- Food, Water, Shelter
- Energy
- Hazardous Materials

4.3.9 Erosion

Erosion is the gradual wearing away of soil, rock, or sediment by wind, water, or human activity. In New Castle County, erosion is most significant along riverbanks, tidal shorelines, and areas under development. Left unmanaged, erosion can lead to land loss, property damage, and degradation of natural habitats, while also threatening infrastructure such as roads and levees.

Location and Extent

Erosion in New Castle County primarily affects riverbanks, the Delaware Bay shoreline, and areas along tributaries of the Christina and Brandywine Rivers. Soil erosion can also occur along steep slopes and construction sites.

Range of Magnitude

- Minor erosion: gradual soil loss, localized property impact.
- Moderate erosion: noticeable bank retreat, damage to landscaping or minor infrastructure.
- Severe erosion: loss of land, structural damage, or failure of flood protection measures.

Past Occurrence

Erosion has historically impacted low-lying riverfront areas and Delaware Bay shores. Notable effects have occurred during flooding and storm events, leading to loss of shoreline, property damage, and occasional road closures.

According to Delaware Coastal Management Program (DCMP) Section 309 Enhancement Program 2021-2025 Assessment and Strategy, Delaware has experienced relatively little coastal shoreline change in the past five years (2016-2020) as a result of development.

Future Occurrence

Erosion is expected to continue, particularly in areas with high development pressure and along rivers and tidal shorelines. Sea-level rise may exacerbate coastal and riverine erosion.

Vulnerability Assessment

Inventory and summary of vulnerable assets

Erosion primarily threatens riverbanks, tidal shorelines, and areas of steep terrain or development. Residential properties, infrastructure (roads, bridges, levees), and natural habitats in low-lying and shoreline areas are most vulnerable.

Potential Impacts

While erosion is unlikely to halt future development, it can increase maintenance costs and result in property and environmental loss. Vulnerable populations in waterfront or flood-prone areas may experience disproportionate impacts.

The FEMA Community Lifelines most likely to be impacted include:

- Safety and Security
- Food, Water, and Shelter
- Energy

4.3.10 Drought/Extreme Heat

Drought is defined as a deficiency of precipitation experienced over an extended period of time, usually a season or more. Droughts increase the risk of other hazards, like wildfires, flash floods, landslides, or debris flows.

A Drought is the result of a natural reduction in precipitation expected to fall over a period of time and is generally defined by three categories:

- A *meteorological drought* occurs when there is a deficiency in atmospheric moisture. Depending on pre-drought conditions, a meteorological drought typically has little effect on crops or water resources.
- A more serious drought is an *agricultural drought*, which occurs when the lack of sufficient moisture starts to inhibit crop growth.
- Should an agricultural drought last on the order of months, it could develop into a *hydrologic drought*. The hydrologic drought is the most devastating of the three types, as water resources can become significantly depleted and crops can be greatly damaged.

Location and Extent

The current climate in Delaware, when compared to many other states across the U.S., is generally water-rich. However, like all other states, Delaware is subject to periodic droughts that impact the State's ability to meet all of its water needs. Droughts are regional climatic events that can impact large areas ranging from several counties in Delaware to the entire mid-Atlantic region. While large geographic areas can be impacted by a given drought, areas with extensive agricultural land use can experience particularly significant impacts.

Range of Magnitude

Droughts can have varying effects, depending upon what month they occur, severity, duration, and location. Some droughts may have their greatest impact on agriculture, and even short-term droughts, when coupled with extreme temperatures, can be devastating.Drought events are defined by rainfall amounts, vegetation conditions, soil-moisture conditions, water levels in reservoirs, stream flow, agricultural productivity, or economic impacts.

Wildfires are often the most severe secondary effect associated with drought. Wildfires can devastate wooded and agricultural areas, threatening natural resources, structures near high wildfire loads, and farm production facilities. Prolonged drought conditions can have a lasting impact on the economy and can cause major ecological changes, such as increases in scrub growth, flash flooding, and soil erosion.

Long-term water shortages during severe drought conditions can have a significant impact on agribusiness, public utilities, and other industries reliant on water for production services.

Table 4.32 - Palmer Drought Severity Index) - a soil moisture algorithm calibrated for relatively homogeneous regions, which measures dryness based on recent precipitation and temperature.

Table 4.32 Palmer Drought Severity Index

Palmer Drought Severity Index	
Severity Category	PDSI
Extremely wet	4.0 or more
Very wet	3.0 to 3.99
Moderately wet	2.0 to 2.99
Slightly wet	1.0 to 1.99
Incipient wet spell	0.5 to 0.99
Near normal	0.49 to -0.49
Incipient dry spell	-0.5 to -0.99
Mild drought	-1.0 to -1.99
Moderate drought	-2.0 to -2.99
Severe drought	-3.0 to -3.99
Extreme drought	-4.0 or less

U.S. Drought Monitor uses the following five stages to describe and manage droughts.

Table 4.33 Drought Intensity Scale

Category	Description	Possible Impacts	Palmer Drought Severity Index (PDSI)
D0	Abnormally Dry	Going into a drought: • Short-term dryness slowing planning, growth of crops and pastures. Coming out of a drought: • Some lingering water deficits • Pastures or crops not fully recovered	-1.0 to -1.9
D1	Moderate Drought	• Some damage to crops and pastures. • Streams, reservoirs, or wells are low, some water shortage development or imminent. • Voluntary water-used restrictions	-2. To -2.9
D2	Severe Drought	• Crop or pasture losses likely. • Water shortages common • Water restrictions imposed	-3.0 to -3.9
D3	Extreme Drought	• Major crop/pasture losses • Widespread water shortages or restrictions	-4.0 to -4.9
D4	Exceptional Drought	• Exceptional and widespread crop/pasture losses	-5.0 or less

Category	Description	Possible Impacts	Palmer Drought Severity Index (PDSI)
		• Shortages of water in reservoirs, streams, and wells creating water emergencies	

Past Occurrence

According to the NCEI Storm Events Database, there have been no droughts recorded in New Castle County.

Future Occurrence

Based on past occurrences, there is a low probability of droughts occurring in New Castle County.

Vulnerability Assessment

Inventory and summary of vulnerable assets

As a hazard, droughts primarily impact water supply and agricultural land. Areas of the Delaware that rely on private wells are more impacted by water supply reductions than areas of the State that rely on public water supply; frequently, these areas reliant on groundwater wells are more rural.

Estimation of Losses

Due to a lack of data, as estimated loss information for New Castle County is not included in the DE 2023 State HMP, it is difficult to make estimations on losses resulting from a drought event, as the severity and duration of the event impact potential losses.

Potential Impacts

Drought events are not expected to impact future development in the County. Additionally, drought events may have a greater impact on vulnerable and underserved populations due to limited freshwater access for personal and farming needs. Drought disproportionately impacts underserved communities by exacerbating existing inequalities in access to clean water, leading to food insecurity, economic hardship, health problems due to poor water quality, and increased stress on already limited resources, often forcing them to travel further distances to find water, impacting their daily lives and livelihoods significantly more than those with greater access and resources.

The FEMA Community Lifelines most likely to be impacted include:

- Safety and Security
- Food, Water, Shelter
- Health and Medical

4.3.11 Energy Pipeline Failures

An energy pipeline failure occurs when a pipeline break creates the potential for an explosion or a leak of a dangerous substance like oil or gas, possibly requiring an evacuation of local residents and businesses, and rapid ecological response depending on location and proximity to water sources, and animal habitats. Incidents. Pipeline failures are low-probability, potentially high-consequence events. Although gas and liquid pipeline failures are infrequent, the hazardous and inflammable

materials released by these events can pose a significant threat to public safety and the built and natural environment. Explosions associated with pipeline failures, for example, can cause severe injury to nearby residents and destroy homes and other properties.

Location and Extent

Energy pipelines cross most of the State with the Colonial Pipeline, Adelphia Gateway Pipeline, and Mariner East Pipeline being some of the more major pipelines in New Castle County. Additionally, The Delaware City Refinery and Eastern Shore Natural Gas are connected to a number of pipelines in the County.

Range of Magnitude

Energy pipeline failures in New Castle County can vary widely in severity depending on the type of fuel or material transported, the size of the pipeline, and the nature of the failure. Typical impacts include:

- Minor incidents: Small leaks or ruptures that are quickly contained, causing limited property damage and no injuries.
- Moderate incidents: Pipeline ruptures or equipment failures resulting in localized fires, injuries, temporary evacuations, and moderate property or environmental damage.
- Major incidents: Large-scale pipeline explosions, refinery equipment failures, or prolonged leaks that cause multiple injuries or fatalities, significant property damage, environmental contamination, and major disruptions to energy supply or transportation infrastructure.

Natural gas and petroleum pipelines, as well as associated refinery operations, have the potential for severe consequences if not properly managed, including fires, explosions, toxic releases, and long-term environmental harm.

Past Occurrence

Energy pipeline failures in New Castle County have historically varied in scale, ranging from localized gas leaks to major refinery incidents with significant human and environmental consequences. One of the most notable events occurred on July 2, 2003, when a contractor excavating for sidewalk and curbing improvements in Wilmington struck an unmarked natural gas line. The resulting rupture triggered a powerful explosion that leveled two rowhouses and injured fourteen people, three of them critically. This incident highlighted the vulnerability of urban infrastructure to pipeline accidents and underscored the importance of accurate mapping and communication during construction activities.

In addition to natural gas incidents, the Delaware City Refinery has been the site of multiple significant events over the past two decades. In October 2018, three contractors were severely burned during operations, prompting an immediate emergency response and reinforcing the hazards associated with high-pressure industrial processes. A similar incident occurred in March 2020, when a fire broke out at the refinery's alkylation unit during maintenance, critically injuring two workers. More recently, in May 2025, a mechanical failure compromised an emission control device, leading to prolonged releases of sulfur dioxide above permitted levels. Although no injuries

were reported, this incident demonstrated the potential for environmental impacts and the need for continuous monitoring and regulatory oversight.

Future Occurrence

The future probability of high-impact pipeline failures will be shaped by the maintenance of existing pipeline systems, the construction of new pipeline systems, and the amount of new development that occurs near pipelines. As the metal in aging pipelines reacts with the environment, it can become corroded, causing a loss of pipe strength that can lead to leakage or rupture. Corrosion is one of the most prevalent causes of pipeline incidents and was listed as the cause for 20 percent of significant pipeline incidents nationwide between 1998 and 2017. Maintenance and repair, however, can reduce the risk of corrosion. Improved technologies have led to better prevention, monitoring, detection, and mitigation of external pipeline corrosion for older as well as newer pipelines (PHMSA, 2018).

As is the case with conventional wells, it remains difficult to predict the number or frequency of unconventional well sites and pipeline incidents. New Castle County should be prepared for multiple incidents to occur annually.

Land development near a pipeline right-of-way can bring people near pipeline hazards. Land development adjacent to natural gas and liquid petroleum pipelines increases the likelihood of damage to the pipeline and also increases the exposure of people and property to pipeline failure hazards.

Vulnerability Assessment

Inventory and summary of vulnerable assets and Estimation of Losses

To evaluate the vulnerability of New Castle County to energy pipeline failures, all census blocks containing or located within 1,000 feet of major natural gas and petroleum pipelines were identified. Populations, building counts, and total assessed property values within these blocks were aggregated to the county level to assess potential exposure. The analysis shows that the majority of vulnerable assets are concentrated around Wilmington and New Castle, where pipeline density is highest and residential, commercial, and industrial development is significant. Key facilities, including refineries, storage terminals, and critical infrastructure such as bridges and utility corridors, are also located within these areas, increasing potential risk to human life, property, and essential services in the event of a pipeline failure.

Potential Impacts

If the industry continues to grow in the region, this potential hazard will likely have an impact on future development, to avoid any harmful impacts from drilling or pipeline transmission. Additionally, these events may have a greater impact on vulnerable and underserved populations due to a lack of health and medical access to clean water following an incident, etc. Gas and pipeline infrastructure disproportionately impact vulnerable and underserved communities by exposing them to higher levels of air pollution from leaks and emissions, often situated near their homes, leading to increased health risks, property devaluation, and environmental damage, while also disrupting their land use and livelihoods.

The FEMA Community Lifelines most likely to be impacted include:

- Safety and Security
- Food, Water, Shelter
- Health and Medical

- Energy

4.3.12 Public Health Incident

According to the Delaware 2023 State HMP, the five public health concerns include Animal/Crop/Plant Disease, Invasive Species, Human Health Incident & Pandemic, Opioid (substance) Addiction, and Housing Instability.

Animal/Crop/Plant Disease

Outbreaks affecting animal, crop, or plant populations can cause widespread disruption to Delaware's economy and food systems. These events may stem from contagious diseases that spread rapidly among animals or plants, or from invasive species and pest infestations that damage agricultural production and native ecosystems.

In Delaware, where poultry and agriculture are vital to the state's economy, an incident such as avian influenza could result in devastating losses. Quarantines or restrictions on the movement, processing, and sale of livestock and related products would significantly affect producers and dependent industries. Likewise, infestations involving crop or plant pests can trigger severe economic hardship for farmers, reduce yields, and cause long-term environmental damage. Invasive plant and insect species, once established, can become endemic, resulting in repeated losses across multiple growing seasons and negatively influencing soil health, biodiversity, and ecosystem services.

Each year, the Delaware Department of Agriculture conducts numerous investigations into suspected animal or crop diseases and monitors for emerging threats, including invasive species. Recovery from large-scale agricultural or ecological disease events would be prolonged, with secondary economic impacts on transportation, food processing, and export markets.

Human Health Incident & Pandemic

A human health incident includes any medical, environmental, or biological threat to public well-being, ranging from infectious disease outbreaks and vector-borne illnesses to contamination events. Delaware's disease prevention and response systems are based on modern public health surveillance and early detection, supported by the Centers for Disease Control and Prevention (CDC) and the Delaware Division of Public Health (DPH). These agencies track notifiable diseases, investigate outbreaks, and implement vaccination, education, and prevention programs.

