

## SECTION 4. RISK ASSESSMENT

### 4.3 Hazards of Concern

This section provides a hazard profile and vulnerability assessment of the wildfire hazard in Camden County.

#### 2022 HMP Changes

- Previous occurrences were updated with events that occurred between 2015 and 2020.
- A vulnerability assessment was conducted using an updated asset inventory. Building footprints from the 2021 Camden County footprint dataset, footprint boundaries from the New Jersey Department of Environmental Protection's 2019 impervious surface layer, updated parcels from the 2020 MODIV tax assessor dataset, and RS Means 2020-dollar values were used to develop a structure-level building inventory and estimate replacement cost value for each building. The 2017 critical facility was reviewed and updated by the Planning Partnership.
- 5-year 2019 population estimates from ACS were used to assess population risk.
- The 2009 NJFFS Wildfire Fuel Hazard data was referenced to assess the County's risk to the wildfire fuel hazard.

#### 4.3.13 Wildfire

A wildland fire can be defined as any non-structural fire that occurs in the wildland. Three distinct types of wildland fires have been defined and include: naturally occurring wildfire, human-caused wildfire, and prescribed fire. Many of these are highly destructive and can be difficult to control. They occur in forested, semi-forested, or less developed areas. Wildland fires can be caused by lightning, human carelessness, and arson. Most frequently, wildland fires in the State of New Jersey are caused by humans. Wildfires result in the uncontrolled destruction of forests, brush, field crops, grasslands, real estate, and personal property, and have secondary impacts on other hazards such as flooding, by removing vegetation and destroying watersheds.

Wildfires can increase the probability of other natural disasters, specifically floods and mudflows. Wildfires, particularly large-scale fires, can dramatically alter the terrain and ground conditions, making land already devastated by fire susceptible to floods. Lands impacted by wildfire increase the risk of flooding and mudflow in those areas impacted by wildfire. Normally, vegetation absorbs rainfall, reducing runoff. However, wildfires leave the ground charred, barren, and unable to absorb water; thus, creating conditions perfect for flash flooding and mudflows. Flood risk in these impacted areas remain significantly higher until vegetation is restored, which can take up to five years after a wildfire (FEMA 2019).

Flooding after a wildfire is often more severe, as debris and ash left from the fire can form mudflows. During and after a rain event, as water moves across charred and denuded ground, it can also pick up

soil and sediment and carry it in a stream of floodwaters. These mudflows have the potential to cause significant damage to impacted areas. Areas directly affected by fires and those located below or downstream of burn areas are most at risk for flooding (FEMA 2019). For detailed information regarding flooding, see Section 4.3.7 (Flood).

The height of wildland fire season in New Jersey is typically in spring (March through May) and culminates in early May, corresponding with the driest live fuel moisture periods of the year. Although the spring months are the most severe, the summer and fall months may also experience extensive fires in the state. While the spring season is historically the period in which wildfire danger is the highest, wildland fires can occur every month of the year. Drought, snowpack, and local weather conditions can expand the length of the fire season. The early and late shoulders of the fire season usually are associated with human-caused fires. Lightning generally is the cause of most fires in the peak season. For more information about lightning, refer to Section 4.3.11 Severe Summer Weather.

In the State of New Jersey, each year an average of 1,500 wildfires damage or destroy 7,000 acres of state forests. Wildfires not only damage woodlands but threaten homeowners who live within or adjacent to forest environments. From January 1, 2020, to December 14, 2020, there were 1,022 wildfires in New Jersey that burned over 4,793 acres (NJDEP 2020).

#### 4.3.13.1 Location and Extent

According to the U.S. Fire Administration (USFA), the fire hazard in the U.S. varies from region to region. This often is a result of climate, poverty, education, demographics, and other causal factors (USFA 2020). Wildfires occur in virtually all of the U.S. The western portion of the U.S. is subject to more frequent wildfires, due to their more arid climate and prevalent conifer and brush fuel types. Wildfires have proven to be the most destructive in California but have become an increasingly frequent and damaging phenomenon nationwide (FEMA 1997).

The New Jersey Forest Fire Service (NJFFS), a division of the New Jersey Department of Environmental Protection (NJDEP), is responsible for protecting the 3.25 million acres of wildland in the State. NJFFS is under the direction of the State Fire Warden and is headquartered in Trenton. NJFFS has 85 full-time employees that provide an array of services including staffing the State's 21 fire towers, which are operational during the months of March, April, May, October, and November.

NJFFS divides the State into three regions (Northern, Central, and Southern) each totaling about 1,250,000 acres. There are 29 125,000-acre sections with a dedicated forest fire warden in each; and 269 districts each consisting of 15,000-20,000 acres (NJDEP 2020). Camden County is located in Division C (Southern NJ).

