5.4.3 Disease Outbreak

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

Profile

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

Description

An outbreak or an epidemic occurs when new cases of a certain disease, in a given population, substantially exceed what is expected. An epidemic may be restricted to one locale, or it may be global, at which point it is called a pandemic. Pandemic is defined as a disease occurring over a wide geographic area and affecting a high proportion of the population. A pandemic can cause sudden, pervasive illness in all age groups on a local or global scale. A pandemic is a novel virus to which humans have no natural immunity that spreads from person-to-person. A pandemic will cause both widespread and sustained effects and is likely to stress the resources of both the State and federal government (NJOEM 2019).

Most disease outbreaks occur due to respiratory viruses. A respiratory virus with pandemic potential is a highly contagious respiratory virus that spreads easily from person to person and for which there is little human immunity. This hazard includes pandemic influenza. This hazard strains the healthcare system, requires school closures, causes high rates of illness and absenteeism that undermine critical infrastructure across the city, and decreases community trust due to social distancing measures interfering with personal movement and being perceived as being ineffectual. Previous events that exemplify this hazard include the 1918 ("Spanish flu") and 2009 ("Swine flu") influenza pandemics and the 2003 SARS outbreak, which had pandemic potential (NYC Emergency Management 2019).

In addition to respiratory viruses, diseases with new or emerging features can challenge control. Emerging diseases are difficult to contain or treat and present significant challenges to risk communication since mechanics of transmission, laboratory identification, and effective treatment protocols may be unknown (NYC Emergency Management 2019).

Of particular concern in Suffolk County are arthropod-borne viruses (arboviruses), which are viruses that are maintained in nature through biological transmission between susceptible hosts (mammals) and blood-feeding arthropods (mosquitos and ticks). These infections usually occur during warm weather months, when mosquitoes and ticks are active (NYS Department of Health 2017).

Mosquito-borne diseases are diseases that are spread through the bite of an infected female mosquito. Three of the most common mosquito-borne diseases recently impacting Suffolk County are: West Nile Virus (WNV), Eastern equine encephalitis (EEE) virus, and Zika virus. These diseases rely on mosquitos to spread. They become infected by feeding on birds carrying the virus; and then spread to humans and other animals when the mosquito bites them (NYS Department of Health 2017).

Tick-borne diseases are bacterial illnesses that spread to humans through infected ticks. These types of diseases rely on ticks for transmission. Ticks become infected by micro-organisms when feeding on small infected mammals (mice and voles). Different tick-borne diseases are caused by different micro-organisms, and it is possible to be infected with more than one tick-borne disease at a time. Anyone who is bitten by an infected tick may get a tick-borne disease. People who spend a lot of time outdoors have a greater risk of becoming infected. The three types of ticks in New York that may carry disease-causing micro-organisms are the Blacklegged Tick

(Ixodes scapularis) (also known as Deer Tick), Lone Star Tick (Amblyomma americanum), and the American dog tick (Dermacentor variabilis) (NYS Department of Health 2019). Blacklegged Ticks typically transmit Lyme disease, babesiosis, anaplasmosis, Borrelia miyamotoi disease and Powassan virus. Lone Star Ticks typically transmit ehrlichiosis, tularemia and Southern Tick Associated Rash Illness (STARI). Bites from lone star ticks can cause alpha-gal meat allergy which is an allergic reaction associated with consumption of red (mammalian) meat. American Dog Ticks typically transmit Rocky Mountain spotted fever and tularemia (Suffolk County 2020).

Not all tick-borne diseases are arboviruses. Lyme Disease is a bacterial infection and Babesiosis is a parasitic infection (NYS Department of Health 2017).

Foodborne illnesses occur as a result of pathogens or naturally occurring food toxins. According to NYS Foodborne Disease Surveillance Data from 2003-2017, 61% of contributing factors identified in foodborne illness outbreaks were from one of four issues:

- Infected person: A food handler, who was infected with a pathogen, transmitted the pathogen during food preparation.
- Contaminated ingredient: The food contained the pathogen when it arrived at the point of preparation.
- Naturally-occurring food toxins: The food naturally contained a chemical agent, or it bioaccumulated in the food prior to/after harvest, like those in finfish and wild mushrooms.
- Inadequate cooking: The food was not heated long enough at an adequate temperature to kill the pathogens (NYS Department of Health 2019 b).

Respiratory illness, foodborne illness, and other forms of disease outbreak can also occur as a result of bioterrorism.

For the purpose of this HMP update, the following diseases will be discussed in further detail: Mosquito borne: West Nile, Eastern Equine Encephalitis, St. Louis Encephalitis, La Crosse Encephalitis; Tick borne: Lyme Disease; Respiratory Viruses: Influenza, MERS-CoV, SARS, and Coronavirus; Ebola; Measles; Tuberculosis; and Hepatitis A.

West Nile Virus

West Nile Virus (WNV) encephalitis is a mosquito-borne viral disease, which can cause an inflammation of the brain. WNV is commonly found in Africa, West Asia, the Middle East and Europe. West Nile virus was first found in New York State in 1999. Since 2000, 490 human cases and 37 deaths of WNV have been reported statewide (NYS Department of Health 2019 c). In a small number of cases, WNV has been spread by blood transfusion, which has resulted in the screening of blood donations for the virus in the US, or by organ transplantation. WNV can also be spread from mother to baby during pregnancy, delivery, or breast-feeding in a small number of cases. The symptoms of severe infection (West Nile encephalitis or meningitis) can include headache, high fever, neck stiffness, muscle weakness, stupor, disorientation, tremors, seizures, paralysis, and coma. WNV can cause serious illness, and in some cases, death. Usually, symptoms occur from 3 to 14 days after being bitten by an infected mosquito (NYS Department of Health 2017 b).

Eastern Equine Encephalitis

Eastern equine encephalitis (EEE) is a virus disease of wild birds that is transmitted to horses and humans by mosquitoes. It is a rare but serious viral infection. EEE is a rare but serious and often fatal infection that causes encephalitis or inflammation of the brain (NYS Department of Health 2016). EEE is most common in the eastern half of the U.S. and is spread by the bite of an infected mosquito. EEE can affect humans, horses, and some birds. The risk of getting EEE is highest from late July through September. People at the greatest risk of

developing severe disease are those over 50 years of age and younger than 15 years of age (NYS Department of Health 2019 c).

St. Louis Encephalitis

St. Louis Encephalitis (SLE) is a rare but serious viral infection. It is transmitted to humans by the bite of an infected mosquito. Most cases of SLE disease have occurred in eastern and central states. Most persons infected with SLE have no apparent illness. Initial symptoms of those who become ill include fever, headache, nausea, vomiting, and tiredness. Severe neuroinvasive disease (often involving encephalitis, an inflammation of the brain) occurs more commonly in older adults (CDC 201 9d).