An epidemic refers to the rapid spread of an infectious disease among a population within a defined region. Such events may occur due to shifts in population immunity, changes in the pathogen itself, or ecological conditions favoring transmission (such as vector population increases). When an epidemic expands globally, affecting populations across multiple continents, it becomes a pandemic.

Opioid (Substance) Addiction

Substance use disorder, particularly opioid addiction, has emerged as a critical public health hazard in New Castle County and across Delaware. The epidemic affects individuals, families, and communities and can magnify other hazards by increasing vulnerability during emergencies. High rates of overdose, mental health crises, and related infections strain public health systems and emergency response capacity.

Injection drug use elevates the risk for blood-borne pathogen transmission, while addiction and overdose incidents can impact workforce stability and social cohesion. Substance abuse is also linked to higher rates of homelessness, domestic instability, and behavioral health emergencies. County

and state agencies, in coordination with hospitals, law enforcement, and community organizations, are advancing prevention, harm reduction, and recovery programs to reduce fatalities and improve long-term resilience.

Housing Instability

Housing insecurity, including homelessness, overcrowding, and substandard living condition, represents a growing social vulnerability in New Castle County. Economic stressors, rising housing costs, and disasters that displace residents all contribute to instability. Individuals experiencing homelessness or unstable housing are at greater risk during emergencies, lacking safe shelter, access to healthcare, and reliable communication channels.

Housing instability also intersects with other public health concerns, including chronic illness, addiction recovery, and exposure to environmental hazards such as extreme heat, cold, or flooding. The county's mitigation planning emphasizes the need to expand affordable housing options, strengthen social service coordination, and integrate housing security into disaster recovery and resilience efforts.

Location and Extent

Public Health Incidents have the potential to occur anywhere in, and spread anywhere throughout, New Castle County. Densely populated areas are more vulnerable to communicable disease outbreaks as the speed and likelihood of disease transmission increase in these types of environments.

Vulnerability to communicable diseases also increases with population mobility and increased exposure to individuals from diverse geographic regions. Additionally, the proximity to highways and rail network increases the vulnerability to the introduction and spread of communicable diseases.

Range of Magnitude

Public Health Incidents can occur at the local level and be contained or can be spread to as large as a global pandemic. COVID-19 is an example of a global pandemic that spread throughout the world very rapidly.

Past Occurrence

New Castle County has experienced outbreaks and infestations affecting agriculture and natural ecosystems, and human populations alike. While Delaware has not experienced a statewide epidemic of animal disease, the poultry sector remains particularly vulnerable.

Pandemics, like the 2009 H1N1 influenza or the 2020 COVID-19 outbreak, have had a deep and prolonged economic and social consequences. They often overwhelmed healthcare systems, disrupted critical supply chains, and impacted every sector of society. Delaware's population includes large numbers of older adults and individuals with chronic conditions, both at higher risk for severe illness.

The CDC's Pandemic Severity Assessment Framework evaluates potential pandemic viruses, such as avian influenza A (H7N9), based on transmissibility, severity, and antiviral resistance.

The first case of COVID-19 was detected in Delaware during the first weeks of March 2020. Between March 2020, and February 2023, there were 324,137 COVID-19 cases with a total of 2,702 deaths. The following table lists COVID-19 case and death data for New Castle County between March 2020 and February 2023.

Table 4.34 COVID-19 Cases in New Castle County

County	# Cases	#Deaths
New Castle	189,681	1,667

Future Occurrence

The future likelihood of a pandemic/infectious disease outbreak in New Castle County is expected to be higher than indicated by the historical occurrence rate alone. Expected increases in likelihood can be attributed to several factors, such as rapid growth in population, an increase in interstate and international travel, and subsequent introduction and spread of infectious diseases and/or the emergence of novel diseases (such as COVID-19), and increased resistance to current treatment and mitigation strategies. Climate change may be a driving cause in any dramatic changes or shifts in viruses and other diseases by potentially creating favorable conditions for transmission through milder winters, earlier spring seasons, and warmer temperatures.

Vulnerability Assessment

Inventory and summary of vulnerable assets

In general, jurisdictions that are more densely populated are more vulnerable to disease threats when the disease is directly spread from human to human, but every jurisdiction in the State has some vulnerability to pandemic and infectious disease threats.

Estimation of Losses

Jurisdictional losses in a pandemic or infectious disease outbreak are similar to the state, stemming from the health impact of employees and residents. No losses are expected to buildings or land. Losses are difficult to estimate because the exact rates of absenteeism and cost of treating a widespread disease will depend on the virus or bacterium in question, the availability of vaccination or treatment, and the severity of symptoms.

Potential Impacts

A pandemic/infectious disease outbreak would likely not have an impact on future development in the County. Additionally, these events may have a greater impact on vulnerable and underserved populations due to a lack of access to healthcare and/or personal protective equipment. A pandemic or disease outbreak can disproportionately impact underserved communities by exacerbating existing inequalities in healthcare access, economic stability, and social support systems, leading to higher rates of infection, severe illness, and mortality compared to more affluent populations; this is often due to factors like limited access to quality healthcare, higher rates of chronic health conditions, and increased exposure to risk factors like crowded housing and essential worker roles.

During a pandemic/infectious disease outbreak, the community lifelines that are most likely to be impacted include:

- Safety and Security
- Food, Water, and Shelter
- Health and Medical

4.3.13 Wildfire

Wildfire occurs throughout wooded and open vegetation areas of Delaware. Open fields, grass, dense brush, and forest-covered areas are typical sites for wildfire events. Under dry conditions or droughts, wildfires have the potential to burn forests as well as croplands. Most wildfires are caused

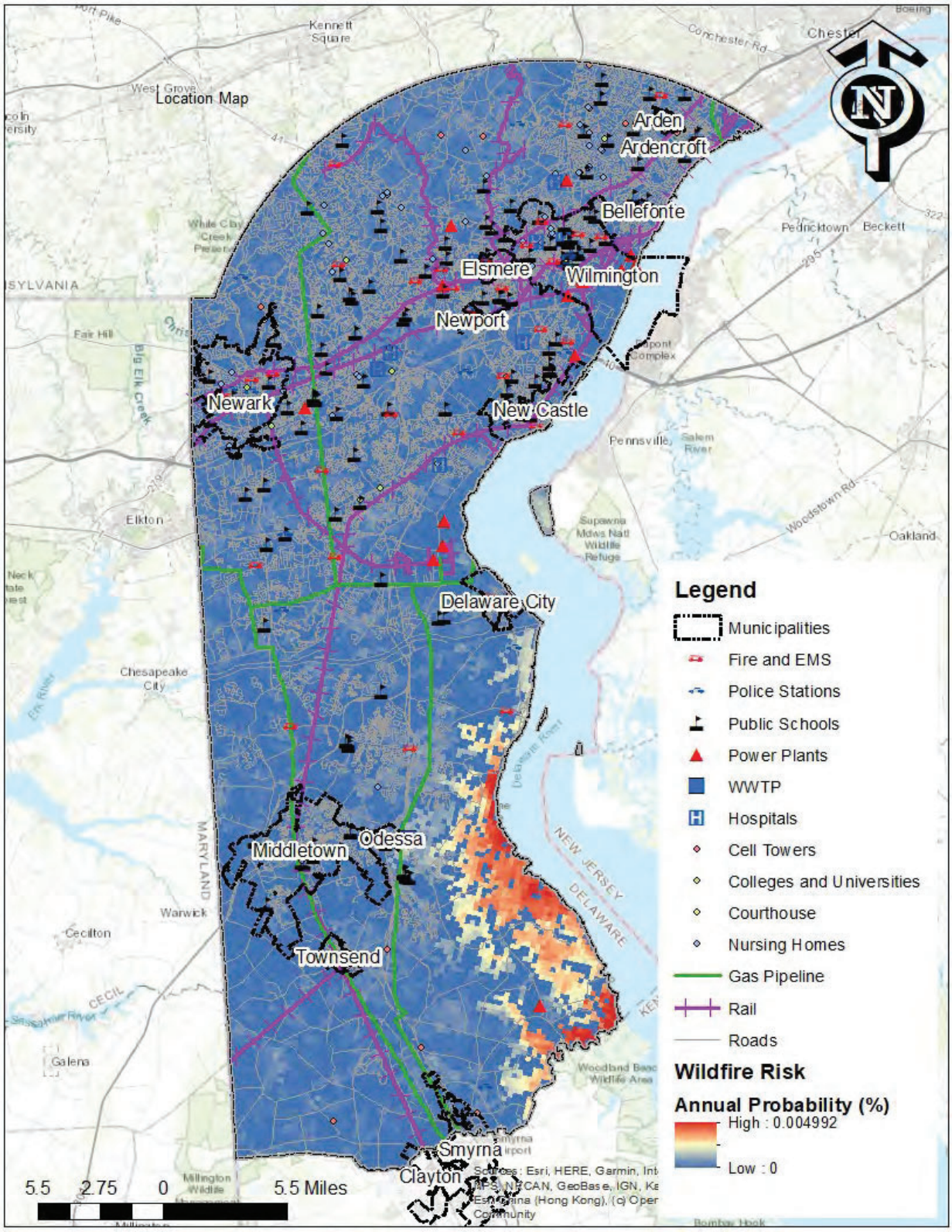
by human carelessness or negligence. However, some are precipitated by lightning strikes (DCNR, 2022c). Large events may require evacuation from one or more communities and necessitate regional or national firefighting support.

New Castle County is at a low risk for wildfire, with wildland-urban interface (WUI) fires are becoming increasingly problematic. As people continue to live and work near wildland areas, the threat to private property from wildfires increases. This phenomenon is growing as suburbanization and population growth continues in the County. Although urban interface fires have the greatest possibility to cause property damage, the potential for wildfire exists throughout the entire planning area.

Location and Extent

The southeastern region is the most wildfire-prone area of the County, with the remainder of the county being low to medium-low.

Figure 4.10 Wildfire Exposure in New Castle County



Range of Magnitude

The frequency and severity of wildfires depend on many factors. The three that control wildfire behavior the most are the availability of fuels, the weather, and the topography of the area. The speed and intensity of a fire will usually increase as the slope and wind increase, and the humidity decreases.

Table 4.35 summarizes the range of magnitude for wildfire hazards.

Table 4.35 Range of Magnitude - Wildfire

Severity	Causes	Frequency	Damage Extents
Minimum	Localized brush burning; contained naturally or by emergency response team	Annual	Minor loss of forest/vegetation; no damage to structures
Maximum	Extreme drought conditions prevent extinguishing and containing a fire	None Recorded	Major loss of forest, agricultural land; damage to structures

Past Occurrence

As provided in the DE 2023 State HMP, over the past 22 years there have been no recorded wildfire impacts in New Castle County.

Future Occurrence

Based on experience, wildfire events are unlikely to occur in New Castle County in any given year.

Vulnerability Assessment

Inventory and summary of vulnerable assets and Estimation of Losses

Exposure to wildfire by jurisdiction, building type, and building count is provided in Table 4.36 and Table 4.37.

Table 4.36 Wildfire Exposure by Building Count

Wildfire Exposure by Building Count										
Jurisdiction	Agriculture	Single-Family Home	Manufactured Housing	Multi-Family Home	Commercial	Industrial	Government	Education	Religious	TOTAL
Arden	2	162	0	1	5	0	0	1	0	171
Ardencroft	2	35	0	1	0	0	0	0	0	38
Ardentown	11	175	1	4	3	0	0	0	0	194
Bellefonte	0	0	0	0	0	0	0	0	0	0

Clayton	0	0	0	0	0	0	0	0	0	0
Delaware City	2	69	0	1	0	15	3	0	0	90
Elsmere	0	25	0	0	0	0	0	0	0	25
Middletown	20	1223	48	21	26	1	0	0	0	1339
New Castle	4	5	0	1	11	4	0	0	0	25
Newark	1	85	0	0	4	4	0	0	0	94
Newport	1	0	0	0	9	4	0	0	0	14
Odessa	8	174	0	4	16	1	6	1	1	211
Smyrna	0	0	0	0	0	0	0	0	0	0
Townsend	2	156	0	0	3	0	0	0	0	161
Wilmington	1	258	0	3	2	0	0	0	1	265
Unincorporated	466	20609	539	275	589	253	27	51	36	22845
TOTAL	520	22976	588	311	668	282	36	53	38	25,472

Table 4.37 Wildfire Exposure by Structure Value

Jurisdiction	Agriculture	Single-Family Home	Manufactured Housing	Multi-Family Home	Commercial	Industrial	Government	Education	Religious	TOTAL
Arden	$222,212	$30,948,698	$0	$3,418,935	$2,187,340	$0	$0	$1,396,486	$0	**$38,173,670**
Ardencroft	$45,649	$8,498,584	$0	$349,634	$0	$0	$0	$0	$0	**$8,893,868**
Ardentown	$892,558	$32,405,619	$68,235	$21,039,279	$2,026,266	$0	$0	$0	$0	**$56,431,958**
Bellefonte	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Clayton	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Delaware City	$320,932	$13,694,106	$0	$520,903	$0	$5,888,182	$4,227,289	$0	$0	**$24,651,413**
Elsmere	$0	$4,971,070	$0	$0	$0	$0	$0	$0	$0	**$4,971,070**
Middletown	$15,022,094	$399,360,144	$3,054,101	$103,107,222	$28,963,934	$438,773	$0	$0	$0	**$549,946,268**
New Castle	$2,199,189	$1,332,816	$0	$1,501,859	$9,621,598	$12,812,095	$0	$0	$0	**$27,467,556**
Newark	$20,680	$21,749,309	$0	$0	$2,170,205	$7,407,559	$0	$0	$0	**$31,347,752**
Newport	$320,430	$0	$0	$0	$4,755,789	$7,728,170	$0	$0	$0	**$12,804,389**
Odessa	$495,702	$32,913,519	$1,560,356	$0	$5,648,805	$158,891	$8,836,139	$4,751,989	$39,053	**$54,404,453**
Smyrna	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Townsend	$5,903,164	$42,876,068	$0	$0	$1,150,707	$0	$0	$0	$0	**$49,929,939**
Wilmington	$661,614	$72,922,005	$0	$4,352,459	$190,546	$0	$0	$0	$6,381,690	**$84,508,315**
Unincorporated	$92,154,337	$5,309,883,333	$36,462,060	$748,381,633	$531,298,048	$307,393,068	$11,871,865	$208,458,625	$32,265,595	**$7,278,168,563**
TOTAL	**$118,258,561**	**$5,971,555,270**	**$41,144,753**	**$882,671,925**	**$588,013,238**	**$341,826,738**	**$24,935,293**	**$214,607,099**	**$38,686,337**	**$8,221,699,214**

Potential Impacts

Wildfire events would likely not have an impact on future development in the County, although it will continue to be recommended to protect and conserve the County's forested areas. Additionally, these events may have a greater impact on vulnerable and underserved populations due to a lesser ability to evacuate and/or have access to transportation and/or medical services. Wildfires disproportionately affect underserved communities by causing greater exposure to harmful smoke due to factors like limited access to resources for evacuation, inadequate housing, language barriers, and a higher prevalence of pre-existing health conditions, making them more vulnerable to the health impacts of wildfire smoke and significantly hindering their ability to recover from fire damage compared to wealthier communities.