#### Wildfire Fuel Hazard Areas

NJFFS developed Wildfire Fuel Hazard data for the entire state based on NJDEP data. For details on the information was developed, refer to: <https://www.state.nj.us/dep/gis/njfh.html>. Figure 4.3.13-1 and Figure 4.3.13-2 illustrate the wildfire fuel hazard and wildfire risk for Camden County. Generally, wildfires

in Camden County are more likely to occur in the southern half of the County. Table 4.3.13-1 below indicates the amount of land in each of the wildfire fuel hazard ranking zones for Camden County.

*Table 4.3.13-1. Area in the Wildfire Hazard Ranking Zones in Camden County*

Hazard Area	Area (Square Miles)
Extreme	23.5
Very High	2.2
High	14.9
Moderate	24.4
Low	44.7

Source: NJFFS 2009

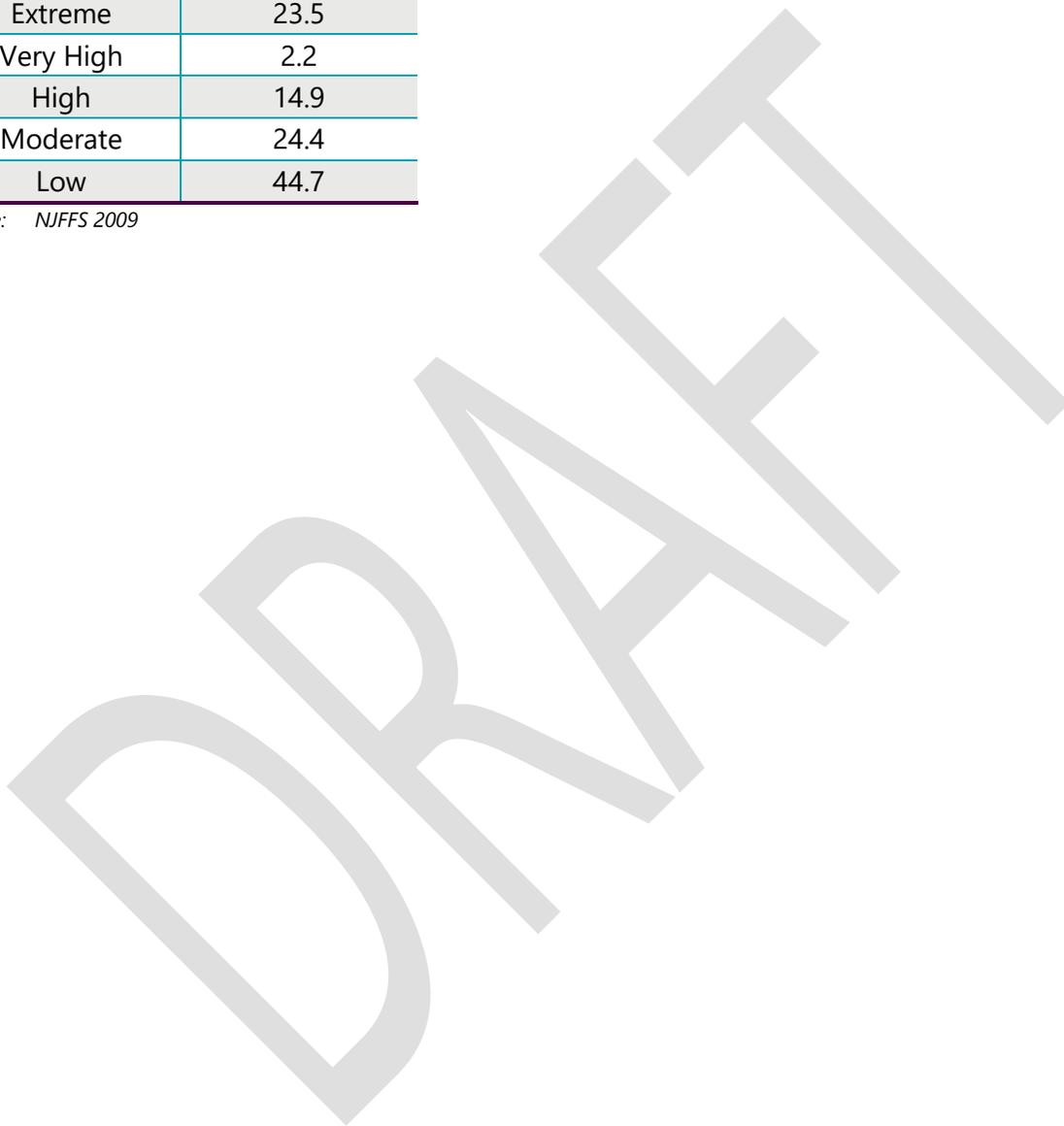
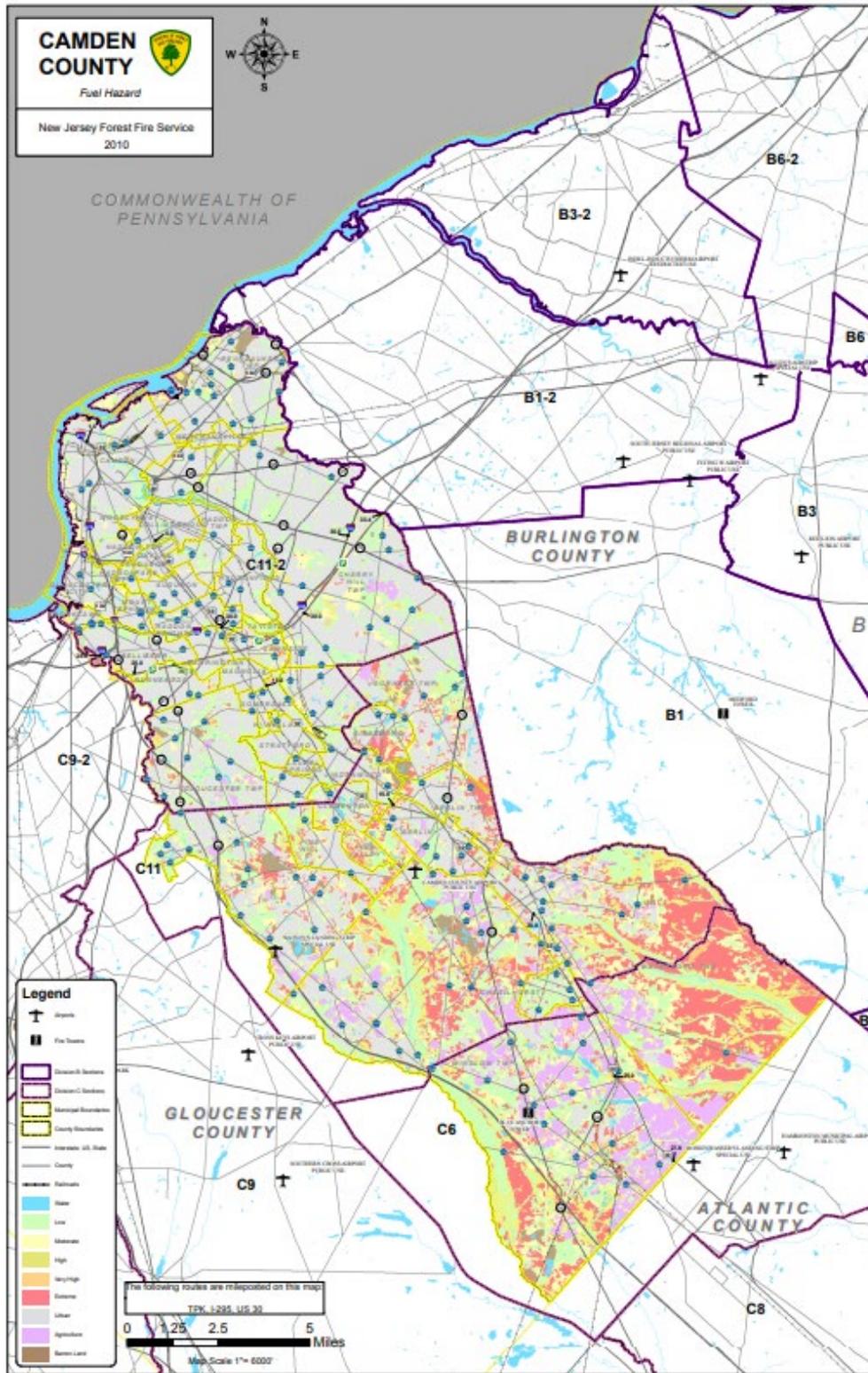