La Crosse Encephalitis

La Crosse Encephalitis (LAC) is transmitted to humans by the bite of an infected mosquito. Most cases of LAC occur in the upper Midwestern, mid-Atlantic and southeastern states. Many people infected with LAC have no apparent symptoms. Among people who become ill, initial symptoms include fever, headache, nausea, vomiting, and tiredness. Some of those who become ill develop severe neuroinvasive disease (CDC 2019 e).

Lyme Disease

Lyme disease is an illness caused by infection with the bacterium Borrelia burgdorferi, which is carried by ticks. The infection can cause a variety of symptoms and, if left untreated, can be severe. Lyme disease is spread to people by the bite of an infected tick. In New York, the commonly infected tick is the deer tick. Immature ticks become infected by feeding on infected white-footed mice and other small mammals. Deer ticks can also spread other tick-borne diseases. Anyone who is bitten by a tick carrying the bacteria can become infected (NYS Department of Health 2017 c).

Influenza

The risk of a global influenza pandemic has increased over the last several years. This disease is capable of claiming thousands of lives and adversely affecting critical infrastructure and key resources. An influenza pandemic has the ability to reduce the health, safety, and welfare of the essential services workforce; immobilize core infrastructure; and induce fiscal instability.

Pandemic influenza is different from seasonal influenza (or "the flu") because outbreaks of seasonal flu are caused by viruses that are already among people. Pandemic influenza is caused by an influenza virus that is new to people and is likely to affect many more people than seasonal influenza. In addition, seasonal flu occurs every year, usually during the winter season, while the timing of an influenza pandemic is difficult to predict. Pandemic influenza is likely to affect more people than the seasonal flu, including young adults. A severe pandemic could change daily life for a time, including limitations on travel and public gatherings (Barry-Eaton District Health Department 2013).

At the national level, the CDC's Influenza Division has a long history of supporting the World Health Organization (WHO) and its global network of National Influenza Centers (NIC). With limited resources, most international assistance provided in the early years was through hands-on laboratory training of in-country staff, the annual provision of WHO reagent kits (produced and distributed by CDC), and technical consultations for vaccine strain selections. The Influenza Division also conducts epidemiologic research including vaccine studies and serologic assays and provided international outbreak investigation assistance (CDC 2010).

Ebola Virus

Ebola, previously known as Ebola hemorrhagic fever, is a rare and deadly disease caused by infection with one of the Ebola virus strains. According to the CDC, the 2014 Ebola epidemic is the largest in history affecting

multiple countries in West Africa. Two imported cases, including one death, and two locally-acquired cases in healthcare workers have been reported in the United States. CDC and partners are taking precautions to prevent the further spread of Ebola in the United States (CDC 2014).

Measles

Measles is a highly contagious virus that lives in the nose and throat mucus of an infected person. It can spread to others through coughing and sneezing. Also, measles virus can live for up to two hours in an airspace where the infected person coughed or sneezed. If other people breathe the contaminated air or touch the infected surface, then touch their eyes, noses, or mouths, they can become infected. Measles is so contagious that if one person has it, 90% of the people close to that person who are not immune will also become infected (CDC 2017).

Tuberculosis

Tuberculosis (TB) is caused by a bacterium called Mycobacterium tuberculosis. The bacteria usually attack the lungs, but TB bacteria can attack any part of the body such as the kidney, spine, and brain. Not everyone infected with TB bacteria becomes sick. As a result, two TB-related conditions exist: latent TB infection (LTBI) and TB disease. If not treated properly, TB disease can be fatal (CDC 2016).

TB bacteria are spread through the air from one person to another. The TB bacteria are put into the air when a person with TB disease of the lungs or throat coughs, speaks, or sings. People nearby may breathe in these bacteria and become infected (CDC 2016).

Symptoms of TB disease depend on where in the body the TB bacteria are growing. TB bacteria usually grow in the lungs (pulmonary TB). TB disease in the lungs may cause symptoms such as a bad cough that lasts three weeks or longer, pain in the chest, and coughing up blood or sputum (phlegm from deep inside the lungs) .Other symptoms of TB disease include weakness or fatigue, weight loss, no appetite, chills, fever, and sweating at night (CDC 2016).

Hepatitis A

Hepatitis A is a vaccine-preventable, communicable disease of the liver caused by the hepatitis A virus (HAV). It is usually transmitted person-to-person through the fecal-oral route or consumption of contaminated food or water. Hepatitis A is a self-limited disease that does not result in chronic infection. Most adults with hepatitis A have symptoms, including fatigue, low appetite, stomach pain, nausea, and jaundice, that usually resolve within 2 months of infection; most children less than 6 years of age do not have symptoms or have an unrecognized infection. Antibodies produced in response to hepatitis A infection last for life and protect against reinfection. The best way to prevent hepatitis A infection is to get vaccinated (CDC 2019).

Coronavirus

Coronavirus disease (COVID-19) is an infectious disease first identified in 2019. The virus rapidly spread into a global pandemic by spring of 2020. Older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness (WHO 2020). With the virus being relatively new, information regarding transmission and symptoms of the virus is still new. The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes. Reported illnesses have ranged from mild symptoms to severe illness and death. Reported symptoms include trouble breathing, persistent pain or pressure in the chest, new confusion or inability to arouse, and bluish lips or face. Symptoms may appear 2-14 days after exposure to the virus (based on the incubation period of MERS-CoV viruses) (CDC 2020)

In an effort to slow the spread of the virus, the federal government and states have urged the public to avoid touching of the face, properly wash hands often, and use various social distancing measures. At the time of this

plan update, there are no specific vaccines or treatments for COVID-19. However, there are many ongoing clinical trials evaluating potential treatments (WHO 2020).

Camplyobacteriosis

Campylobacteriosis is a disease of the intestines caused by bacteria. People become infected by ingesting food or drink water that is contaminated with the bacteria. Most cases come from handling raw poultry, such as chicken. The bacteria are not typically spread from person to person. While outbreaks are not frequent, large outbreaks of Campylobacteriosis are usually related to unpasteurized milk or contaminated water (NYS Department of Health 2016 b).