The FEMA Community Lifelines most likely to be impacted include:

- Safety and Security
- Food, Water, Shelter
- Health and Medical

4.3.14 Earthquake, Sinkholes, and Landslides

An earthquake is the motion or trembling of the ground produced by sudden displacement of rock, usually within the upper 10-20 miles of the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of underground caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of disrupt the social and economic functioning of the affected area.

In a landslide, masses of rock, earth, or debris move down a slope. Landslides can be caused by a variety of factors, including earthquakes, storms, fire, and human modification of land. Areas that are prone to landslide hazards include previous landslide areas, areas on or at the base of slopes, areas in or at the base of drainage hollows, developed hillsides with leach field septic systems, and areas recently burned by forest or brush fires.

Location and Extent

According to the DE 2023 State HMP, earthquake events in Delaware are unlikely. Since 2000, there have been three recorded earthquakes with epicenters inside the State. The strongest of these earthquakes occurred near Dover in November 2017, and was a level IV intensity on the Mercalli Intensity Scale. Earthquakes originating from outside Delaware can also impact the State.

Areas that are generally prone to landslide hazards include previous landslide areas; the bases of steep slopes; the bases of drainage channels; and developed hillsides where leach-field septic systems are used. Areas that are typically considered safe from landslides include areas that have not moved in the past; relatively flat-lying areas away from sudden changes in slope; and areas at the top or along ridges, set back from the tops of slopes.

In New Castle County, the northern part of the County is identified as a low-medium risk of landslide, while the remainder of the County is only low risk.

Figure 4.11 shows the landslide risk throughout the County.

Figure 4.11 Landslide Risk Areas

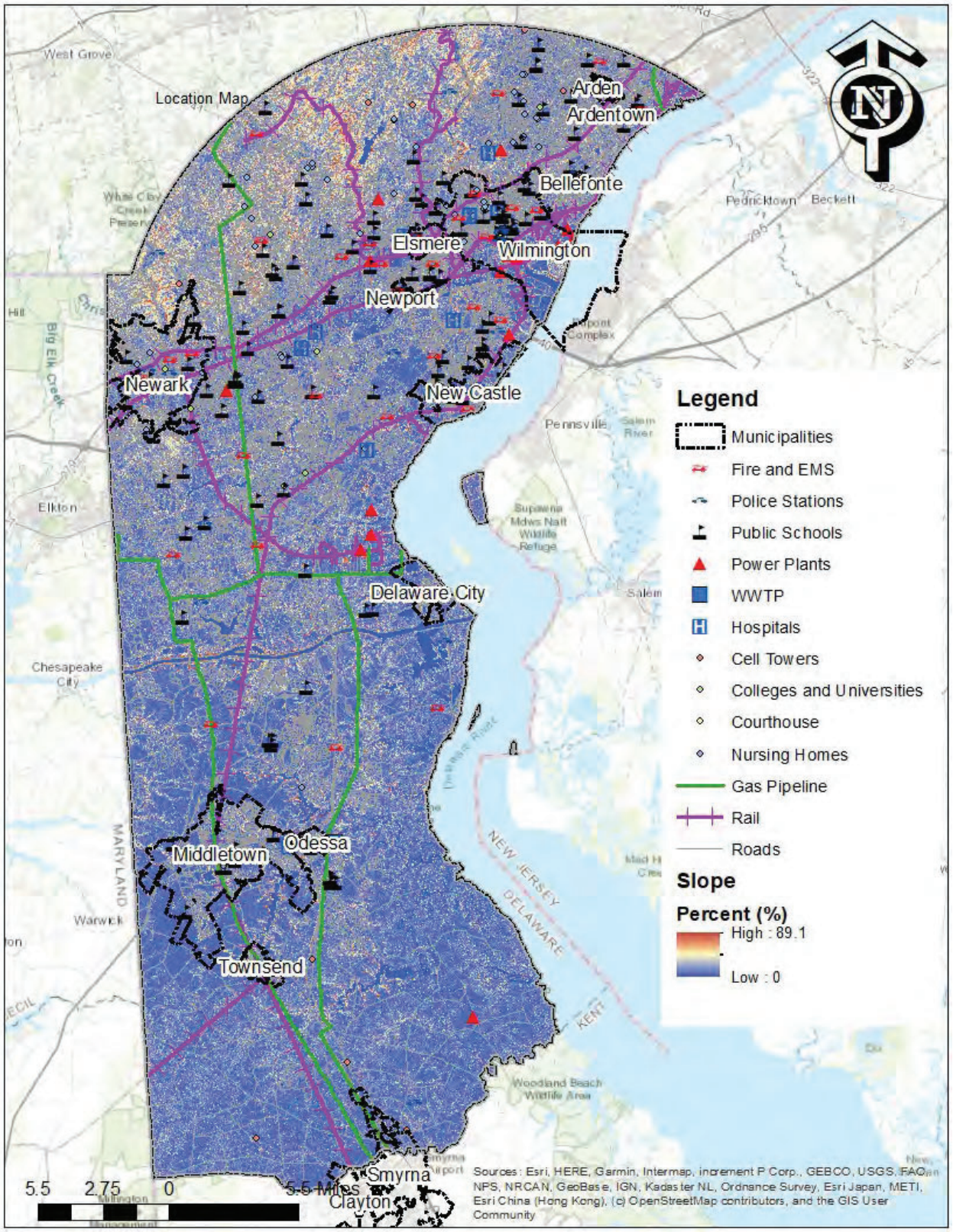


Table 4.38 summarizes the range of magnitude for landslide hazards.

Table 4.38 Range of Magnitude - Landslides

Severity	Causes	Frequency	Damage Extents
Minimum	Rock falls from steep roadway cuts	Annual	Minor traffic disruptions; damage to vehicles
Maximum	Heavy rainfall resulting in slope failure	>10 years	Substantial road closures

Range of Magnitude

Earthquake magnitude is often measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake, shown in Table 4.44. The impact an earthquake event has on an area is typically measured in terms of earthquake intensity, as intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects. A detailed description of the Modified Mercalli Intensity Scale is provided in Table 4.39.

Table 4.39 Richter Scale

Richter Magnitudes	Earthquake Effects
Less than 3.5	Generally, not felt but recorded.
3.5-5.4	Often felt but rarely causes damage.
Under 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1-6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0-7.9	Major earthquake. Can cause serious damage over larger areas.
8 or greater	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Table 4.40 Modified Mercalli Intensity Scale and Impacts

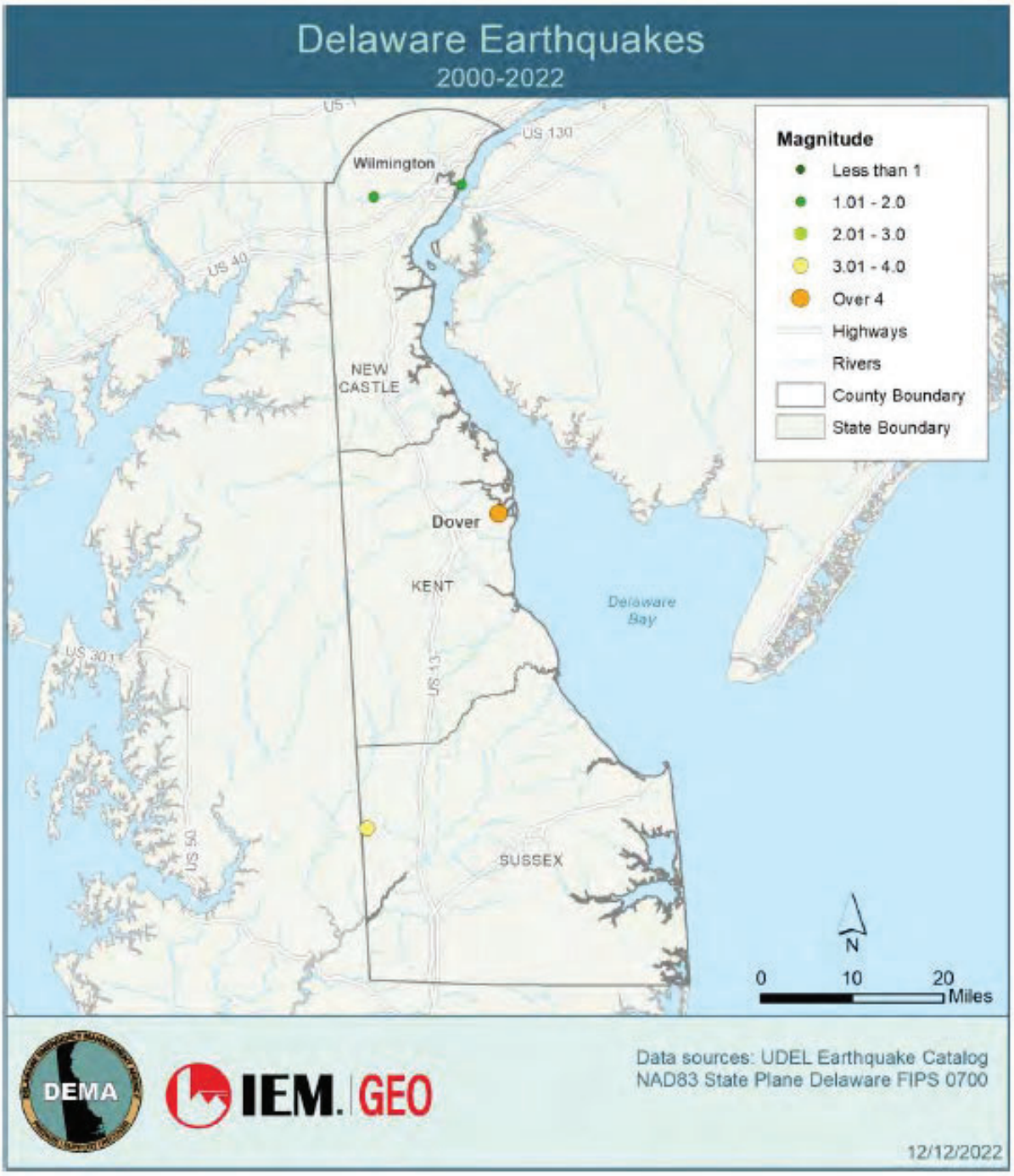
Scale	Intensity	Description of Effects	Corresponding Richter Scale Magnitude
I	Instrumental	Usually detected only on seismographs.	<4.2
II	Feeble	Felt only by a few persons at rest, especially on upper floors of buildings.	
III	Slight	Felt quite noticeably indoors, especially on upper floors. Most people do not recognize it as an earthquake (i.e., a truck rumbling).	
IV	Moderate	Can be felt by people walking; dishes, windows, and doors are disturbed.	
V	Slightly Strong	Sleepers are awoken; unstable objects are overturned.	<4.8
VI	Strong	Trees sway; suspended objects swing; objects fall off shelves; damage is slight.	<5.4
VII	Very Strong	Damage is negligible in buildings of good design and construction, slight to moderate in well-built ordinary	<6.1

		structures, and considerable in poorly built or badly designed structures; some chimneys are broken.	
VIII	Destructive	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged	<6.9
IX	Ruinous	Some houses collapse; ground cracks; pipes break open	
X	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread	<7.3
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes, and cables destroyed; general triggering of other hazards	<8.1
XII	Catastrophic	Total destruction: trees fall; ground rises and falls in waves	>8.1

Past Occurrence

Three earthquakes have been recorded with epicenters in Delaware. Figure 4.12 shows the location of these epicenters. One of the three earthquakes was recorded with an epicenter in New Castle County, along with one in both Kent and Sussex Counties.

Figure 4.12 DE Earthquake History (2000-2022)



Earthquakes whose epicenters fall outside of Delaware can impact the State as well. A cluster of historical epicenters in southeastern Pennsylvania is spatially associated with a seismic trend along the lower Delaware River, which continues in a northeasterly direction through New Jersey.

According to the DE 2023 State HMP, there have been no local earth movements (landslides, sinkholes, etc.) since 2000.

Future Occurrence

The likelihood of significant earthquake damage in New Castle County is low since the probability of the area being stricken by an earthquake with an epicenter in New Castle County is relatively low compared to other parts of the country. Even though earthquakes do occur occasionally, the County is located in an area of very low seismic activity. Because of the very low risk associated with this hazard, a simple loss estimation based on default Hazus data was completed for earthquakes and is covered in the next chapter. The frequency and intensity of earthquakes is not expected to be impacted as a result of climate change.