Figure 4.3.13-1. Wildfire Fuel Hazard for Camden County



Source: NJFFS 2010

Figure 4.3.13-2. Wildfire Risk for Camden County

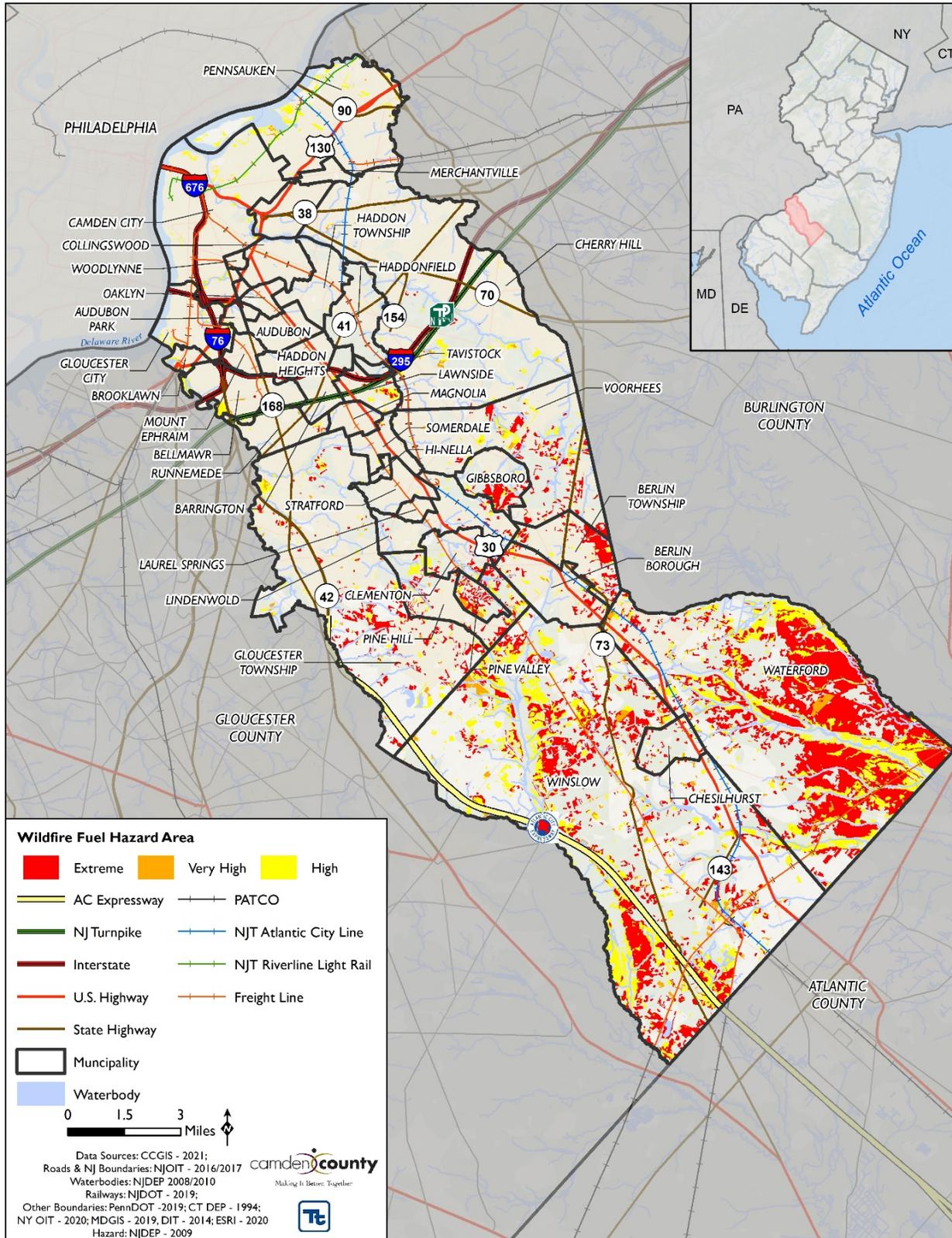
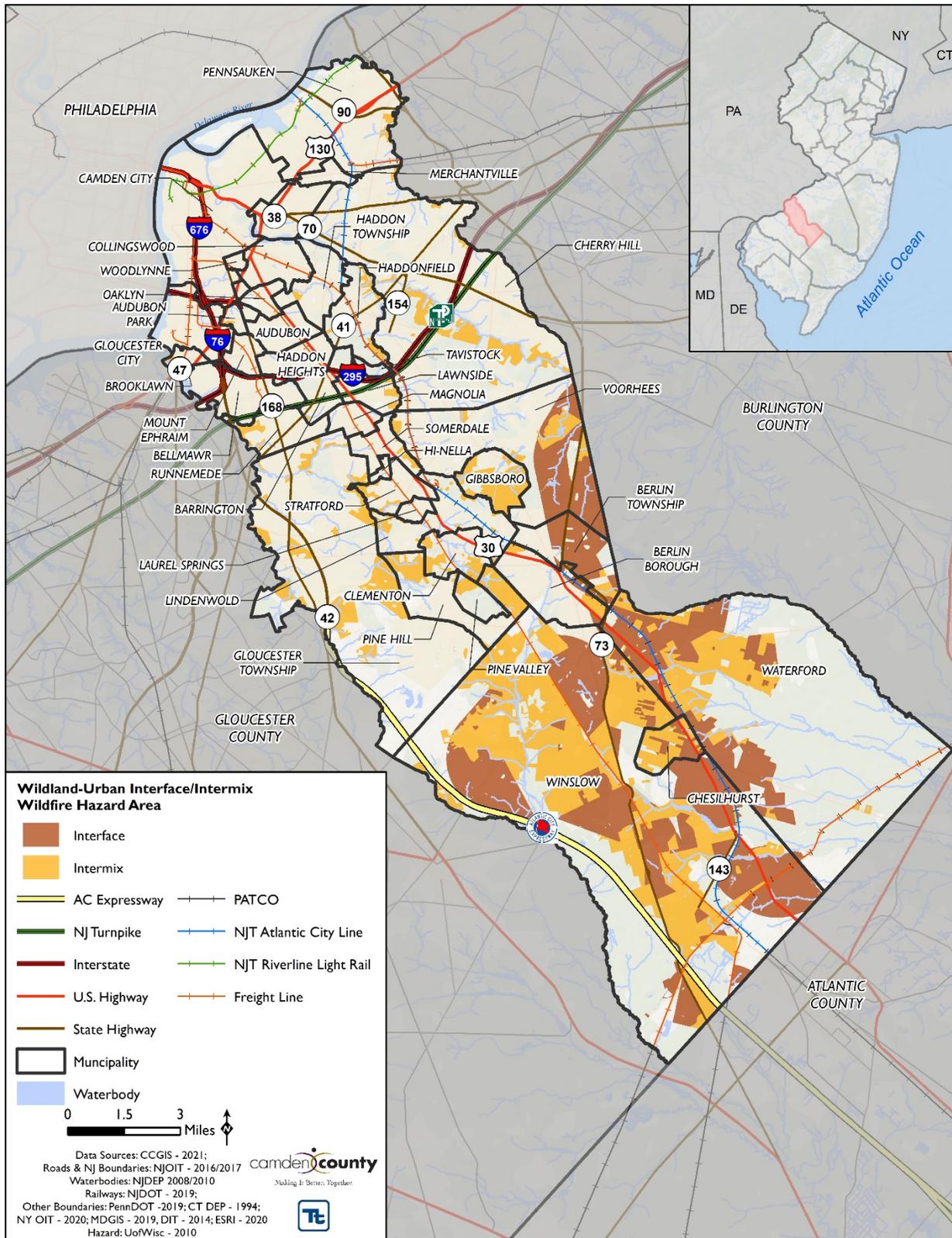