Extent

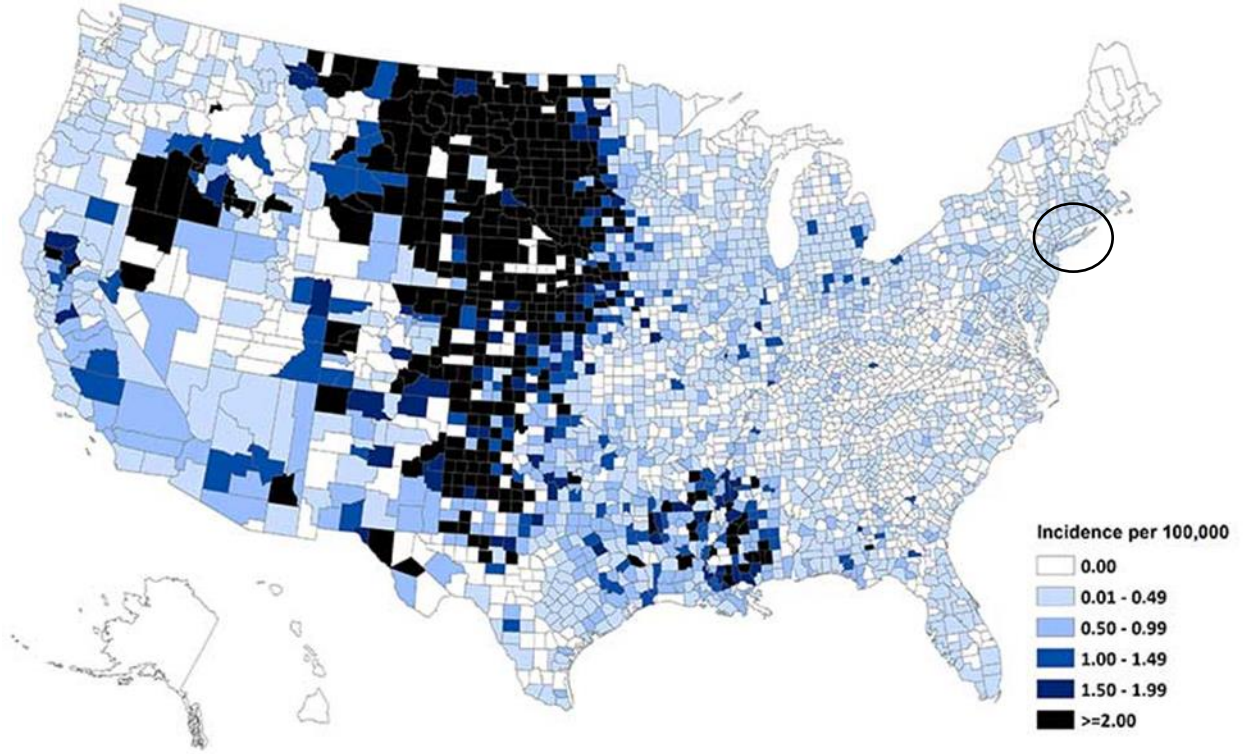
The exact size and extent of an infected population depends on how easily the illness is spread, the mode of transmission, and the amount of contact between infected and uninfected individuals. The transmission rates of pandemic illnesses are often higher in more densely populated areas. The transmission rate of infectious diseases will depend on the mode of transmission of a given illness.

The extent and location of disease outbreaks depends on the preferred habitat of the species, as well as the species' ease of movement and establishment. The magnitude of disease outbreaks species ranges from nuisance to widespread. The threat is typically intensified when the ecosystem or host species is already stressed, such as periods of drought. The already weakened state of the ecosystem causes it to more easily be impacted to an infestation. The presence of disease-carrying mosquitoes and ticks has been reported throughout most of New York and Suffolk County.

West Nile Virus

Since it was discovered in the western hemisphere, WNV has spread rapidly across North America, affecting thousands of birds, horses and humans. WNV swept from the New York City region in 1999 to almost all of the continental U.S., seven Canadian provinces and throughout Mexico and parts of the Caribbean by 2004. Figure 5.4.3-1 illustrates WNV activity in the U.S. from 1999-2018.

Figure 5.4.3-1. Average Annual Incidence of West Nile Virus Neuroinvasive Disease Reported to CDC by County, 1999-2018



Source: *CDC 2019b*
Note: *The circle indicates the approximate location of Suffolk County.*

Eastern Equine Encephalitis

In the State of New York, there has been eight cases of EEE from 2009-2018 (CDC 2019.)

St. Louis Encephalitis

In the State of New York, there have been no cases of St. Louis virus neuroinvasive disease from 2009-2018. However, nearby states have reported cases (CDC 2019).

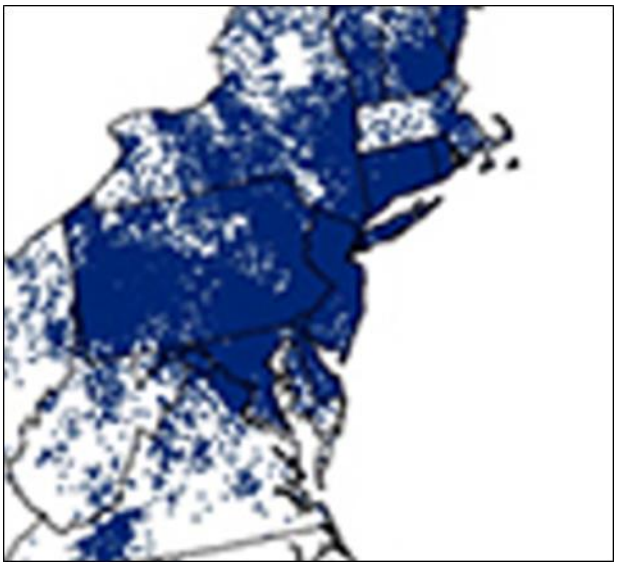
La Crosse Encephalitis

In the State of New York, there have been no cases of La Crosse virus neuroinvasive disease from 2009-2018. However, nearby states have reported cases (CDC 2019).

Lyme Disease

Lyme disease is the most commonly reported vector borne illness in the U.S. Between 2014 and 2018, there were 2,966 confirmed cases of Lyme disease in Suffolk County (NYS Department of Health 2019). Figure 5.4.3-2 shows the reported cases of Lyme disease in the northeast U.S. for 2018.

Figure 5.4.3-2. 2018 Reported Cases of Lyme Disease in the Northeast U.S.



Source: CDC 2019f
Note: The red circle indicates the approximate location of Suffolk County.

The CDC Division of Vector Borne Diseases (DVBD) indicated in 2018 that New York was the state with the third-highest number of confirmed Lyme disease cases, totaling approximately 2,886 cases (CDC 2019 g).