The likelihood of a landslide or sinkhole occurring in New Castle County is low as there have been no instances recorded in the past 25 years.

Vulnerability Assessment

Inventory and summary of vulnerable assets and Estimation of Losses

Table 4.41 shows the estimated losses in New Castle County for a 1000-year earthquake event. Income losses and building stock losses are identified for different building occupancies. The total estimated loss for an earthquake in New Castle County is $307,998,900.

Table 4.41 1000-Year Earthquake Loss

1000-Year Earthquake Loss						
Loss Type	Single Family	Other Residential	Commercial	Industrial	Other	Total
Income Losses	$18,902,900	$3,047,800	$34,418,300	$1,610,400	$6,264,600	$64,244,000
Building Stock Losses	$120,804,800	$14,752,500	$67,620,800	$15,467,300	$25,109,500	$243,754,900
Total	$139,707,700	$17,800,300	$102,039,100	$17,077,700	$31,374,100	$307,998,900

Potential Impacts

There are essential and critical facilities that may be impacted by an earthquake event. These facilities are those specifically noted in the HAZUS identified essential facilities and critical facility results for Earthquake in Appendix E and the list of critical facilities provided in Appendix F.

An earthquake event may have an impact on future development in the County. Additionally, these events may have a greater impact on vulnerable and underserved populations. Earthquakes disproportionately affect underserved communities by causing greater damage to their often poorly constructed housing, limited access to emergency services, increased vulnerability to displacement and economic hardship, and a harder time recovering due to pre-existing social and economic disadvantages, making them more susceptible to the devastating impacts of a seismic event compared to more affluent areas.

During an Earthquake, the community lifelines that are most likely to be impacted include:

- Food, Water, and Shelter
- Health and Medical
- Hazardous Materials
- Transportation Systems

4.3.15 Hail

Hail is a form of solid precipitation that occurs during thunderstorms when updrafts in the storm carry raindrops into extremely cold areas of the atmosphere. In New Castle County, hailstorms are typically associated with severe summer thunderstorms and can vary from small, pea-sized stones to larger hail capable of damaging property, vehicles, and crops. While usually localized, severe hail events have the potential to cause economic and structural impacts.

Location and Extent

Hail events in New Castle County can occur anywhere in the county, typically associated with severe thunderstorms during the spring and summer months. Hail size is highly variable, ranging from pea-sized to larger hailstones capable of causing property or vehicle damage.

Range of Magnitude

Depending on meteorological factors, hail can range in size from small to large, and have varying impacts based on size and intensity.

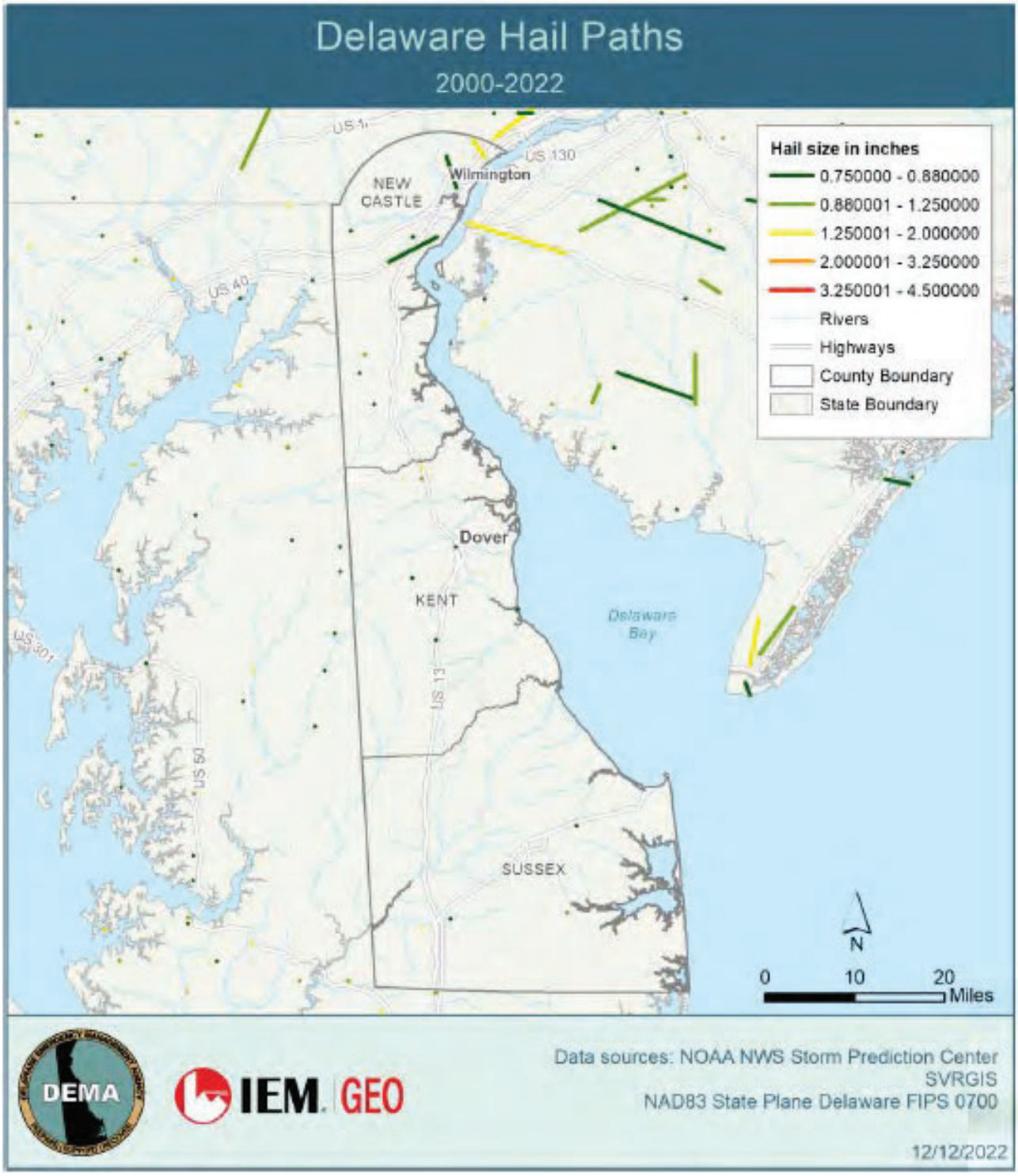
- Small Hail (<1 inch): minor property and vehicle damage.
- Moderate Hail (1–2 inches): roof, siding, and vehicle damage.
- Large Hail (>2 inches): significant structural damage, potential injury to persons and livestock.

Past Occurrence

Hailstorms are relatively common in New Castle County, often accompanying severe thunderstorms or squall lines. Most events produce small hail, causing minimal damage; however, larger sporadic events have damaged roofs, vehicles, and crops. For example, hail up to 1.75 inches in diameter was recorded during storms in the summer of 2019. Since 1970 there have been 73 recorded events in the County. No deaths or injuries were reported and only one event resulted in reportable damage, which being in $5,000 in Smyrna in 1993.

Figure 4.13 identifies Hail Paths through Delaware between the years of 2000 to 2022.

Figure 4.13 Delaware Hail Paths (2000-2022)



Future Occurrence

Hail events are expected to continue annually, with intensity varying based on storm systems. Climate change may slightly alter the frequency or intensity of severe hail events.

Vulnerability Assessment

Inventory and summary of vulnerable assets

Hail can occur throughout New Castle County, particularly during severe summer thunderstorms. Populations, residential and commercial buildings, vehicles, and crops in areas with dense development or agricultural activity are most exposed to damage.

Potential Impacts

Hail events are unlikely to influence future development patterns but can cause localized property and crop damage. Vulnerable populations, including those with limited financial resources, may face disproportionate impacts due to damage to vehicles, roofs, and small farms.

The FEMA Community Lifelines most likely to be impacted include:

- Safety and Security
- Food, Water, and Shelter
- Health and Medical

4.3.16 Geomagnetic Storm (Solar Flares)

Geomagnetic storms, caused by solar activity, can disrupt the Earth's magnetic field and affect electrical and communication systems. In New Castle County, impacts would primarily involve power grid disturbances, satellite and radio communication interruptions, and potential disruption to critical infrastructure. While severe storms are uncommon, their effects could be widespread if they occur.

Location and Extent

Geomagnetic storms could affect New Castle County along with the entire U.S. East Coast. Effects are primarily on electrical grids, communications, and satellite-dependent systems.

Range of Magnitude

Minor storms: temporary disruptions to communications and navigation systems.

Moderate storms: short-term power fluctuations, minor grid disturbances.

Severe storms: widespread power outages, damage to transformers, disruption to critical services.

Past Occurrence

New Castle County has experienced geomagnetic storm effects indirectly, primarily minor electrical and communication disruptions. No major power failures have been directly attributed to solar activity.

Future Occurrence

Geomagnetic storms are likely to occur periodically in line with the 11-year solar cycle. Severe events remain low probability but could cause widespread disruption.

Vulnerability Assessment

Inventory and summary of vulnerable assets

Electrical substations, critical infrastructure, communication networks, hospitals, and transportation systems. Power grid infrastructure is the primary exposed asset, along with hospitals, emergency services, and telecommunications systems. Short- or long-term power outages, communication failures, and disruption of critical services. Losses could be moderate to high for prolonged events.

Potential Impacts

Geomagnetic storms could disrupt power, communication, and transportation systems. Vulnerable populations relying on medical devices, emergency services, or digital communications may experience disproportionate impacts.

The FEMA Community Lifelines most likely to be impacted include:

- Safety and Security
- Health and Medical
- Energy
- Transportation

4.3.17 Volcano

Volcanic hazards result from eruptions, which can include lava flows, ashfall, and gas emissions. Delaware has no active or dormant volcanoes, so the risk to New Castle County is limited to the potential for minor ashfall from distant eruptions, which could temporarily affect air quality and transportation. The likelihood of direct impacts is extremely low.

Location and Extent

Delaware has no active or dormant volcanoes. Any volcanic hazard would be from distant eruptions (ashfall) affecting air quality.

Range of Magnitude

Minor ashfall: temporary air quality reduction.

Major distant ashfall: disruption of transportation (air travel), minor property and health impacts.

Past Occurrence

No volcanic events have affected New Castle County.

Future Occurrence

The likelihood is extremely low; impacts would be minor and largely limited to air quality or transport disruptions.

Vulnerability Assessment

Inventory and summary of vulnerable assets

Ashfall from distant volcanic eruptions could affect air quality and aviation operations. Populations with respiratory conditions and facilities reliant on-air travel are most susceptible.

Potential Impacts

The likelihood of volcanic impact is extremely low. Effects would primarily be short-term disruptions to transportation and minor health impacts, with limited influence on development. The FEMA Community Lifelines most likely to be impacted include:

- Health and Medical
- Transportation
- Safety and Security

4.3.18 Tsunami

A tsunami is a series of ocean waves generated by sudden disturbances such as underwater earthquakes, landslides, or volcanic eruptions. Although extremely rare along the mid-Atlantic coast, low-lying areas of New Castle County along the Delaware Bay could theoretically experience minor flooding if a distant tsunami were to occur. The probability of a significant event impacting the county is very low.

Location and Extent

Tsunamis are extremely unlikely in Delaware due to its geographic location on the mid-Atlantic coast. Any potential inundation would be confined to low-lying tidal areas along the Delaware Bay.

Range of Magnitude

A theoretical tsunami would likely produce only minor coastal flooding, given the lack of nearby subduction zones or major offshore earthquake sources.

Past Occurrence

There are no recorded tsunami events in Delaware's history.

Future Occurrence

Future tsunamis are considered highly unlikely but could theoretically result from distant undersea earthquakes or landslides.

Vulnerability Assessment

Inventory and summary of vulnerable assets

Low-lying tidal areas along the Delaware Bay are the most exposed, including waterfront homes, marinas, and critical infrastructure near the shore.

Potential Impacts

Although the probability of a tsunami is extremely low, even minor inundation could temporarily disrupt transportation and utilities. Vulnerable populations in these coastal areas could experience temporary displacement.

The FEMA Community Lifelines most likely to be impacted include:

- Safety and Security
- Food, Water, and Shelter
- Energy

4.4 Hazard Vulnerability Summary

4.4.1 Methodology

To prepare for the Vulnerability Assessment, a variety of sources and analyses were completed. Historic data for each event (where available) were tabulated to determine current probabilities and estimate future occurrences. For spatially specific hazards, such as flooding and wildfires, those hazard areas were obtained from the best available data sources (e.g., FEMA DFIRM GIS shapefiles and National Land Cover Dataset). Building footprint and parcel data were obtained from the county and were overlain with the hazard areas in GIS to determine the number of structures potentially exposed to these hazards and to better characterize those structures. Critical facilities data was obtained from the county and State database sources and was also overlain with the hazard areas in GIS to determine which critical facilities are potentially exposed to each hazard.

FEMA's risk assessment software, Hazus, was used to calculate probabilistic losses for the flood, earthquake, hurricane wind, and hurricane surge hazards. Inventory and vulnerable assets (including exposure estimates), and loss estimates were discussed with the Steering Committee and communities. For specific hazards, loss estimates were prepared based on historic annualized loss data (where available). Inventory and vulnerable assets (including exposure estimates) and loss estimates were incorporated into this Vulnerability Assessment.

Finally, a "risk factor" calculation was also prepared based on the characteristics of each hazard, to quantitatively weigh and rank each hazard as part of the hazard prioritization effort. Risk factors from the 2020 HMP were reviewed with the Steering Committee, and it was agreed that no changes are desired regarding specific risk factors for the 2025 Update.