Figure 4.3.13-3. Wildfire Urban Interface in Camden County



### Range of Magnitude

The extent (that is, magnitude or severity) of wildfires depends on weather conditions (dryness/drought) and human activity. To determine the potential for wildfires, the NJFFS uses two indices to measure and monitor the dryness of forest fuels and the possibility of fire ignitions becoming wildfires. This includes the National Fire Danger Rating Systems Buildup Index and the Keetch-Byram Drought Index. Both are used for fire preparedness planning, which includes the following initiatives: campfire and burning restrictions, fire patrol assignments, staffing of fire lookout towers, and readiness status for both observation and firefighting aircraft.

- The **Buildup Index** is a number that reflects the combined cumulative effects of daily drying and precipitation fuels with a 10-day time lag constant. It is a rating of the total amount of fuel available for combustion.
- The **Keetch-Byram Drought Index** (KBDI) is an index used to determining forest fire potential. The drought index is based on a daily water balance, where a drought factor is balanced with precipitation and soil moisture (assumed to have a maximum storage capacity of 8-inches) and is expressed in hundredths of an inch of soil moisture depletion.

In addition to the two indices, the NJFFS uses the National Fire Danger Rating System (NFDRS) to provide a measure of relative seriousness of burning conditions and threat of fire in the State. It allows the NJFFS to estimate the daily fire danger for a given area. The NFDRS uses a five-color coded system to help the public understand fire potential. The NJFFS slightly adapted the color system for their purposes. The NFDRS, with the NFFS color scheme, is as follows in Table 4.3.13-2:

Table 4.3.13-2. Fire Danger Rating and Color Code

Fire Danger Rating and Color Code	Description
Low (L) (Dark Green)	Fuels do not ignite readily from small firebrands although a more intense heat source, such as lightning, may start fires in duff or punky wood. Fires in open cured grasslands may burn freely a few hours after rain, but woods fires spread slowly by creeping or smoldering, and burn in irregular fingers. There is little danger of spotting.
Moderate (M) (Light Green or Blue)	Fires can start from most accidental causes, but with the exception of lightning fires in some areas, the number of starts is generally low. Fires in open-cured grasslands will burn briskly and spread rapidly on windy days. Timber fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel, especially draped fuel, may burn hot. Short-distance spotting may occur, but is not persistent. Fires are not likely to become serious and control is relatively easy.

Fire Danger Rating and Color Code	Description
High (H) (Yellow)	All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High-intensity burning may develop on slopes or in concentrations of fine fuels. Fires may become serious and their control difficult unless they are attacked successfully while small.
Very High (VH) (Orange)	Fires start easily from all causes and, immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high-intensity characteristics such as long-distance spotting and fire whirlwinds when they burn into heavier fuels.
Extreme (E) (Red)	Fires start quickly, spread furiously, and burn intensely. All fires are potentially serious. Development into high-intensity burning will usually be faster and occur from smaller fires than in the very high fire danger class. Direct attack is rarely possible and may be dangerous except immediately after ignition. Fires that develop headway in heavy slash (trunks, branches, and tree tops) or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions the only effective and safe control action is on the flanks until the weather changes or the fuel supply lessens.

Source: NJFFS 2014

#### 4.3.13.2 Past Occurrences

Between 1954 and 2020, New Jersey was included in two FEMA fire management assistance (FMA) declarations. Generally, these disasters cover a wide range of the state; therefore, the disaster may have impacted many counties. Camden County was not included in either of these FMA declarations.