Influenza and Ebola

As noted above, the exact size and extent of an infected population depends on how easily the illness is spread, the mode of transmission, and the amount of contact between infected and uninfected individuals. The transmission rates of pandemic illnesses are often higher in more densely populated areas. The transmission rate of infectious diseases will depend on the mode of transmission of a given illness. The Ebola virus is spread to others through direct contact; it is not spread through the air like influenza. The severity of an influenza pandemic will be based on the virulence of the virus that presents itself (NYS Disaster Preparedness Commission 2020). The severity and length of the next pandemic cannot be predicted; however, experts expect that its effect on the United States could be severe.

In 1999, the WHO Secretariat published guidance for pandemic influenza and defined the six phases of a pandemic. Updated guidance was published in 2005 to redefine these phases. This schema is designed to provide guidance to the international community and to national governments on preparedness and response for pandemic threats and pandemic disease. Compared with the 1999 phases, the new definitions place more emphasis on pre-pandemic phases when pandemic threats may exist in animals or when new influenza virus subtypes infect people but do not spread efficiently. Because recognizing that distinctions between the two interpandemic phases and the three pandemic alert phases may be unclear, the WHO Secretariat proposes that classifications be determined by assessing risk based on a range of scientific and epidemiological data (WHO 2009). The WHO pandemic phases are outlined in Table 5.4.3-1.

Table 5.4.3-1. WHO Global Pandemic Phases

Phase	Description
Preparedness	
Phase 1	No viruses circulating among animals have been reported to cause infections in humans.

Phase	Description
Phase 2	An animal influenza virus circulating among domesticated or wild animals is known to have caused infection in humans and is therefore considered a potential pandemic threat.
Phase 3	An animal or human-animal influenza reassortant virus has caused sporadic cases or small clusters of disease in people but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks. Limited human-to-human transmission may occur under some circumstances, for example, when there is close contact between an infected person and an unprotected caregiver. However, limited transmission under such restricted circumstances does not indicate that the virus has gained the level of transmissibility among humans necessary to cause a pandemic.
Response and Mitigation Efforts	
Phase 4	Human infection(s) are reported with a new subtype, but no human-to-human spread or at most rare instances of spread to a close contact.
Phase 5	is characterized by human-to-human spread of the virus into at least two countries in one WHO region. While most countries will not be affected at this stage, the declaration of Phase 5 is a strong signal that a pandemic is imminent and that the time to finalize the organization, communication, and implementation of the planned mitigation measures is short.
Phase 6	the pandemic phase is characterized by community level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in Phase 5. Designation of this phase will indicate that a global pandemic is under way.

Source: WHO 2009

In New York, activities to be undertaken by pandemic period, use the World Health Organization's classification system. The Pandemic Influenza Plan describes activities which are designated as to whether they are the role of the state health department, local health department and/or providers and public health partners (NYS Department of Health 2006).

Measles

From 2014 to 2018, there was one confirmed case of Measles in Suffolk County (NYS Department of Health 2019d).

Tuberculosis

From 2014 to 2018, there were 151 confirmed cases of Tuberculosis in Suffolk County (NYS Department of Health 2019d).

Hepatitis A

From 2014 to 2018, there were 45 confirmed cases of Hepatitis A in Suffolk County (NYS Department of Health 2019d).

Location

New York and Suffolk County's geographic and demographic characteristics make it particularly vulnerable to importation and spread of infectious diseases. In terms of pandemic influenza, all counties may experience pandemic influenza outbreak caused by factors such as population density and the nature of public meeting areas and mass transportation (i.e., trains, buses). Densely populated areas will spread diseases quicker than less densely populated areas. Figure 5.4.3-3 through Figure 5.4.3-5 shows population density throughout the County. This figure indicates that Suffolk County contains many densely populated areas throughout the County. Additionally, much of the County can experience other diseases such as WNV due to the abundance of water bodies, which provide a breeding ground for infected mosquitos.