To aid in prioritization efforts in terms of planning needs and mitigation strategy, each of the hazards was assigned a "risk factor." The risk factor is essentially a weighted calculation based on five variables associated with each hazard: 1) probability; 2) impact; 3) spatial extent; 4) warning time; and 5) duration. An index was then assigned to each variable depending on level: "1" – low to "4" – high. These variables, levels, and indices associated with each are summarized in Table 4.59. For probability specifically, highly likely indicates a 100% chance to occurring in a given year; likely probability indicates a 75% chance top occurring in a given year; possible probability indicates at least a 50% percent of occurring in a given year; and unlikely probability indicates less than a 25% chance of occurring in a given year. The risk factor calculation matrix is provided in Table 4.59.

Table 4.59 Risk Factor Calculation Matrix

Probability		Impact		Spatial Extent		Warning Time		Duration	
Weight – 30%		Weight – 30%		Weight – 20%		Weight – 10%		Weight – 10%	
Level	Index	Level	Index	Level	Index	Level	Index	Level	Index
Unlikely	1	Minor	1	Negligible	1	>24 Hrs	1	<6 Hours	1
Possible	2	Limited	2	Small	2	12-24 Hrs	2	<24 Hours	2
Likely	3	Critical	3	Moderate	3	6-12 Hrs	3	<1 Week	3
Highly Likely	4	Catastrophic	4	Large	4	<6 Hrs	4	>1 Week	4

The risk factor for each hazard was then calculated using the following equation:

- Risk Factor = (0.3) (Probability Index) + (0.3) (Impact Index) + (0.2) (Spatial Extent Index) + (0.1) (Warning Time Index) + (0.1) (Duration Index)

4.4.2 Ranking Results

Table 4.60 presents the updated hazard ranking results based on applying the risk factor calculation to each hazard.

Hazard Ranking	Probability	Impact	Spatial Extent	Warning Time	Duration	Total Cumulative	Risk Score	Risk Level
Flooding (Storm Surge/Tide and Coastal Flooding)	4	3	4	2	3	16	3.4	High
Winter Storms, Nor'easters and Freezes	4	3	4	1	3	15	3.3	High
Hurricanes and Coastal Storms	4	3	4	1	3	15	3.3	High
Severe T-Storms and Tornados	4	3	3	3	1	14	3.1	High
Transportation and Infra. Incidents	4	3	2	4	2	15	3.1	High
Hazardous Materials	4	2	2	4	2	14	2.8	High
Dam/Levee Failure	2	3	3	4	2	14	2.7	High
Terrorism	2	3	3	4	2	14	2.7	High
Erosion	3	2	2	1	4	12	2.4	Moderate
Drought/Extreme Heat	2	2	4	1	3	12	2.4	Moderate
Energy Pipeline Failures	2	2	3	4	2	13	2.4	Moderate
Public Health Incidents	2	2	3	2	3	12	2.3	Moderate
Wildfire	2	2	2	4	2	12	2.2	Moderate
Earthquakes	1	2	4	3	1	11	2.1	Moderate
Hail	2	2	2	3	1	10	2	Moderate
Geomagnetic Storms	1	1	3	1	2	8	1.5	Low

Sinkholes/Debris Pits	2	1	2	1	1	7	1.5	Low
Landslides	1	1	1	4	1	8	1.3	Low
Volcano	1	1	1	3	1	7	1.2	Low
Tsunami	1	1	1	3	1	7	1.2	Low

Based on the results of the risk factor analysis, it was determined that the top five hazards that impact NCC are: 1) Flooding (Storm Surge/Tide and Coastal Flooding; 2) Winter Storms, Nor'easters and Freezes; 3) Hurricanes and Coastal Storms; 4) Severe Thunderstorms and Tornadoes; 5) Transportation and Infrastructure Incidents.

It is important to understand how any hazards included in this plan may impact municipalities differently than the County as a whole. Table 4.61 provides a matrix and breakdown of how hazard risks differ between the participating jurisdictions.

Table 4.61 Jurisdictional Risk Comparison Matrix

	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR															
JURISDICTION	Flooding (Storm Surge/Tide and Coastal Flooding)	Winter Storms, Nor' easters and	Hurricanes and Coastal Storms	Severe T-Storms and Tornados	Transportation and Infra. Incidents	Hazardous Materials	Dam/Levee Failure	Terrorism	Erosion	Drought/Extreme Heat	Energy Pipeline Failures	Public Health Incidents	Wildfire	Earthquakes	Hail	Geomagnetic Storms
Arden	<	=	=	=	<	<	<	=	<	=	=	=	>	=	=	=
Ardencroft	<	=	=	=	<	<	<	=	<	=	>	=	>	=	=	=
Ardentown	<	=	=	=	<	<	<	=	<	=	>	=	>	=	=	=
Bellefonte	<	=	=	=	=	=	=	=	<	=	>	=	=	=	=	=
Delaware City	>	=	>	=	<	<	=	=	>	=	>	=	>	=	=	=
Elsmere	=	=	=	=	>	=	>	=	<	=	>	=	=	=	=	=
Middletown	<	=	<	=	<	>	>	=	<	=	>	=	=	=	=	=
New Castle	>	=	>	=	>	=	<	=	>	=	>	=	=	=	=	=
Newark	>	=	>	=	=	>	=	>	<	=	>	>	=	=	=	=

IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR															
JURISDICTION	Flooding (Storm Surge/Tide and Coastal Flooding)	Winter Storms, Nor' easters and	Hurricanes and Coastal Storms	Severe T-Storms and Tornados	Transportation and Infra. Incidents	Hazardous Materials	Dam/Levee Failure	Terrorism	Erosion	Drought/Extreme Heat	Energy Pipeline Failures	Public Health Incidents	Wildfire	Earthquakes	Hail	Geomagnetic Storms
Newport	=	=	=	=	=	=	<	=	<	=	<	=	=	=	=	=
Odessa	<	=	<	=	=	<	=	=	<	=	>	=	>	=	=	=
Townsend	<	=	<	=	=	<	=	=	<	=	>	=	=	=	=	=
Wilmington	>	=	>	>	>	>	>	>	>	=	>	>	=	=	=	=

IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR (CONTINUED)				
JURISDICTION	Sinkholes/Debris Pits	Landslides	Volcano	Tsunami
Arden	=	=	=	=
Ardencroft	=	=	=	=
Ardentown	=	=	=	=
Bellefonte	=	=	=	=
Delaware City	=	=	=	=
Elsmere	=	=	=	=
Middletown	=	=	=	=
New Castle	=	=	=	=

IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR (CONTINUED)				
JURISDICTION	Sinkholes/Debris Pits	Landslides	Volcano	Tsunami
Newark	=	=	=	=
Newport	=	=	=	=
Odessa	=	=	=	=
Townsend	=	=	=	=
Wilmington	=	=	=	=

4.4.3 Potential Loss Estimates

Table 4.62 presents the results of a summary table of potential loss estimates for each hazard based on the analyses conducted in the hazard profiling.

Summary of New Castle County Average Annual Loss Estimations		
Hazard	Asset	Annual Losses ($)
Floods	Residential (using NFIP claims projection)	$1,123,640
Floods	Residential (using Hazus annual loss)	$226,500
Floods	All properties (using Hazus annual loss)	$3,554,580
Hurricane Wind	All properties (Hazus annual loss estimate)	$20,577,314
Winter Storm	All properties (based on NCDC reported losses)	
Storm/Tornado/Wind Event	All properties	--
Earthquake	All properties (Hazus annual loss estimate)	$1,265,993
Transportation	All properties	--
Gas Wells/Pipelines	All properties	--

4.4.4 Future Development and Vulnerability

As part of this Plan Update, the Steering Committee repeatedly expressed concern that new development should be focused on where infrastructure already exists and regulate development in hazard areas such as the floodplain or forested and steeply sloped areas, to mitigate the increased potential for hazard impacts. These hazards will not cause problems countywide, although the vulnerability for those areas at risk may continue to increase.

Risk and vulnerability to natural and human-caused hazard events are not static. Risks will increase or decrease as counties and municipalities see changes in land use and development, as well as changes in population. New Castle County is expected to experience a variety of factors that will, in some areas, increase vulnerability to hazards, while in other areas, vulnerability may stay static or even be reduced.

5.0 CHAPTER 5 – CAPABILITY ASSESSMENT

5.1 Update Process Summary

The Capability Assessment is an evaluation of New Castle County's governmental structure, political framework, legal jurisdiction, fiscal status, policies and programs, regulations and ordinances and resource availability. Each category is evaluated for its strengths and weaknesses in responding to, preparing for and mitigating the effects of the profiled hazards.

The Capability Assessment is critical to developing a comprehensive and implementable mitigation strategy. The Capability Assessment serves to identify existing gaps, conflicts and/or shortcomings that may need to be addressed through future mitigation actions. The capability assessment also helps to ensure that proposed mitigation actions are practical considering the local ability to implement them.

The Capability Assessment comprises three components:

1. Plan Integration and Document Review - an inventory of select County planning and regulatory tools and a review and incorporation of existing plans and other technical information as appropriate.
2. County Roles and Emergency Response Capabilities and Responsibilities; and
3. Municipal Capability Assessment - an analysis of municipal capacity from a planning, policy, staffing, response, and training standpoint.

This update process included disseminating county and municipal Capability Assessment surveys to all jurisdictions. Information returned was utilized to inform this Capability Assessment Update. Throughout the planning process, the mitigation local planning team considered the county's 13 municipalities. Delaware municipalities have their own governing bodies, pass and enforce their own ordinances and regulations, purchase equipment and manage their own resources, including critical infrastructure. These capability assessments, therefore, consider the various characteristics and capabilities of municipalities under study.

NCC has a number of resources it can access to implement hazard mitigation initiatives including emergency response measures, local planning and regulatory tools, administrative assistance and technical expertise, fiscal capabilities and participation in local, regional, state and federal programs. The presence of these resources enables community resiliency through actions taken before, during and after a hazardous event. While the capability assessment serves as a good instrument for identifying local capabilities, it also provides a means for recognizing gaps and weaknesses that can be resolved through future mitigation actions. The results of this assessment lend critical information for developing an effective mitigation strategy. The 2020 Plan's Capability Assessment was used as a baseline, and sections of this Capability Assessment have been derived from the 2020 plan and updated where applicable.

5.2 Capability Assessment Findings

5.2.1 Planning and Regulatory Capability

Municipalities have the authority to govern more restrictively than state and county minimum requirements. Municipalities can develop their own policies and programs and implement their own rules and regulations to protect and serve their local residents. Local policies and programs are typically identified in a comprehensive plan, implemented through a local ordinance and enforced

by the governmental body or its appointee.

Municipalities regulate land use via the adoption and enforcement of zoning, subdivision and land development, building codes, building permits, floodplain management and/or storm water management ordinances. When effectively prepared and administered, these regulations can lead to an opportunity for hazard mitigation. For example, the National Flood Insurance Program (NFIP) established minimum floodplain management criteria. Municipalities have the option of adopting a single-purpose ordinance or incorporating these provisions into their zoning, subdivision and land development, or building codes; thereby mitigating the potential impacts of local flooding. This capability assessment details the existing NCC and municipal legal capabilities to mitigate the profiled hazards. It identifies the counties and the municipalities' existing planning documents and their hazard mitigation potential. Hazard mitigation recommendations are, in part, based on the information contained in the assessment.

All jurisdictions participate in some form of regional planning decisions, most notably through the Wilmington Area Planning Council (WILMAPCO). WILMAPCO is the designated Metropolitan Planning Organization (MPO) for the region that includes New Castle County, Delaware, and Cecil County, Maryland. The organization is primarily responsible for coordinating transportation plans of local governments within the region, including towns and cities, counties, and states.

Table 5.1 provides a summary of the local plans and programs in place for New Castle County's participating local governments. An "X" indicates that the given plan or program is currently in place and being implemented by the local jurisdiction. An asterisk in front of the "X" for indicates that these capabilities are handled by New Castle County under the Local Service Agreements, or by reliance on the County's capability.

Table 5.1 Jurisdictional Plan Matrix

Jurisdiction	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
New Castle County	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Arden, Village of	X		*X	X	*X			*X	*X	*X	X	X	*X	*X	*X	*X	X		*X
Ardencroft, Village of	X		*X	X	*X			*X	*X	*X		X	*X	*X	*X	*X			*X
Ardentown, Village of	X		*X	X	*X			*X	*X	*X		X	*X	*X	*X	*X	X		*X
Bellefonte, Town of	X		X	X	*X			*X	*X	*X		X	*X	X	*X	*X			*X
Delaware City, City of	X		X	X	X	X	X	*X	*X	*X	X	X	X	X	X	X	X	X	X
Elsmere, Town of	X		X	X	X	X	X	*X	*X	*X	X	X		X	X	X	X		X
Middletown, Town of	X	X	X	X	X	*X	X	*X	*X	*X	X	X	X	X	X	X	X		X
New Castle, City of	X		X	X	X	X	X	*X	*X	*X	X	X	X	X	X	X	X	X	X
Newark, City of	X	X	X	X	X	X	X	*X	*X	X	X	X	X	X	X	X	X	X	X
Newport, City of	X		X	X	X	*X	X	*X	*X	*X	X	X	*X	X	X	X			X
Odessa, Town of	X		X	X	*X		X	*X	*X	*X		X	X	X	X	X	X		X
Townsend, Town of	X	X	X	X	X	X	X	*X	*X	*X	X	X		X	X	X			X
Wilmington, City of	X	X	X	X	X	X	X	*X	X	X	X	X	X	X	X	X	X		X

Key to Table 5.1
HMP – Hazard Mitigation Plan
DRP – Disaster Recovery Plan
CLUP – Comprehensive Land Use Plan
FMP – Floodplain Management Plan / Flood Mitigation Plan
SMP – Stormwater Management Plan
EOP – Emergency Operations Plan
COOP – Continuity of Operations Plan
REP – Radiological Emergency Plan
SARA – SARA Title III Emergency Response Plan

TRANS – Transportation Plan
CIP – Capital Improvements Plan (that regulates infrastructure in hazard areas)
REG-PL – Regional Planning
HPP – Historic Preservation Plan
ZO – Zoning Ordinance
SO – Subdivision Ordinance
FDPO – Flood Damage Prevention Ordinance
NFIP – National Flood Insurance Program
CRS – Community Rating System
BC – Building Codes

Building Codes

Building Codes regulate construction standards. In many communities, permits are issued for, and inspections of work take place on, new construction. Decisions regarding the adoption of building codes (that account for hazard risk), the type of permitting process required both before and after a disaster, and the enforcement of inspection protocols all affect the level of hazard risk faced by a community.