Camden County was also not included in any U.S. Department of Agriculture (USDA) declarations for the wildfire hazard between 2015 and 2020.

For the 2022 HMP update, known fire events that have impacted Camden County between 2015 and 2020 are summarized in Table 4.3.13-3. Appendix E (Supplemental Data) contains details on wildfire events that occurred prior to 2015.

Table 4.3.13-3. Wildfire Incidents in Camden County, 2015 to 2020

Dates of Event	Event Type	FEMA Declaration Number (if applicable)	County Designated?	Event Details
November 22, 2016	Wildfire	N/A	N/A	Dry conditions and wind helped spread a 200-acre wildfire in the Wharton State Forest
May 19, 2019	Wildfire	N/A	N/A	A forest fire burned about 2,107 acres in the Winslow Wildlife Management Area.

Source: NJOEM 2019, NJ.com 2020

### 4.3.13.3 Future Occurrences

Estimating the approximate number of wildfires to occur in Camden County is difficult to predict in a probabilistic manner. This is because a number of variable factors impact the potential for a fire to occur and because some conditions (for example, ongoing land use development patterns, location, fuel sources, and construction sites) exert increasing pressure on the wildland-urban interface (WUI) zone. Based on available data, urban fires and wildfires will continue to present a risk to Camden County. Given the numerous factors that can impact urban fire and wildfire potential, the likelihood of a fire event starting and sustaining itself should be gauged by professional fire managers on a daily basis.

In Section 4.4, the identified hazards of concern for Camden County were ranked. The probability of occurrence, or likelihood of the event, is one parameter used for ranking hazards. Based on historical records and input from the Planning Committee, the probability of occurrence for a wildfire in the county is considered "occasional"; however, events such as brush fires have had no major impacts.

### 4.3.13.4 Climate Change Impacts

Climate change includes major changes in temperature, precipitation, or wind patterns, which occur over several decades or longer. Due to the increase in greenhouse gas concentrations since the end of the 1890s, New Jersey has experienced a 3.5° F (1.9° C) increase in the State's average temperature (Office of the New Jersey State Climatologist 2020), which is faster than the rest of the Northeast region (2° F [1.1° C]) (Melillo et al. 2014) and the world (1.5° F [0.8° C]) (IPCC 2014). This warming trend is expected to continue. By 2050, temperatures in New Jersey are expected to increase by 4.1 to 5.7° F (2.3° C to 3.2° C) (Horton et al. 2015). Thus, New Jersey can expect to experience an average annual temperature that is warmer than any to date (low emissions scenario) and future temperatures could be as much as 10° F (5.6° C) warmer (high emissions scenario) (Runkle et al. 2017). New Jersey can also expect that by the middle of the 21st century, 70% of summers will be hotter than the warmest summer experienced to date (Runkle et al. 2017). The increase in temperatures is expected to be felt more during the winter months (December, January, and February), resulting in less intense cold waves, fewer sub-freezing days, and less snow accumulation.

As temperatures increase, Earth's atmosphere can hold more water vapor which leads to a greater potential for precipitation. Currently, New Jersey receives an average of 46 inches of precipitation each

year (Office of the New Jersey State Climatologist 2020). Since the end of the twentieth century, New Jersey has experienced slight increases in the amount of precipitation it receives each year, and over the last 10 years there has been a 7.9% increase. By 2050, annual precipitation in New Jersey could increase by 4% to 11% (Horton et al. 2015). By the end of this century, heavy precipitation events are projected to occur two to five times more often (Walsh et al. 2014) and with more intensity (Huang et al. 2017) than in the last century. New Jersey will experience more intense rain events, less snow, and more rainfalls (Fan et al. 2014, Demaria et al. 2016, Runkle et al. 2017). Also, small decreases in the amount of precipitation may occur in the summer months, resulting in greater potential for more frequent and prolonged droughts (Trenberth 2011).

A gradual change in temperatures will alter the growing environment of many tree species throughout the United States and New Jersey, reducing the growth of some trees and increasing the growth of others. Tree growth and regeneration may be affected more by extreme weather events and climatic conditions than by gradual changes in temperature or precipitation. Warmer temperatures may lead to longer dry seasons and multi-year droughts, creating triggers for wildfires, insects, and invasive species. Increased temperature and change in precipitation will also affect fuel moisture during wildfire season and the length of time during while wildfires can burn during a given year (U.S. Department of Agriculture [USDA] 2012). Climate change may also increase the frequency of lightning strikes. A warmer atmosphere holds more moisture which is one of the key items for triggering a lightning strike. Lightning strikes cause approximately half the wildfires in the United States. If the frequency of lightning strikes increases, the potential for wildfires from these strikes also increases (Lee 2014). Wildfire incidents are predicted to increase throughout the United States due to climate change, causing at least a doubling of areas burned within the next century (USDA 2012).