Figure 5.4.3-3. Population Density of Suffolk County – West

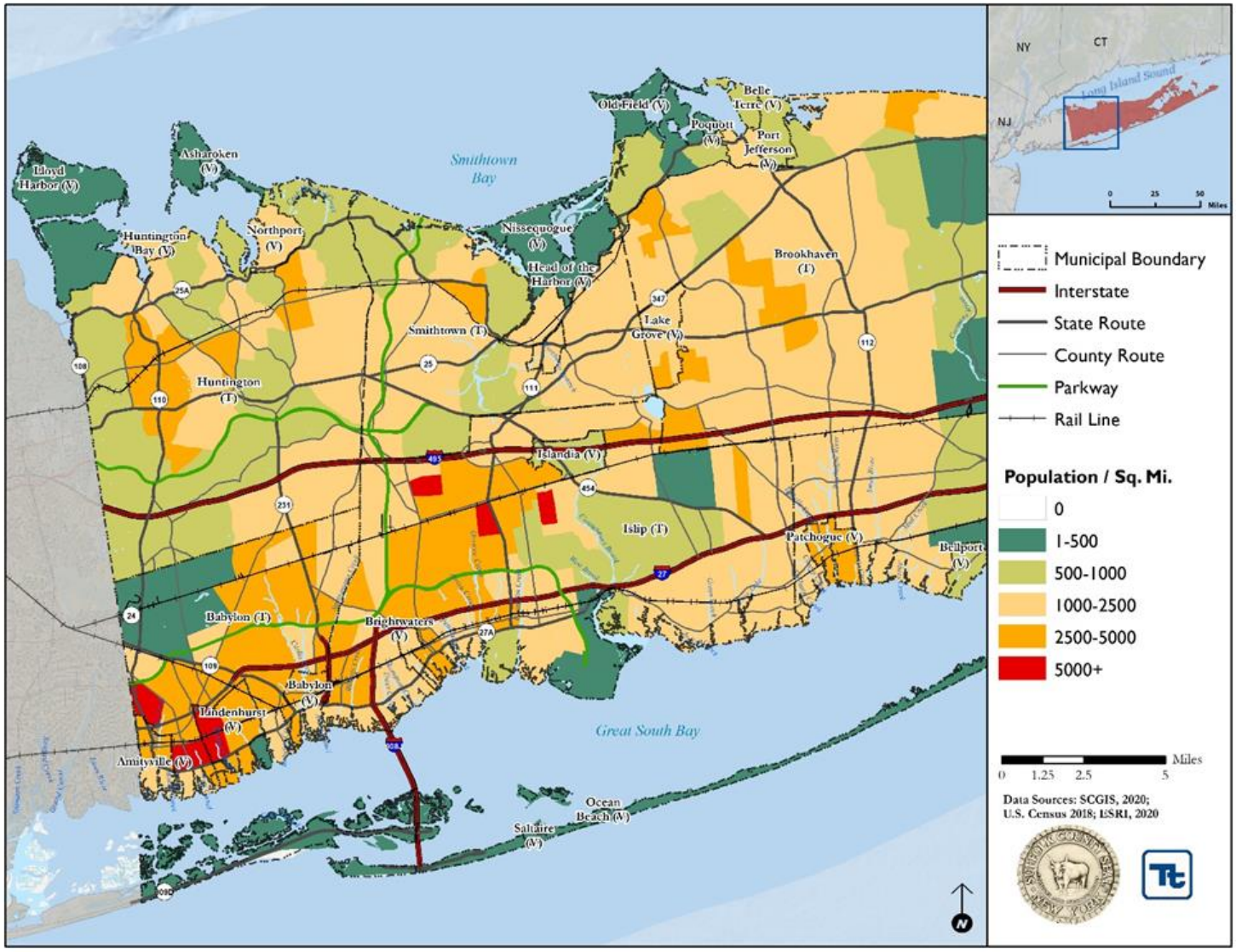


Figure 5.4.3-4. Population Density of Suffolk County – Central

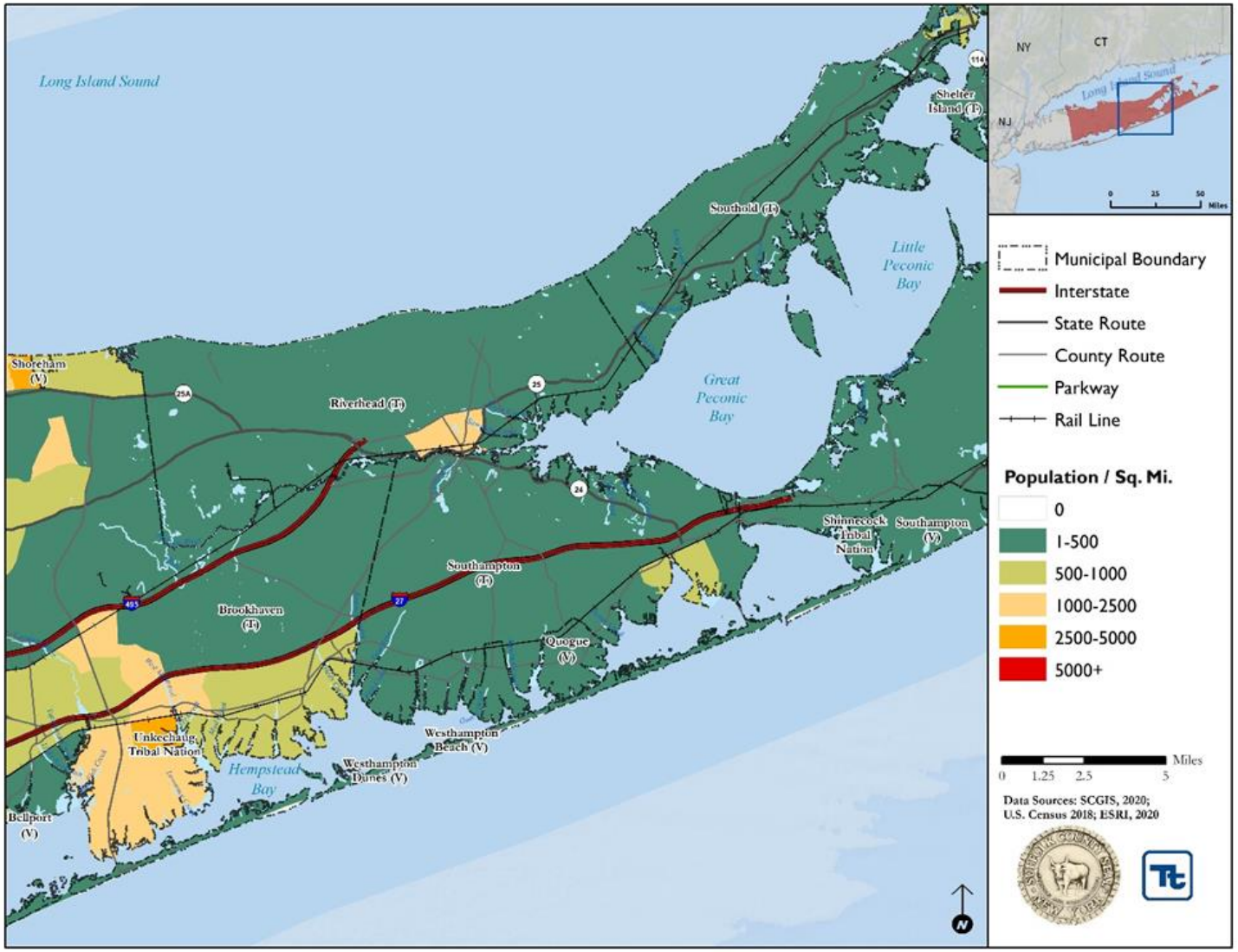
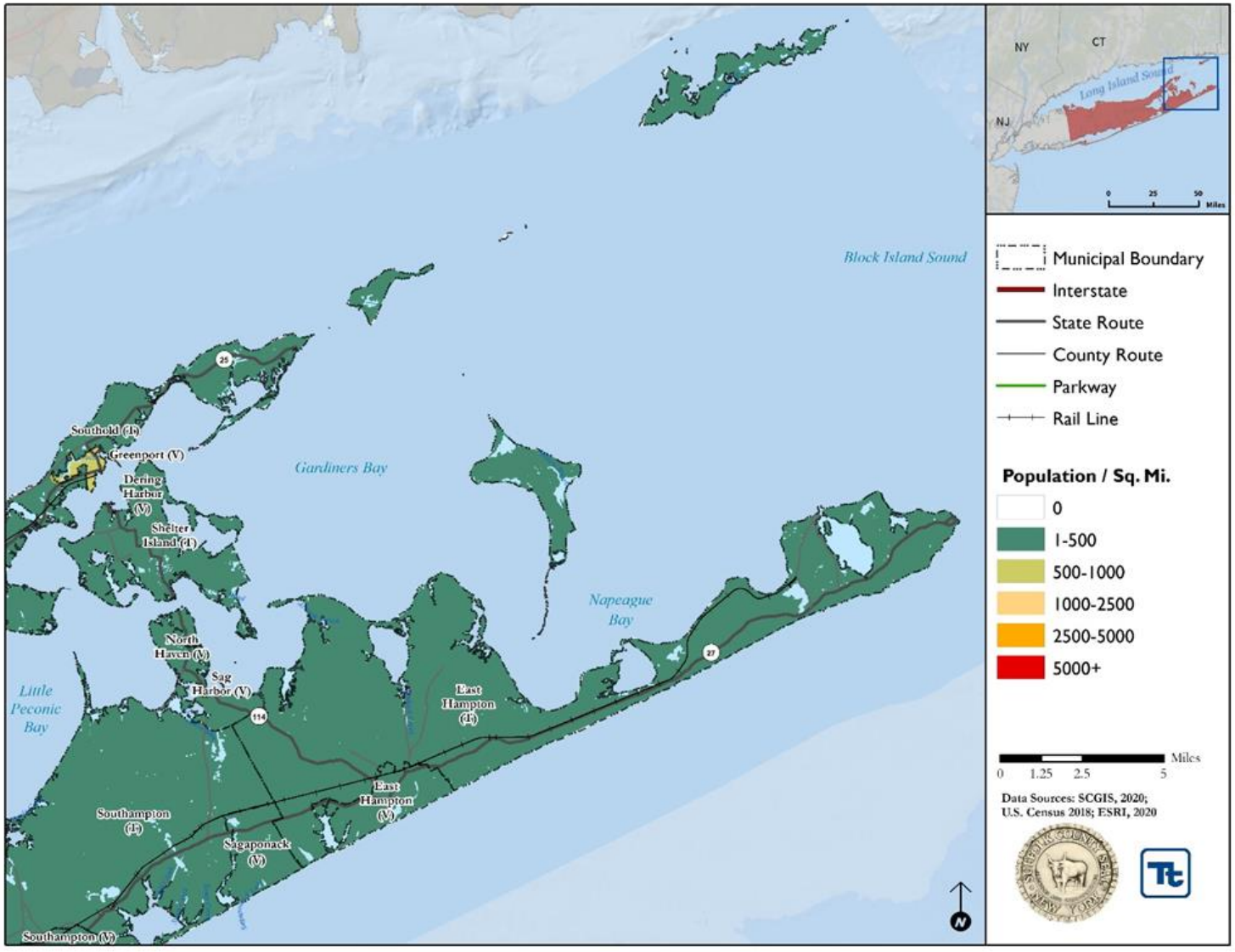