Building codes are important in mitigation because they are developed for a region of the country in respect to the hazards existing in that area. Consequently, structures that are built according to applicable codes are inherently resistant to many hazards, such as strong winds, floods and earthquakes; and can help mitigate regional hazards, such as wildfires. NCC, Middletown, Wilmington, and Newark all have adopted the most recent 2018 Standard of IBC/ICC Building Code, while others have either 2012 standard or at least 2000 standard, as in Elsmere's case which switched to IBC/ICC in 2015.

The adoption and enforcement of building codes by local jurisdictions was assessed using the Building Code Effectiveness Grading Schedule (BCEGS) program developed by the Insurance Services Office, Inc. (ISO). This program is voluntary, and the jurisdiction is not required to have their building codes and personnel evaluated. Under the BCEGS program, ISO assesses the building codes in effect in a community and how the community enforces its building codes, with special emphasis on mitigation of losses from natural hazards.

In conducting the assessment, ISO collects information related to personnel qualification and continuing education as well as number of inspections performed per day. This type of information, combined with local building codes, is used to determine a grade for that jurisdiction. The grades range from 1 to 10, with the lower grade being more ideal. A BCEGS grade of 1 represents exemplary commitment to building code enforcement, and a grade of 10 indicates less than minimum recognized protection. A rating of 99 means that the entity does not meet the minimum requirements for a 1-10 class rating. BCEGS grades for each of New Castle County's local jurisdictions are listed in Table 5.2.

Table 5.2 BCEGS grades for each of New Castle County's Local Jurisdictions

Jurisdiction	BCEGS Grade	BCEGS Grade
Residential Properties	Residential Properties	Commercial Properties
New Castle County	3	3
Arden, Village of	3	3
Ardencroft, Village of	3	3

Jurisdiction Residential Properties	BCEGS Grade Residential Properties	BCEGS Grade Commercial Properties
Ardentown, Village of	3	3
Bellefonte, Town of	3	3
Delaware City, City of	4	4
Elsmere, Town of	10	10
Middletown, Town of	99	99
New Castle, City of	3	3
Newark, City of	4	4
Newport, City of	99	99
Odessa, Town of	3	3
Townsend, Town of	3	3
Wilmington, City of	5	4

Zoning Ordinance

Zoning represents the means by which land use is controlled by local governments. As part of a community's police power, zoning is used to protect the public health, safety and welfare of those in each jurisdiction that maintains zoning authority. A zoning ordinance is the mechanism through which zoning is typically implemented. Since zoning regulations enable municipal governments to limit the type and density of development, it can serve as a powerful tool when applied in identified hazard areas.

Stormwater Management

The proper management of storm water runoff can improve conditions and decrease the chance of flooding. A stormwater management plan is designed to address flooding associated with stormwater runoff. The stormwater management plan is typically focused on design and construction measures that are intended to reduce the impact of minor urban flooding more frequently occurring.

Many of the municipalities in New Castle County coordinate their stormwater management efforts with the New Castle County Conservation District and the Delaware Department of Natural Resources and Environmental Control. Section 5101 of the Sediment and Stormwater Regulation identifies ways to reduce effects of stormwater runoff on the water and lands of the State of Delaware. It is administered by the Division of Watershed Stewardship, Department of Natural Resources and Environmental Control (DNREC). The City of Newark created a Stormwater Utility and associated fee to fund stormwater improvements, as did the City of Wilmington since 2007. Middletown does not have a drainage ordinance but adopted the State SWM Regs for code.

Subdivision Ordinance

Subdivision and land development ordinances include regulations to control the layout of streets, the planning of lots and the provision of utilities and other site improvements. The objectives of a subdivision and land development ordinance are to: coordinate street patterns; ensure adequate utilities and other improvements are provided in a manner that will not pollute streams, wells and/or soil; reduce traffic congestion; and provide sound design standards as a guide to developers, the elected officials, planning commissions and other municipal officials.

A subdivision ordinance is intended to regulate the development of housing, commercial, industrial or other uses, including associated public infrastructure, as land is subdivided into buildable lots for sale or future development. Subdivision design that accounts for natural hazards can dramatically reduce the exposure of future development.

Comprehensive Plan

A comprehensive plan establishes an overall vision for what a community wants to be and a guide to future governmental decision-making. Typically, a comprehensive plan is comprised of demographic conditions, land use, transportation elements and community facilities. Given the broad nature of the plan and its regulatory standing in many communities, the integration of hazard mitigation measures into the comprehensive plan can enhance the likelihood of achieving risk reduction goals, objectives and actions.

The State of Delaware requires its counties to adopt and regularly update comprehensive plans in conformity with the Quality-of-Life Act of 1988 codified under Title 22, Chapter 7, and for the Counties under Title 9 of the Delaware State Code. This law requires the plans to include the following elements: Public Participation, Population Data and Analysis, Future Land Use Plan, Mobility, Water and Sewer, Conservation, Recreation and Open Space, Housing, Intergovernmental Coordination, Community Design, Historic Preservation, Economic Development, Capital Improvements, and Implementation Strategies. The plans are to be on a 10-year cycle with 5-year updates provided, and an Annual Report submitted to the State Office of Planning. Currently, the Villages of Arden, Ardencroft, and Ardentown fall under county comprehensive planning jurisdiction while all other municipalities have their own certified comprehensive plans.

Capital Improvements Plan

The capital improvements plan is a multi-year policy guide that identifies needed capital projects and is used to coordinate the financing and timing of public improvements. Capital improvements relate to streets, storm water systems, water distribution, sewage treatment and other major public facilities. A capital improvements plan should be prepared by the respective county's planning department and should include a capital budget. This budget identifies the highest priority projects recommended for funding in the next annual budget. The capital improvements plan is dynamic and can be tailored to specific circumstances.

Most of the jurisdictions have a Capital Improvement Plan that is part of their Capital Budget process. Some of the smaller municipals have funds within their operating budgets for small projects based upon their services and needs. Ardencroft and Ardentown do not have any capital infrastructure or needs, and all capital infrastructure in Bellefonte and Odessa is under the responsibility of other entities.

Transportation Plan:

A transportation plan identifies the means to gauge transportation demands and the options to meet those needs, while considering the social, economic and environmental characteristics of the area. The development of transportation networks can significantly impact the amount, type and location

of future growth. As a result, transportation planning can have a dramatic effect on future hazard vulnerability.

Transportation planning (including emergency evacuation planning) is commonly addressed as an element to the local comprehensive plans and in coordination with the Delaware Department of Transportation and WILMAPCO. Primarily, WILMAPCO's Regional Transportation Plan focused on the I-95 corridor through Northern NCC and into Cecil County, MD. Over the past several years, WILMAPCO has developed area focused plans for municipals, areas of specific transit problems, and assisted in the plans for the Southern portion of NCC. Newport and Newark both have separate Transportation Plans that address specifics for their municipals.

DELDOT manages the transportation network and projects, including railroad crossings, and coordinates with the County and City OEMs on the Evacuation Routes and Evacuation Plans.

Historic Preservation Plan

A historic preservation plan is intended to preserve historic structures or districts within a community. An aspect of the historic preservation plan that is often overlooked is the assessment of buildings and sites located in areas subject to natural hazards to include the identification of the most effective way to reduce future damages.[32] This may involve retrofitting or relocation techniques that account for the need to protect buildings that do not meet current building standards or are within a historic district that cannot easily be relocated out of harm's way.

Historic Preservation Planning is broadly handled at the State level through the State Historic Preservation Office (SHPO), or as its proper name, the Division of Historical and Cultural Affairs under the Department of State. SHPO has developed an overall State Historic Preservation Plan, and each jurisdiction has individually addressed Historic Preservation within the CLUP's. All of the jurisdictions have their own Historic Preservation Plan or are part of the State/County's Plan except Elsmere and Townsend. In addition, several towns are designated as Historic District Overlay areas.

Participation in the National Flood Insurance Program (NFIP)

Flooding represents the greatest natural hazard facing the nation. At the same time, the tools available to reduce the impacts associated with flooding are among the most developed when compared to other hazard-specific mitigation techniques. In addition to approaches that cut across hazards, such as education, outreach, and the training of local officials, the National Flood Insurance Program (NFIP) contains specific regulatory measures that enable government officials to determine where and how growth occurs relative to flood hazards. Participation in the NFIP is voluntary for local governments, but the program is promoted by FEMA and DEMA as a first basic step for implementing and sustaining an effective hazard mitigation program. It is therefore used as a key indicator for measuring local capability as part of this assessment.

In order for a county or municipality to join the NFIP, they must adopt a local flood damage prevention ordinance that requires jurisdictions to follow established minimum building standards in the floodplain. These standards require that all new buildings and substantial improvements to existing buildings will be protected from damage by the 100-year flood, and that new floodplain development will not aggregate existing flood problems or increase damage to other properties.

[32] See Protecting the Past from Natural Disasters. 1989. Nelson, Carl. National Trust for Historic Preservation: Washington, D.C.

Another key service provided by the NFIP is the mapping of identified flood hazard areas. Once prepared, the Flood Insurance Rate Maps (FIRMs) are used to assess flood hazard risk, regulate construction practices, and set flood insurance rates. FIRMs are an important source of information to educate residents, government officials and the private sector about the likelihood of flooding in their community. As of August 10, 2020, FEMA Region 3 is the first in the country to have wall-to-wall coverage in digital maps – a big step forward in ensuring the safety of local communities from flooding. FEMA Region 3, which includes Delaware, Maryland, Pennsylvania, Virginia, West Virginia, and Washington, D.C. leads the country in providing up-to-date flood hazard information to local communities. Table 5.3 summarizes NFIP participation for each of New Castle County's municipalities below.

Table 5.3 NFIP Map Dates

Jurisdiction	NFIP Entry Date	Current Effective Map
New Castle County	12/03/71	01/22/2020
Arden, Village of	03/11/2016	01/22/2020
Ardencroft, Village of	Not in NFIP	01/22/2020
Ardentown, Village of	1/28/97	01/22/2020
Bellefonte, Town of	Not in NFIP	01/22/2020
Delaware City, City of	2/16/77	02/04/2015
Elsmere, Town of	12/31/76	01/22/2020
Middletown, Town of	1/07/77	01/22/2020
New Castle, City of	12/26/75	01/22/2020
Newark, City of	3/29/74	01/22/2020
Newport, City of	Not in NFIP	01/22/2020
Odessa, Town of	04/27/2012	02/04/2015
Townsend, Town of	Not in NFIP	01/22/2020
Wilmington, City of	5/02/1977	01/22/2020

An additional indicator of floodplain management capability is the number of participants in the *Community Rating System* (CRS). The CRS is administered by FEMA's National Flood Insurance Program (NFIP). The CRS is an incentive-based program that encourages counties and municipalities to undertake defined flood mitigation activities as extra measures, which provide protection from flooding that goes beyond the minimum requirements of the NFIP, adding extra local measures to provide protection from flooding. The incentives are in the form of premium discounts. There are 18 creditable CRS mitigation activities available to communities. These activities are assigned a range of point values. A community receives a CRS classification based upon the credit points it receives for its activities. It can take on a wide range of activities that reduce flood losses. These activities include but are not limited to better mapping, regulations, public information, flood damage reduction and/or flood warning and preparedness programs. As points are accumulated and reach identified thresholds, communities can apply for an improved CRS class. Class ratings, which run from 10 to 1, are tied to flood insurance premium reductions shown in Table 5.4. Under the CRS, flood insurance premiums for properties in participating communities are reduced to reflect the flood protection activities that are being implemented. As class ratings improve (decrease), the percent reduction in flood insurance premiums for NFIP policy holders in that community increases.

Table 5.4 CRS Classes and Premium Reductions

CRS Class	Premium Reduction	CRS Class	Premium Reduction
1	45%	6	20%
2	40%	7	15%
3	35%	8	10%
4	30%	9	5%
5	25%	10	0

Community participation in the CRS is voluntary. Any community that is in full compliance with the rules and regulations of the NFIP may apply to FEMA for a CRS classification better than Class 10. The CRS application process has been greatly simplified over the past several years based on community comments to make the CRS more user friendly as possible, and extensive technical assistance is also available for communities who request it.

Table 5.5 lists the current CRS communities in New Castle County.

Table 5.5 CRS Communities in New Castle County

Jurisdiction	CRS Entry Date	Current CRS Class
New Castle, City of	10/1/94	8
Newark, City of	10/1/92	7
Delaware City, City of	10/1/12	9
Unincorporated areas of County	05/01/13	5

Source: FEMA

After discussions with the Steering Committee, and a survey sent to County and Local Floodplain Coordinators, GIS Specialists, and County Planning, the following information is included (Table 5.1) to document how the County and municipalities currently address and will continue to address NFIP compliance and requirements in the future. This was also sent to all municipal representative/floodplain coordinators to identify the responsibilities at the municipal level, which vary from jurisdiction to jurisdiction. Individual municipalities are responsible for fulfilling NFIP requirements and can request county assistance, while the county is responsible at the county level and for the municipalities' areas. All completed municipal NFIP Questionnaires are included in Appendix C, effectively providing a reflection of NFIP activities for each participating community. The designee responsible for implementing the NFIP locally for each jurisdiction are the municipal representatives identified in in Table 5.6, and/or the local floodplain coordinator/administrator.