As stated above, according to the temperature projections this area can expect warmer and drier conditions which may increase the frequency and intensity of wildfires. Higher temperatures are expected to increase the amount of moisture that evaporates from land and water. These changes have the potential to lead to more frequent and severe droughts, which, in turn, increases the likelihood of wildfires (U.S. EPA 2009).

#### 4.3.13.5 Vulnerability Assessment

A spatial analysis was conducted using the 2009 NJFFS Wildfire Fuel Hazard spatial layer. For the purposes of the assessment, an asset (population, structures, critical facilities, and lifelines) is considered exposed and potentially vulnerable to the wildfire hazard if it is located in the extreme, very high and high wildfire fuel hazard areas. Refer to Section 4.2 for additional details on the methodology used to assess wildfire risk.

#### Impact on Life, Health, and Safety

Wildfires have the potential to impact human health and life of residents and responders, structures, infrastructure, and natural resources. The most vulnerable populations include emergency responders and those within a short distance of the interface between the built environment and the wildland

environment. First responders are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke. Table 4.3.13-4 summarizes the estimated population exposed to the wildfire hazard by municipality.

Based on the analysis, an estimated 5,322 residents, or 1.1-percent of the County's population, are located in the extreme, high, and very high wildfire hazard areas. Overall, the Township of Winslow has the greatest number of individuals located in the extreme, very high, and high hazard areas (i.e., 2,331 persons).

Of the population exposed, the most vulnerable include the economically disadvantaged and the population over age 65. In Camden County, there are 61,187 persons in poverty and 77,791 persons over 65 years old. Economically disadvantaged populations are more vulnerable because they are likely to evaluate their risk and make decisions to evacuate based on net economic impacts on their families. The population over age 65 is also more vulnerable because they are more likely to seek or need medical attention that may not be available due to isolation during a wildfire event, and they may have more difficulty evacuating.

*Table 4.3.13-4. Estimated Population Located in the Extreme, Very High, and High Wildfire Fuel Hazard Area*

Municipality	American Community Survey (2015-2019) Population	Number of People Located in the Extreme, Very High, and High Wildfire Fuel Hazard Area	Percent of Total
Audubon (B)	8,661	0	0.0%
Audubon Park (B)	854	0	0.0%
Barrington (B)	6,716	0	0.0%
Bellmawr (B)	11,398	9	0.1%
Berlin (B)	7,539	120	1.6%
Berlin (Twp)	5,553	409	7.4%
Brooklawn (B)	2,004	2	0.1%
Camden (C)	74,002	15	<0.1%
Cherry Hill (Twp)	70,965	17	<0.1%
Chesilhurst (B)	1,489	64	4.3%
Clementon (B)	4,918	36	0.7%
Collingswood (B)	13,912	0	0.0%
Gibbsboro (B)	2,169	50	2.3%
Gloucester City (C)	11,248	141	1.3%
Gloucester (Twp)	63,705	652	1.0%
Haddon (Twp)	14,539	6	<0.1%
Haddon Heights (B)	7,514	3	<0.1%
Haddonfield (B)	11,345	3	<0.1%
Hi-Nella (B)	988	0	0.0%

Municipality	American Community Survey (2015-2019) Population	Number of People Located in the Extreme, Very High, and High Wildfire Fuel Hazard Area	Percent of Total
Laurel Springs (B)	1,959	0	0.0%
Lawnside (B)	2,885	73	2.5%
Lindenwold (B)	17,320	17	0.1%
Magnolia (B)	4,272	0	0.0%
Merchantville (B)	3,719	0	0.0%
Mount Ephraim (B)	4,582	2	<0.1%
Oaklyn (B)	3,964	0	0.0%
Pennsauken (Twp)	35,660	21	0.1%
Pine Hill (B)	10,442	87	0.8%
Pine Valley (B)	5	1	17.4%
Runnemede (B)	8,327	3	<0.1%
Somerdale (B)	5,448	68	1.2%
Stratford (B)	6,971	0	0.0%
Tavistock (B)	2	0	0.0%
Voorhees (Twp)	29,212	798	2.7%
Waterford (Twp)	10,702	395	3.7%
Winslow (Twp)	38,829	2,331	6.0%
Woodlynne (B)	2,920	0	0.0%
<b>Camden County (Total)</b>	<b>506,738</b>	<b>5,322</b>	<b>1.1%</b>

Source: Source: ACS 5-year Estimate 2015-2019; NJFFS 2009

Notes: B = Borough, C = City, Twp = Township, % = Percent, < = Less Than

### Impact on General Building Stock

Buildings located within the NJFFS identified extreme, very high or high fuel hazard areas are exposed and considered vulnerable to the wildfire hazard. Buildings constructed of wood or vinyl siding are generally more likely to be impacted by the fire hazard than buildings constructed of brick or concrete. Table 4.3.13-5 summarizes the estimated building stock inventory located in the hazard area by municipality. Approximately 2.5-percent (\$7 billion) of the County’s building replacement cost value is located in the extreme/very high/high hazard area. The Township of Winslow has the greatest number of buildings located in the wildfire hazard area (949 structures – 6.0-percent of its total) and has the greatest replacement cost value located in the hazard area (approximately \$1.7 billion – 9.3-percent of its total).