Figure 5.4.3-5. Population Density of Suffolk County – East



As the COVID-19 pandemic heavily impacted New York City and other metropolitan areas during 2020, many families within cities have relocated to more suburban and rural locations to maintain space from infection hotspots, more easily social distance, or have more residential space available during the quarantine period. While exact population statistics are unavailable for this time frame, County and municipal officials have noted many seasonal homes have been occupied and school enrollments have seen marked increases. It remains to be seen if this shift in population is temporary in nature and will reverse as the coronavirus pandemic subsides or if changes in population are likely to become permanent.

Previous Occurrences and Losses

Between 1954 and 2020, the State of New York was included in two disease outbreak-related emergency (EM) declarations; one for West Nile Virus and one for the coronavirus pandemic. The State was also included in a disaster (DR) declaration for the coronavirus pandemic. Generally, these disasters cover a wide region of the State; therefore, they may have impacted many counties. Suffolk County was included in all three of these declarations (FEMA 2020).

Table 5.4.3-2. Disease Outbreak-Related FEMA Declarations for Suffolk County, 1954 to August 2018

Date(s) of Event	FEMA Declaration Number	Event Type
May 22-November 1, 2000	EM-3155	New York Virus Threat (West Nile Virus)
January 20, 2020 and continuing	EM-3434	New York Covid-19
January 20, 2020 and continuing	DR-4480	New York Covid-19 Pandemic

Source: FEMA 2020

Known disease outbreak events that have impacted Suffolk County between 2014 and 2020 are identified in Table 5.4.3-3.

Table 5.4.3-3. Disease Outbreak Events in Suffolk County, 2014 to 2020

Date(s) of Event	Disease Type	FEMA Declaration Number (if applicable)	Suffolk County Designated?	Description
2014	Camplyobacteriosis	N/A	N/A	The New York State Health Department reported 265 cases of camplyobacteriosis in Suffolk County in 2014.
2014	Encephalitis (non-WNV)	N/A	N/A	The New York State Health Department reported 6 cases of encephalitis in Suffolk County in 2014.
2014	Hepatitis A	N/A	N/A	The New York State Health Department reported 6 cases of Hepatitis A in Suffolk County in 2014.
2014	Laboratory Confirmed Influenza	N/A	N/A	The New York State Health Department reported 3,798 cases of Influenza in Suffolk County in 2014.
2014	Lyme Disease	N/A	N/A	The New York State Health Department reported 654 cases of Lyme Disease in Suffolk County in 2014.
2014	Tuberculosis	N/A	N/A	The New York State Health Department reported 35 cases of Tuberculosis in Suffolk County in 2014.
2015	Camplyobacteriosis	N/A	N/A	The New York State Health Department reported 290 cases of camplyobacteriosis in Suffolk County in 2015.
2015	Encephalitis (non-WNV)	N/A	N/A	The New York State Health Department reported 3 cases of encephalitis in Suffolk County in 2015.
2015	Hepatitis A	N/A	N/A	The New York State Health Department reported 5 cases of Hepatitis A in Suffolk County in 2015.
2015	Laboratory Confirmed Influenza	N/A	N/A	The New York State Health Department reported 2,034 cases of Influenza in Suffolk County in 2015.
2015	Lyme Disease	N/A	N/A	The New York State Health Department reported 669 cases of Lyme Disease in Suffolk County in 2015.
2015	Tuberculosis	N/A	N/A	The New York State Health Department reported 24 cases of Tuberculosis in Suffolk County in 2015.
2015	West Nile Virus	N/A	N/A	The New York State Health Department reported 3 cases of West Nile Virus in Suffolk County in 2015.
2016	Camplyobacteriosis	N/A	N/A	The New York State Health Department reported 243 cases of camplyobacteriosis in Suffolk County in 2016.
2016	Encephalitis (non-WNV)	N/A	N/A	The New York State Health Department reported 9 cases of encephalitis in Suffolk County in 2016.
2016	Hepatitis A	N/A	N/A	The New York State Health Department reported 8 cases of Hepatitis A in Suffolk County in 2016.