Table 5.6 Involvement in NFIP Compliance

Flood Identification and Mapping	County

Does the County make the Flood Insurance Rate Map and Flood Insurance Studies available to the public? Where are these documents housed within the County?	YES
Will the recently developed Digital Flood Insurance Rate Maps be made available to the public as well? How?	YES, via a link (to the FEMA website) on the County website
A) Are Letters of Map Revisions (LOMRs) reviewed and signed by County officials. B) If during the subdivision review process a new development determines a reduction in the floodplain delineation of the FIRM floodplain, is the developer required to submit a LOMR submission to FEMA?	A) NO B) YES, the local Flood Plain administrators must enforce this as per their regulations.
Does the County provide advice to community residents regarding elevation certificates and Letter of Map Amendment (LOMA) applications?	YES
Does the County maintain records of approved letters of map change?	NO, this is available on the FEMA website
Does the County assist residents in interpreting the FIRM and County flood studies to determine the property's status in the floodplain? If yes, which department?	YES
Are any restrictions on floodplain use enforced through the subdivision and building permit process?	YES, for those municipalities which enforce such permits.
Do all proposed developments require plans to go through the County's subdivision approval process or to acquire a building permit for new structures?	YES, depending on type of development and size of building
Are all new structures required to be at least 1.5 feet above the 100-year base flood elevation?	YES
Is the County committed to educating residents about the value and availability of flood insurance? Is an annual letter sent to residents in the floodplain explaining the importance of flood insurance and where it may be obtained?	Municipalities educate their own residents.
Does the County assist residents in interpreting the FIRM and County flood studies to determine the resident's property's flood plain status, and offer advice regarding elevation certificates and LOMA applications?	YES
When was the last Community Assistance Visit conducted and, as of that date, NCC County was found to meet the requirements for continued participation in the NFIP?	New Castle County was found to meet the requirements.

5.2.2 Administrative and Technical Capability

There are 13 municipalities within New Castle County. Each of these municipalities conducts its daily operations and provides various community services according to local needs and limitations. Some of these municipalities have formed cooperative agreements and work jointly with their neighboring municipalities to provide services such as police protection, fire and emergency response, infrastructure maintenance and water supply management. Others choose to operate on their own. Municipalities vary in staff size, resource availability, fiscal status, service provision, constituent population, overall size and vulnerability to the profiled hazards.

Administrative Capability

Administrative capability was evaluated by reviewing county and municipal staffing and the existing organizational structure for local governments to implement mitigation strategies. The ability of a local government to develop and implement mitigation projects, policies and programs is directly tied to its ability to direct staff time and resources for that purpose.

The analysis of the responses to the *Capability Assessment* findings indicated that there is generally a *limited to moderate* administrative capability of New Castle County's jurisdictions to implement mitigation strategies, and one jurisdiction rated as High. Eight (8) jurisdictions indicated they had limited administrative capability, while six (4) indicated they had moderate administrative capability, and one (1), New Castle, indicated they had a High capability. Local municipal jurisdictions in New Castle County indicated that they work cooperatively with the county and State on many activities, and utilize contractors, helping to offset their administrative and staff limitations. Most municipal police and fire departments have mutual aid agreements in place with the county covering response and recovery operations, but not mitigation activities. The villages of Arden, Ardencroft and Ardentown work cooperatively with each other and the county on many local activities. Some municipalities in fact credit their small staff size to facilitating close intergovernmental cooperation.

The implementation of mitigation actions is assigned to special services and/or contractors. Municipal actions are completed by the municipality. Both county and municipal actions are often completed in coordination with the Conservation District. Other mitigation actions are identified within the departments and handled by specific departments. Town of Townsend ranked their Admin Capability as a High Low, almost Moderate due to staffing and improvements within the Town on management of administrative components. In addition, the City of New Castle ranked their Administrative Capability as High, given the experience of their staff and the use of three separate engineering firms to evaluate and manage projects.

The results of the administrative capability assessment demonstrate that each jurisdiction has a wide range of experience, internal and external capability, and possess some capability to conduct projects, but the available time of commitment to dedicate to these projects is the challenge for all of them. The development of contractual project management firms through a dedicated effort would assist all levels of government in developing and administering mitigation grants and projects. In preparing local mitigation strategies, local governments should look to integrate hazard mitigation activities into routine governmental functions whenever possible.

Technical Capability

Technical capability can be defined as possessing the skills and tools needed to improve decision making, including the development and implementation of sound mitigation actions. For purposes of gauging the technical capability of New Castle County's local jurisdictions for mitigation planning purposes, the Capability Assessment meetings focused on the local availability and application of Geographic Information Systems (GIS) and having engineering capability within the jurisdiction.

The analysis of the responses to the Capability Assessment feedback indicated that there is generally a limited technical capability of New Castle County's jurisdictions to implement mitigation strategies. Nine (9) of the 15 jurisdictions indicated they had limited technical capability, while only four (4) indicated they had high technical capability. Most of the cities and towns do not employ GIS staff or have direct access to GIS systems due to financial limitations, and many indicated that they rely on New Castle County for GIS data and management services. Many local officials indicated that

they are interested in gaining better access to GIS and related technical resources for their jurisdiction.

The development of GIS capability and availability of those resources remains strong at the State, County, Private, and Academia levels, however, the municipal level depends on those levels for support. As understanding grows amongst them of the available capabilities, this effort will continue to grow in a coordinated effort. NCC GIS now has the ability internally to handle HAZUS and other vulnerability analysis, in conjunction with the State, Sussex and Kent Counties, City of Wilmington, and University of Delaware. The evaluation of projects has always been a challenge for entities, in order to determine the best solution and grant program.

Emergency Management Coordinator

Emergency Management is a comprehensive, integrated program of mitigation, preparedness, response and recovery for emergencies/disasters of any kind. No public or private entity is immune to disasters, and no single segment of society can meet the complex needs of a major emergency or disaster on its own. A County and municipal emergency management coordinator is responsible for emergency management – preparedness, response, recovery and mitigation within his/her respective jurisdiction.

The New Castle County Department of Public Safety coordinates countywide emergency management efforts. Each municipality has a designated local emergency management coordinator who possesses a unique knowledge of the impact hazard events have on their community.

Political Capability

One of the most difficult capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to mitigate hazard events. The adoption of hazard mitigation measures may be seen as an impediment to growth and economic development. In many cases, mitigation may not generate interest among local officials when compared with competing priorities. Therefore, the local political climate must be considered when designing mitigation strategies, as it could be the most difficult hurdle to overcome in accomplishing the adoption or implementation of specific actions.

The capability assessment survey was used to capture information on each jurisdiction's political capability. Survey respondents were asked to identify examples of political capability, such as guiding development away from hazard areas, restricting public investments or capital improvements within hazard areas, or enforcing local development standards that go beyond minimum state or federal requirements (i.e., building codes, floodplain management ordinances, etc.). These examples were used to guide respond- ents in scoring their community on a scale of "unwilling" (0) to "very willing" (5) to adopt policies and programs that reduce hazard vulnerabilities. Of the municipalities that responded, none of the municipalities completed this section with a numerical response.

New Castle County Emergency Operations Center

The New Castle County Emergency Operations Center (EOC) serves as a central hub for coordinating emergency response efforts during natural or human-caused disasters. It acts as a command-and-control center, managing resources, information, and communication to support first responders and citizens. The EOC does not manage incidents directly but rather coordinates the overall response. The New Castle County EOC acts as the "brain" of the county's emergency response system, ensuring a coordinated and effective approach to managing and mitigating the impacts of any emergency. The EOC is located at the Department of Public Safety (DPS) building, located at 3601 N Dupont Hwy, New Castle, DE 19720.

Local Fire and EMS Organizations

New Castle County has numerous fire and EMS facilities serving its communities. These include local fire departments, often volunteer-based, and EMS services that may be integrated with the fire departments or operate independently. These facilities provide a range of services, including fire suppression, rescue operations, and emergency medical care, often with cross-trained firefighter/paramedic.

Self-Assessment

In addition to the inventory and analysis of specific local capabilities, the *Capability Assessment Survey* required each local jurisdiction to conduct its own self-assessment of its capability to effectively implement hazard mitigation activities. As part of this process, county and municipal officials were encouraged to consider the barriers to implementing proposed mitigation strategies in addition to the mechanisms that could enhance or further such strategies. In response to the survey questionnaire, local officials classified each of the capabilities as either "L = limited" "M = moderate" or "H = high." *Table 5.7 – Capability Self-Assessment Matrix* summarizes the results of the self-assessment survey. All municipalities returned this section of the assessment completed.

Table 5.7 Capability Self-Assessment Matrix

Jurisdiction	Technical Capability	Fiscal Capability	Administrative Capability
New Castle County	H	M	M
Arden, Village of	L	L	L
Ardencroft, Village of	L	L	L
Ardentown, Village of	L	L	L
Bellefonte, Town of	L	L	L
Delaware City, City of	L	L	M
Elsmere, Town of	M	L	L
Middletown, Town of	H	M	M
New Castle, City of	H	M	H
Newark, City of	M	M	M
Newport, City of	L	L	L
Odessa, Town of	L	L	L
Townsend, Town of	L	M	L
Wilmington, City of	H	M	H

Existing Limitations

Funding has been identified as the largest limitation for a municipality to complete mitigation activities. The acquisition of grants is the best way to augment this process for the municipalities. The county and municipalities representatives will need to rely on regional, state and federal partnerships for future financial assistance. Development of intra-county regional partnerships and intra-municipality regional partnerships will bolster this process.

5.2.3 Financial Capability

The ability to act is often closely associated with the amount of money available to implement policies and projects. This may take the form of grants received or state and locally based revenue. The costs associated with policy and project implementation vary widely. In some cases, policies are tied primarily to staff costs associated with the creation and monitoring of a given program. In other cases, money is linked to an actual project, like the acquisition of flood-prone homes, which can require a substantial commitment from local, state and federal funding sources.

The analysis of the responses to the Capability Assessment feedback indicated that there is a limited to moderate fiscal capability of New Castle County's jurisdictions to implement mitigation strategies. Nine (9) jurisdictions indicated they had limited fiscal capability, while six (6) indicated they had moderate fiscal capability. Some jurisdictions can generate revenue for mitigation purposes, such as charging stormwater utility fees for clearing drainage systems and completing flood mitigation projects (in fact, most communities in New Castle County do pay for drainage system maintenance through their own internal funding sources). However, most jurisdictions in New Castle County do not have access to such dedicated revenue streams and rely heavily upon monies available through state and federal grant programs.

Under the NCC Capital Budget for FY 2020-2025, the County Council is required to approve a capital program and adopt a capital budget before it ordains the annual operating budget. The program is required to detail each capital improvement project. Each project indicates the amount of appropriations that have been expended or are to be expended and the funding sources. This ranking is then related to the County's ability to pay for the projects over time. There are several capital projects related to stormwater, drainage, and infrastructure improvements.

The results of the local capability assessment should be used as a general guide to help craft mitigation actions that are achievable. When considering the effect of fiscal capability on the implementation of mitigation policies and projects, jurisdictions should consider whether the actions require monetary commitment or staff resources. If so, consideration should be given to available grant funding sources, or perhaps combining resources with the county or other municipalities to offset costs of implementation. Consideration should also be made as to whether the jurisdiction is willing to commit local revenue on a sustained or one-time basis.

In most cases, in order to implement mitigation projects and policies, some monetary commitment or staff resources will be required. This may take the form of a non-federal match requirement or the costs associated with staff time devoted to policy development, implementation and monitoring. The identification of eligible Pre-Disaster Mitigation projects, as well as other federal funding sources identified in the New Castle County Mitigation Plan, enables communities to compete nationally for available funding. The county and municipal governments should consider, whenever possible, combining financial and staff resources to address hazards, most of which tend to impact regions rather than individual jurisdictions. The State Hazard Mitigation Council has discussed this effort recently. There have also been discussions on the establishment of a Mitigation Fund at the State and Local levels with a dedicated revenue stream to assist in the match funding of projects.

Fiscal capability is significant to the implementation of hazard mitigation activities. Every jurisdiction must operate within the constraints of limited financial resources. The following information pertains to various financial assistance programs relevant to hazard mitigation.

FEMA Hazard Mitigation Assistance Program

FEMA administers three hazard mitigation grant programs, known collectively as the Hazard Mitigation Assistance (HMA) programs. FEMA's Hazard Mitigation Assistance Program and Policy Guide (April 2023) provide specific guidance for these different programs. The HMA guidance replaces previous guidance and more efficiently manages hazard mitigation grants under one umbrella. Three FEMA hazard mitigation grants of the HMA program include:

Financial sources are a critical aspect to implementing projects within a community. In the past, the municipalities, as well as the County, have taken an active role in seeking funds for these planning efforts. The following funding sources provide grants for hazard mitigation planning and project related activities:

- Hazard Mitigation Grant Program (HMGP) – HMGP is administered by FEMA and provides grants to states, tribes and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to natural disasters and to enable mitigation activities to be implemented as a community recovers from a disaster. Eligible projects include elevating flood-prone homes or businesses; acquisition of flood-prone homes from willing owners and returning the property to open space; retrofitting buildings; and construction of floodwall systems to protect critical facilities.
- Flood Mitigation Assistance (FMA) Program – FMA provides funding to assist communities and states in implementing actions that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, or other National Flood Insurance Program (NFIP) insurable structures with a focus on repetitive loss properties. The NFIP enables property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. Three types of FMA grants are available to States and communities: 1) planning grants to prepare Flood Mitigation Plans; 2) project grants to implement measures to reduce flood losses, such as elevation, acquisition, or relocation of NFIP-insured structures; and 3) technical assistance grants for the State to help administer the FMA program and activities.

