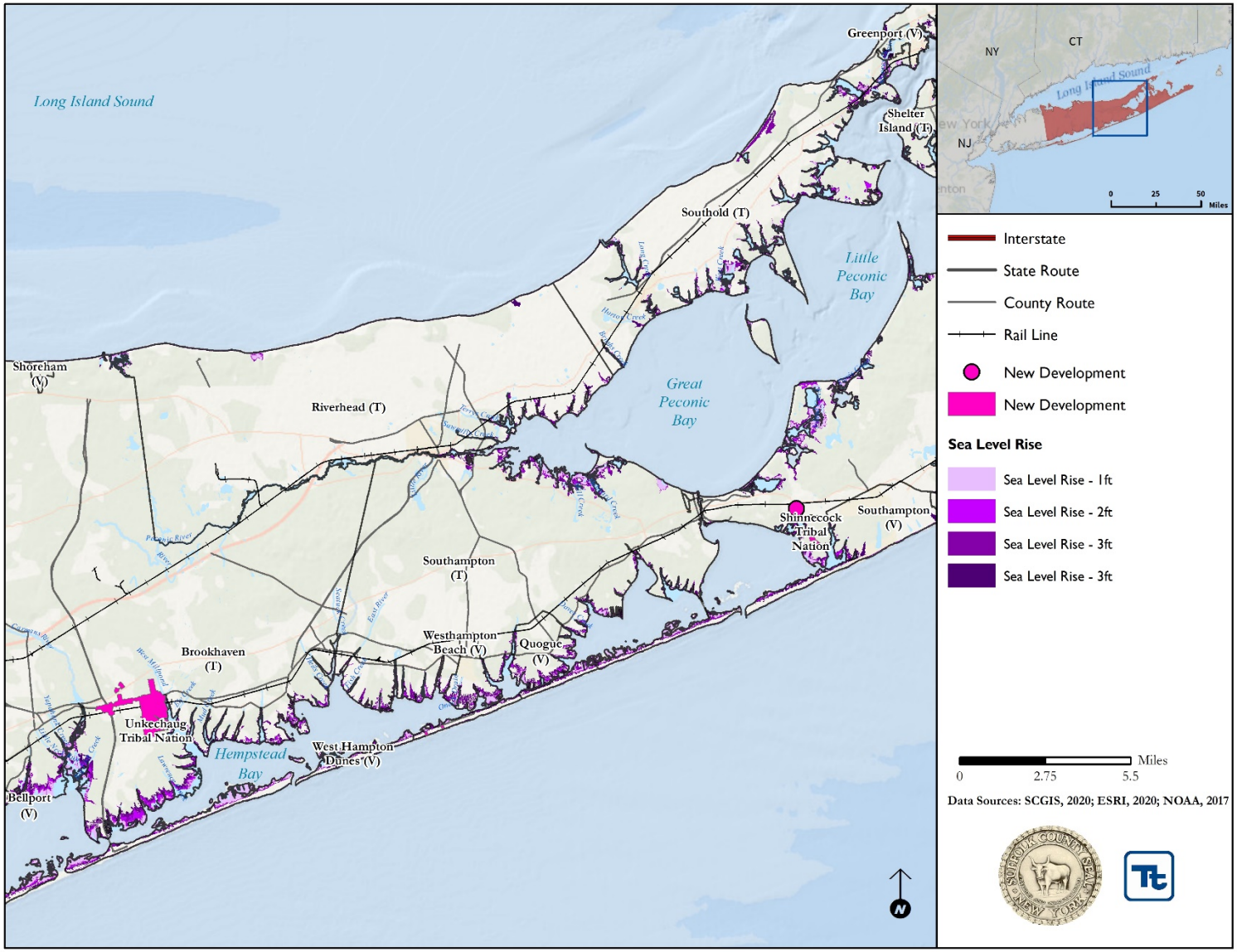


Figure 5.4.8-33. New Development and Sea Level Rise in Suffolk County - East