Date(s) of Event	Disease Type	FEMA Declaration Number (if applicable)	Suffolk County Designated?	Description
2016	Laboratory Confirmed Influenza	N/A	N/A	The New York State Health Department reported 3,559 cases of Influenza in Suffolk County in 2016.
2016	Lyme Disease	N/A	N/A	The New York State Health Department reported 644 cases of Lyme Disease in Suffolk County in 2016.
2016	Tuberculosis	N/A	N/A	The New York State Health Department reported 34 cases of Tuberculosis in Suffolk County in 2016.
2016	West Nile Virus	N/A	N/A	The New York State Health Department reported 4 cases of West Nile Virus in Suffolk County in 2016.
2016	Zika Virus	N/A	N/A	The New York State Health Department reported 66 cases of Zika Virus in Suffolk County in 2016.
2017	Camplyobacteriosis	N/A	N/A	The New York State Health Department reported 270 cases of camplyobacteriosis in Suffolk County in 2017.
2017	Encephalitis (non-WNV)	N/A	N/A	The New York State Health Department reported 6 cases of encephalitis in Suffolk County in 2017.
2017	Hepatitis A	N/A	N/A	The New York State Health Department reported 15 cases of Hepatitis A in Suffolk County in 2016.
2017	Laboratory Confirmed Influenza	N/A	N/A	The New York State Health Department reported 4,400 cases of Influenza in Suffolk County in 2017.
2017	Lyme Disease	N/A	N/A	The New York State Health Department reported 523 cases of Lyme Disease in Suffolk County in 2017.
2017	Measles	N/A	N/A	The New York State Health Department reported 1 case of Measles in Suffolk County in 2017.
2017	Tuberculosis	N/A	N/A	The New York State Health Department reported 34 cases of Tuberculosis in Suffolk County in 2017.
2017	Zika Virus	N/A	N/A	The New York State Health Department reported 13 cases of Zika Virus in Suffolk County in 2017.
2018	Camplyobacteriosis	N/A	N/A	The New York State Health Department reported 317 cases of camplyobacteriosis in Suffolk County in 2018.
2018	Encephalitis (non-WNV)	N/A	N/A	The New York State Health Department reported 21 cases of encephalitis in Suffolk County in 2018.
2018	Hepatitis A	N/A	N/A	The New York State Health Department reported 11 cases of Hepatitis A in Suffolk County in 2018.
2018	Laboratory Confirmed Influenza	N/A	N/A	The New York State Health Department reported 8,341 cases of Influenza in Suffolk County in 2018.

Date(s) of Event	Disease Type	FEMA Declaration Number (if applicable)	Suffolk County Designated?	Description
2018	Lyme Disease	N/A	N/A	The New York State Health Department reported 476 cases of Lyme Disease in Suffolk County in 2018.
2018	Tuberculosis	N/A	N/A	The New York State Health Department reported 24 cases of Tuberculosis in Suffolk County in 2018.
2018	West Nile Virus	N/A	N/A	The New York State Health Department reported 7 cases of West Nile Virus in Suffolk County in 2018.
2018	Zika Virus	N/A	N/A	The New York State Health Department reported 3 cases of Zika Virus in Suffolk County in 2018.
Spring 2020	Coronavirus	EM 3434, DR-4480	Yes	Spread of novel coronavirus (COVID-19) led to an emergency declaration and disaster declaration, New York State social distancing requirements, shutdown of non-essential businesses, and the declaration of a global pandemic by the World Health Organization. As of July 2020, Suffolk County had reported 40,000 confirmed cases and close to 2,000 deaths. New coronavirus cases and associated deaths were decreasing in New York State and Suffolk County and restrictions were being eased. However, as cases increase in other states, fears of a resurgence in cases persists.

Source: New York Department of Health 2019; FEMA 2020, WHO 2020
N/A Not Available
WNV West Nile Virus

With disease outbreak documentation for New York and Suffolk County being so extensive, not all sources have been identified or researched. Therefore, Table 5.4.3-3 may not include all events that have occurred in the County. Statistics from the 2020 Coronavirus pandemic were subject to change day to day.

Probability of Future Occurrences

It is difficult to predict when the next disease outbreak will occur and how severe it will be because viruses are always changing. The United States and other countries are constantly preparing to respond to pandemic. The Department of Health and Human Services and others are developing supplies of vaccines and medicines. In addition, the United States has been working with the WHO and other countries to strengthen detection of disease and response to outbreaks. Preparedness efforts are ongoing at the national, State, and local level (NJOEM 2019).

In Suffolk County, the probability for a future disease outbreak event is dependent on several factors. One factor that influences the spread of disease is population density. Populations that live close to one another are more likely to spread diseases. As population density increases in the County, so too will the probability of a disease outbreak event occurring.

All of the critical components necessary to sustain the threat of mosquito-borne disease in Suffolk County have been clearly documented. Instances of the WNV have been generally decreasing throughout the Northeast because of aggressive planning and eradication efforts, but some scientists suggest that as global temperatures rise and extreme weather conditions emerge from climate change, the range of the virus in the United States will grow. While instances of Zika have decreased since the outbreak in 2016, there is still the possibility of an outbreak occurring in the future. Therefore, based on all available information and available data regarding mosquito populations, it is anticipated that mosquito-borne diseases will continue to be a threat to Suffolk County.

Disease-carrying ticks will continue to inhabit the northeast, including Suffolk County, creating an increase in Lyme disease and other types of infections amongst the county population if not controlled or prevented. Ecological conditions favorable to Lyme disease, the steady increase in the number of cases, and the challenge of prevention predict that Lyme disease will be a continuing public health concern. Personal protection measures, including protective clothing, repellents or acaricides, tick checks, and landscape modifications in or near residential areas, may be helpful. However, these measures are difficult to perform regularly throughout the summer. Attempts to control the infection on a larger scale by the eradication of deer or widespread use of acaricides, which may be effective, have had limited public acceptance. New methods of tick control, including host-targeted acaricides against rodents and deer, are being developed and may provide help in the future (Steere, Coburn, and Glickstein 2004).

Currently and in the future, control of Lyme disease will depend primarily on public and physician education about personal protection measures, signs and symptoms of the disease, and appropriate antibiotic therapy. Based on available information and the ongoing trends of disease-carrying tick populations, it is anticipated that Lyme disease infections and other tick-borne diseases will continue to be a threat to Suffolk County.

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 Steering and Planning Committees, the probability of occurrence for disease outbreaks in the County is considered ‘frequent’.

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. 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. 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). Increased rainfall and heavy rainfalls increase the chances of standing water where mosquitos breed.

The relationship between climate change and increase in infectious diseases is difficult to predict with certainty, there are scientific linkages between the two. As warm habitats that host insects such as mosquitoes increase, more of the population becomes exposed to potential virus threats (The Washington Post 2017). The notion that rising temperatures will increase the number of mosquitoes that can transmit diseases such as WNV and Zika among humans (rather than just shift their range) has been the subject of debate over the past decade. Some believe that climate change may affect the spread of disease, while others are not convinced. However, many researchers point out that climate is not the only force at work in increasing the spread of infectious diseases into the future (NJOEM 2019).