Other FEMA and Federal Programs

- National Flood Insurance Program (NFIP) – As discussed in other sections, the NFIP offers flood insurance to homeowners, renters, and business owners if their community participates in the NFIP. Flood insurance protects two types of insurable property – building and contents. The program is administered in Delaware by DNREC. There is language in the NFIP pertaining to substantial damage, wherein if the insured structure in the floodplain is more than 50% damaged (or modified) the structure must be brought into compliance with the NFIP. Structures in the floodplain that are substantially damaged may be eligible for the Increased Cost of Compliance (ICC) coverage, and new and renewed Standard Flood Insurance Policies. Substantial Damage Determinations and ICC coverage have been found to be effective in communities working to mitigate RL and SRL properties and may be considered in combination with other funding streams. [33]

[33] PA 2023 State Hazard Mitigation Plan

- The Community Rating System (CRS) -The goal of the Community Rating System (CRS) program is to provide incentives for communities to go beyond the minimum floodplain management requirements to develop extra measures to provide protection from flooding. The incentives are in the form of premium discounts. The CRS is administered by FEMA's National Flood Insurance Program (NFIP). Under the CRS, flood insurance premiums for properties in participating communities are reduced to reflect the flood protection activities that are being implemented. A community receives a CRS classification based upon the credit points it receives for its activities. It can take on a wide range of activities that reduce flood losses. These activities include but are not limited to better mapping, regulations, public information, flood damage reduction and/or flood warning and preparedness programs. Currently, four jurisdictions in New Castle County belong to the CRS: City of New Castle; City of Newark; Delaware City; and unincorporated areas of NCC.
- Public Assistance (PA) Program – According to the FEMA website, "Through the PA Program, FEMA provides assistance for the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain PNP organizations. Section 406 of the Stafford Act provides a funding source for cost-effective hazard mitigation measures that would reduce or eliminate the threat of future damage to a facility damaged during the disaster. The measures must apply only to the damaged elements of a facility rather than to other, undamaged parts of the facility or to the entire system. Section 406 mitigation measures are considered part of the total eligible cost of repair, restoration, reconstruction, or replacement of a facility. They are limited to measures of permanent work, and the Applicant may not apply mitigation funding to alternate projects or improved projects if a new replacement facility is involved. Upgrades required to meet applicable codes and standards are not 'mitigation measures' because these measures are part of eligible restoration work."
- FEMA Regional Catastrophic Preparedness Grant Program (RCPGP) – The RCPGP is intended to support coordination of regional all-hazard planning for catastrophic events, including the development of integrated planning communities, plans, protocols, and procedures to manage a catastrophic event in high-risk urban areas and their surrounding regions. [34]
- Community Assistance Program – State Support Services Element (CAP-SSSE) According to the FEMA website, "[the CAP-SSSE] program provides funding to States to provide technical assistance to communities in the National Flood Insurance Program (NFIP) and to evaluate community performance in implementing NFIP floodplain management activities. In this way, CAP-SSSE helps to:
    - Ensure that the flood loss reduction goals of the NFIP are met.
    - Build State and community floodplain management expertise and capability.
    - Leverage State knowledge and expertise in working with their communities." [35]
- Public Health Emergency Preparedness (PHEP) – The PHEP program provides funds for health departments to build and strengthen their abilities to effectively respond to a range of public health threats, including infectious diseases, natural disasters, and biological, chemical, nuclear, and radiological events. Preparedness activities funded by the PHEP cooperative agreement are targeted specifically for the development of emergency-ready public health departments that are flexible and adaptable.
- Urban Areas Security Initiative (UASI)– The UASI program assists high-threat, high-density urban areas in efforts to build and sustain the capabilities necessary to prevent, protect against,

[34] Ibid
[35] Ibid.

mitigate, respond to, and recover from acts of terrorism. The UASI program is intended to provide financial assistance to address the unique multi-discipline planning, organization, equipment, training, and exercise needs of high-threat, high-density Urban Areas, and to assist these areas in building and sustaining capabilities.

- Repetitive Flood Claims – The program provides funding to States and communities to reduce or eliminate the long-term risk of flood damage to structures insured under the NFIP that have had one or more claims for flood damages, and that cannot meet the requirements of the Flood Mitigation Assistance (FMA) program for either cost share or capacity to manage the activities. Eligible activities include: 1) acquisition of properties and either demolition or relocation of flood-prone structures, where the property is deed restricted for open space uses in perpetuity; 2) elevations; 3) dry flood-proofing of non-residential structures; and 4) minor localized flood control projects.
- Severe Repetitive Loss (SRL) - A SRL property is defined as a residential property that is covered under a NFIP flood insurance policy and: 1) that has at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; or 2) for which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building. Eligible flood mitigation project activities under the SRL program include: 1) acquisition and demolition or relocation of at-risk structures and conversion of the property to open space; 2) elevation of existing structures to at least the base flood elevation; 3) minor physical localized flood reduction projects; and 4) dry flood-proofing for historic properties.
- Emergency Management Performance Grants (EMPG) – The EMPG program provides resources to state and local governments to develop an all-hazards planning approach to emergency management and to sustain and enhance all-hazards emergency management capabilities. Every State is eligible for a percentage of the available funds and is intended to sustain the core capabilities of the five (Prevention, Protection, Mitigation, Response, and Recovery) mission areas.
- Additional Federal Programs are provided below.
    - Community Disaster Loan Program
    - Individuals and Households Program
    - Environmental Planning and Historic Preservation Program
    - Fire Management Assistance Grant
    - RiskMAP
    - Individuals and Households Program
    - Safeguarding Tomorrow Revolving Loan Fund (RLF)
    - Community Development Block Grant (CDBG)
    - Department of Homeland Security Grant Program (HSGP)
    - Small Business Administration Disaster Loan Programs
    - Natural Resources Conservation Service (NRCS)

In addition to Federal funding sources, the State of Delaware utilizes funding sources to meet the match requirements of FEMA programs, and a variety of technical assistance programs available to aid communities with hazard mitigation. State Programs are listed below, and for additional information regarding these programs, as well as potential additional State programs, please refer to the DE 2023 State HMP's Capability Assessment chapter.

Delaware Emergency Management Agency (DEMA)

- DEMA is the lead state agency coordinating mitigation, response, and recovery.
- It manages key FEMA-related mitigation grant programs: Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance, Pre-Disaster Mitigation, etc.
- Provides training and education (all-hazards training, workshops, seminars) for local governments and other stakeholders to improve preparedness and mitigation capacity.

DNREC – Division of Watershed Stewardship; Coastal Programs; Floodplain Management

- Floodplain Management Program: offers technical assistance to municipalities related to floodplain ordinance compliance, mapping, NFIP (National Flood Insurance Program) administration, and monitoring local ordinances.
- Resilient Community Partnership: helps communities prepare for coastal hazards, sea level rise, coastal storms, etc. This includes planning support, staff support, outreach, training.

Delaware State Housing Authority (DSHA)

- Two pilot programs offering free technical assistance to local governments:
    - Zoning and Land Use Reform Pilot Program: helps jurisdictions modernize zoning / land use codes to encourage more resilient, mixed use, compact development.
    - Disaster Housing Pilot Program: helps municipalities adopt *pre-disaster recovery ordinances*, assess risk & capacity, streamline housing recovery after disasters, establish best practices.

Delaware Forest Service / Wildland Fire Program

- Offers cost-share grants and technical assistance to communities for wildland fire risk reduction (fuel management, fire suppression tools, etc.).
- Prescribed fire program to reduce fuel loads, plus education and support for fire companies.

Community Conservation Assistance Program (DeCAP) – DNREC

- Though more water quality / environmental, this program offers technical & financial assistance for implementing best management practices (BMPs) that can help with stormwater, erosion control, drainage – all relevant to flood or water hazard mitigation.

Several of the programs under the HMA program as well as several of the other state programs that require a local match component. If funding is not obtained through other state or federal grant programs, often local municipalities use their own funds to provide the match. Mitigation resources from the local level are limited to funds generated from local taxes permitted by state enabling legislation and/or proceeds from the issuance or floating of local municipal bonds. While the percentage of local contribution varies from program to program, Local communities need to assess their financial capability and resources to implement their hazard mitigation action plans.

5.2.4 Education and Outreach

DEMA conducts outreach to county and local officials, universities, and other agencies as applicable to engage them in applying for both annual HMA funding and post-disaster HMGP funding. Annual notice of funding availability is publicized through county contacts, and post-disaster briefings are held for disaster-impacted areas to engage county and local officials in opportunities for mitigation funding. DEMA uses the Letter of Intent for HMGP projects and the Letter of Interest for other

HMA projects to identify leads on hazard mitigation projects.If the projects described in the letters fit the eligibility guidelines, the HMPO form is completed. In addition, DEMA supports local HMA application development by providing technical assistance and trainings.

DEMA also uses its website to provide guidance on mitigation grant programs and supply forms and documents. DEMA is consistently working to track progress on mitigation as the agency maintains and updates lists on mitigation projects that are in progress and complete.

Table 5.8 shows Education and outreach programs and methods at the State level that can be used to implement mitigation activities and communicate hazard-related information.

Table 5.8 Education and Outreach Programs and Methods at the State Level

Capability	Lead Organization	Description of Capability
Fire Prevention and Protection Program	Department of Agriculture Delaware Forest Service	This program operates directly through the DFS Urban and Community Forestry Program and provides technical and financial assistance to homeowners' associations, municipalities, counties, and state government agencies on tree care and hazard mitigation
Delaware Accidental Release Prevention Program	DNREC	The program led to the creation of a system that allows citizens to promptly learn of releases or discharges of contaminants or pollutants that meet or exceed certain thresholds. Following the receipt of a discharge or release report, DNREC notifies the public within 12 hours. The program was developed in response to Senate Bill 33 that was passed in July 2001. The program's mission is "protecting the lives and health of persons living and working in the vicinity of facilities handling extremely hazardous substances." The program, based on the Clean Air Act, Section 112r, requires that owners and operators of stationary sources that maintain regulated substances on site must develop and implement a risk management program that anticipates and minimizes the chances of catastrophic events.
Citizen Corps	DEMA	The mission of Citizen Corps is to harness the power of every individual through education, training, and volunteer service to make communities safer, stronger, and better prepared to respond to the threats of terrorism, crime, public health issues, and disasters of all kinds
Community Rating System	DNREC	The primary goals of the CRS are to reduce flood losses, facilitate accurate insurance ratings, and to promote the awareness of flood insurance. These goals are achieved through the administration of a program that goes beyond the requirements of NFIP participation. The CRS is an incentive-based program that encourages counties and municipalities to undertake defined actions designed to reduce the impacts of future flooding.
DC CAER (Delaware City Community Awareness and Emergency Response) group	DSHS	DC-CAER is an informal organization made up of representatives of all the chemical facilities in the Delaware City Refinery complex, NCC OEM, DEMA, DNREC, and DSP. Formed voluntarily in 1985, DC-CAER strives to meet three goals: to enhance emergency response capabilities, to test and evaluate these capabilities, and to foster knowledge about chemical-related hazards and protective measures. DC-CAER maintains a comprehensive emergency response plan, known as the DCCAER Plan, to deal with chemical emergencies at the plant; conducts training programs for emergency responders; coordinates annual field emergency response exercises and tabletop drills; conducts community outreach programs to disseminate emergency information; makes presentations about its

		programs to community, government, and professional organizations throughout Delaware and in other States.
Annual Summit and Coffee Hours	RASCL	An annual summit and quarterly coffee hours to promote information sharing, networking, and disseminate best practices.
"News Digest" newsletter	RASCL	RASCL issues a newsletter periodically with links to resources, program announcements, and information on best practices for resilience, sustainability, and hazard mitigation.
Coast Day	UDEL College of Earth Ocean and Environment	Annual outreach event, which features lectures and exhibits that relate to earth sciences and hazard information.
Cape Community Coalition	Delaware Sea Grant	Local resilience network in eastern Sussex County that activates when there is a crisis. CCC leverages help and resources within the network to address gaps related to food, housing, equipment, or other needs during a crisis.
Preparedness Workshops	Delaware Sea Grant	Emergency preparedness workshops for vulnerable populations (including the deaf and older adults).
Weather Awareness Weeks: www.climate.udel.edu	CEMA	Work with DEMA and Delaware Sea Grant severe weather awareness week, and hurricane awareness, winter weather awareness. State climate office and National weather service. Presentations around the state on severe weather and hazards Monthly summary weather reports and climate updates for the state and maintain the state's database for the state's climate.
Delaware Environmental Monitoring Coordination Council (DEMCC) Annual Symposium	DEMCC	A gathering of environmental partners from around the state to promote best practices in environmental monitoring and coordinate monitoring around the state of Delaware. These gatherings offer an opportunity to learn about the current state of environmental monitoring activities in Delaware, discuss upcoming challenges, and explore opportunities to collaborate on future monitoring campaigns.
Delaware Weather Hazard Index	CEMA	Reflects 48-hour potential threats & weather conditions.
All Ready Delaware	University of Delaware Center for Disability Studies	This website will help the disabled population think through personal needs in an emergency, and how to plan ahead for various situations. It will suggest action steps to develop a personal preparedness plan.
University of Delaware's Citizen Monitoring Program	University of Delaware Sea Grant Marine Advisory Service	Established in 1991, the University of Delaware's Citizen Monitoring Program collects verifiable water quality data to support public policy decisions and to increase public participation and support for the management and protection of the Inland Bays. Today, the program includes the original Inland Bays Citizen Monitoring Program, the Broadkill River Monitoring Program, the Harmful Algae Monitoring Program, and the Bacteria Monitoring Program. The program is managed by the University of Delaware Sea Grant Marine Advisory Service at the College of Earth, Ocean, and Environment in Lewes. Support for the program comes from many sources including Sea Grant; DNREC; the Center for the Inland Bays; U.S.