Vulnerability Assessment

To understand risk, a community must evaluate what assets are exposed or vulnerable to the identified hazard. The following discusses Suffolk County's vulnerability, in a qualitative nature, to the disease outbreak hazard.

Impact on Life, Health and Safety

The entire population of Suffolk County is vulnerable to the disease outbreak hazard. Due to a lack of quantifiable loss information, a qualitative assessment was conducted to evaluate the assets exposed to this hazard and the potential impacts associated with this hazard. Healthcare providers and first responders have an increased risk of exposure due to their frequent contact with infected populations. Areas with a higher population density also have an increased risk of exposure or transmission of disease to do the closer proximity of population to potentially infected people.

Most recently with COVID-19, the CDC indicated that persons over 65 years and older, persons living in a nursing home or long-term care facility, and persons with underlying medical conditions such as diabetes, severe obesity, serious heart conditions, etc. are at a higher risk of getting severely ill (CDC 2020 b). Population data from the 2018 5-year American Community Survey indicates that 239,284 persons over 65 years old in Suffolk County would be considered at risk for getting severely ill from the COVID-19 virus. While the statistics of this virus are subject to change during the publication of this HMP, the New York Department of Health dashboard shows that there is a higher percent of illnesses within the mentioned age group and that Suffolk County is within the top five Counties experiencing the greatest number of outbreaks (NJ 2020).

Impact on General Building Stock

No structures are anticipated to be directly affected by disease outbreaks.

Impact on Critical Facilities

Hospitals and medical facilities will likely see an increase in patients, but it is unlikely that there will be damages or interruption of services. However, large rates of infection may result in an increase in the rate of hospitalization which may overwhelm hospitals and medical facilities and lead to decreased services for those seeking medical attention. The 2020 coronavirus pandemic has led to overwhelmed hospitals in numerous hotspots.

Impact on Economy

The impact disease outbreaks have on the economy and estimated dollar losses are difficult to measure and quantify. Costs associated with the activities and programs implemented to conduct surveillance and address disease outbreaks have not been quantified in available documentation. Instead, activities and programs implemented by the County to address this hazard are described below, all of which could impact the local economy.

In Suffolk County, numerous Towns and Villages have instituted a pest management program which provides a balanced approach to controlling ticks and mosquitos and reducing the annoyance and threat of disease carried by these insects. Most recently, the Health Department has played an active role in maintaining and controlling COVID-19 protocols across the State. This activity requires additional costs from the State and County to manage COVID-19 in communities. Further, there has been secondary economic impact of closing non-essential facilities to reduce the spread of the virus. The final costs of this virus are still to be determined.

Impact on Environment

Disease outbreaks may have an impact on the environment if the outbreaks are caused by invasive species. Invasive species tend to be competitive with native species and their habitat and can be the major transmitters of disease like Zika, dengue, and yellow fever (Placer Mosquito and Vector Control District 2019). Secondary impacts from mitigating disease outbreaks could also have an impact on the environment. Pesticides used to control disease carrying insects like mosquitos have been reviewed by the EPA and the New York Department of Environmental Conservation. If these sprays are applied in large concentrations, they could potentially leach into waterways and harm nearby terrestrial species. As a result, pesticides must be registered before they can be sold, distributed, or used in the state (New York Department of Environmental Conservation 2020).

Cascading Impacts on Other Hazards

There are no known cascading impacts that disease outbreaks can cause to other hazards of concern for Suffolk County.

Future Changes that May Impact Vulnerability

Understanding future changes that may impact vulnerability in the county can assist in planning for future development and ensuring that appropriate mitigation, planning, and preparedness measures are in place. The county considered the following factors that may affect hazard vulnerability:

- Potential or projected development.
- Projected changes in population.
- Other identified conditions as relevant and appropriate, including the impacts of climate change.

Projected Development

As discussed in Section 4, areas targeted for future growth and development have been identified across the County. Any areas of growth could be potentially impacted by the disease outbreak hazard because the entire planning area is exposed and vulnerable. Additional development of structures in close proximity to waterbodies or areas with high population density are at an increased risk. Please refer to the specific areas of development indicated in tabular form and/or on the hazard maps included in the jurisdictional annexes in Volume II, Section 9 of this plan.

Projected Changes in Population

According to the Suffolk County Department of Economic Development and Planning'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, but it is important to note that the population is aging (Suffolk County 2017). Since vulnerable populations (i.e., persons over 65) are increasing throughout the County, it can be assumed that more persons are at greater risk of impacts from disease outbreaks. Furthermore, changes in the density of population when households move throughout the County could influence the number of persons exposed to disease outbreaks. Higher density jurisdictions are not only at risk of greater exposure to disease outbreak, density may also reduce available basic services provided by critical facilities such as hospitals and emergency facilities for persons that are not affected by a disease.

As noted earlier in this section, the County has seen a shift in population with increases marked in school districts as a result of the emergence of COVID-19. This is assumed to be due to residents located in metropolitan areas looking to relocate to more suburban and rural locations to decrease their exposure. Exact population changes across the County are unavailable for this time frame however, the following has been shared by municipal officials: Quogue Schools were up 60% in enrollment as of the start of the 2020 academic school year and Amagansett reported a 100% increase. It remains to be seen if this shift in population is temporary in nature and will reverse as the coronavirus pandemic subsides or if changes in population are likely to become permanent.

Climate Change

As discussed earlier in this section, the relationship between climate change and increase in infectious diseases is difficult to predict with certainty, however there may be linkages between the two. Changes in the environment may create a more livable habitat for vectors carrying disease as suggested by the Centers for Disease Control and Prevention (CDC n.d.). Localized changes in climate and human interaction may also be a factor in the spread of disease.

The relationship between climate change and infectious diseases is somewhat controversial. The notion that rising temperatures will increase the number of mosquitoes that can transmit malaria among humans (rather than just shift their range) has been the subject of debate over the past decade. Some believe that climate change may affect the spread of disease, while others are not convinced. However, many researchers point out that climate is not the only force at work in increasing the spread of infectious diseases into the future. Other factors, such as expanded rapid travel and evolution of resistance to medical treatments, are already changing the ways pathogens infect people, plants, and animals. As climate change accelerates it is likely to work synergistically with many of these factors, especially in populations increasingly subject to massive migration and malnutrition (Harmon 2010).

Change of Vulnerability Since the 2014 HMP

Disease outbreak is a new hazard profile for the 2020 HMP update.