Table 4.3.13-5. Estimated General Building Stock and Replacement Cost Value Located Extreme, Very High, and High Wildfire Fuel Hazard Area

Municipality	Number of Buildings	Total Replacement Cost Value (RCV)	Number of Buildings Located in the Extreme, Very High, and High Wildfire Fuel Hazard Area	Percent of Total	Replacement Cost Value of Structures Located in the Extreme, Very High, and High Wildfire Fuel Hazard Area	Percent of Total
Audubon (B)	3,560	\$3,982,105,081	0	0.0%	\$0	0.0%
Audubon Park (B)	218	\$113,958,539	0	0.0%	\$0	0.0%
Barrington (B)	2,607	\$3,993,943,132	4	0.2%	\$133,968,120	3.4%
Bellmawr (B)	4,106	\$4,528,930,831	5	0.1%	\$79,171,442	1.7%
Berlin (B)	3,199	\$3,513,614,243	48	1.5%	\$85,305,841	2.4%
Berlin (Twp)	2,587	\$8,790,953,567	183	7.1%	\$523,537,483	6.0%
Brooklawn (B)	903	\$1,349,439,712	3	0.3%	\$67,306,237	5.0%
Camden (C)	23,161	\$56,584,405,974	13	0.1%	\$129,620,893	0.2%
Cherry Hill (Twp)	26,798	\$33,592,477,509	10	<0.1%	\$50,710,118	0.2%
Chesilhurst (B)	868	\$753,192,869	32	3.7%	\$17,671,983	2.3%
Clementon (B)	2,283	\$2,920,934,056	15	0.7%	\$4,679,609	0.2%
Collingswood (B)	4,939	\$9,994,688,881	0	0.0%	\$0	0.0%
Gibbsboro (B)	1,194	\$2,794,254,297	32	2.7%	\$160,462,059	5.7%
Gloucester City (C)	4,748	\$8,699,066,833	59	1.2%	\$98,458,254	1.1%
Gloucester (Twp)	23,553	\$24,827,109,084	293	1.2%	\$1,486,433,460	6.0%
Haddon (Twp)	5,635	\$8,495,714,525	4	0.1%	\$5,057,769	0.1%
Haddon Heights (B)	3,160	\$4,935,884,626	1	<0.1%	\$381,369	<0.1%
Haddonfield (B)	4,820	\$8,852,674,248	1	<0.1%	\$338,847	<0.1%
Hi-Nella (B)	214	\$364,325,072	1	0.5%	\$33,492,030	9.2%
Laurel Springs (B)	996	\$1,450,376,747	0	0.0%	\$0	0.0%
Lawnside (B)	1,200	\$1,722,718,258	27	2.3%	\$11,714,767	0.7%
Lindenwold (B)	5,515	\$7,681,293,689	9	0.2%	\$49,688,277	0.6%
Magnolia (B)	1,978	\$2,481,735,074	1	0.1%	\$33,492,030	1.3%
Merchantville (B)	1,435	\$2,982,747,312	0	0.0%	\$0	0.0%
Mount Ephraim (B)	2,349	\$3,176,898,888	1	<0.1%	\$322,177	<0.1%
Oaklyn (B)	1,674	\$2,536,130,354	0	0.0%	\$0	0.0%
Pennsauken (Twp)	13,276	\$18,990,295,898	20	0.2%	\$209,874,028	1.1%
Pine Hill (B)	3,610	\$2,320,272,349	38	1.1%	\$105,449,363	4.5%
Pine Valley (B)	41	\$82,965,246	8	19.5%	\$13,881,402	16.7%
Runnemede (B)	3,220	\$4,203,633,200	1	<0.1%	\$322,177	<0.1%
Somerdale (B)	2,323	\$3,999,602,407	27	1.2%	\$11,037,203	0.3%
Stratford (B)	2,408	\$2,645,521,871	0	0.0%	\$0	0.0%
Tavistock (B)	14	\$17,692,986	0	0.0%	\$0	0.0%
Voorhees (Twp)	9,785	\$18,757,102,175	298	3.0%	\$1,495,938,418	8.0%
Waterford (Twp)	4,926	\$4,400,620,966	204	4.1%	\$568,753,315	12.9%

Municipality	Number of Buildings	Total Replacement Cost Value (RCV)	Number of Buildings Located in the Extreme, Very High, and High Wildfire Fuel Hazard Area	Percent of Total	Replacement Cost Value of Structures Located in the Extreme, Very High, and High Wildfire Fuel Hazard Area	Percent of Total
Winslow (Twp)	15,915	\$17,669,828,003	949	6.0%	\$1,651,772,870	9.3%
Woodlynne (B)	950	\$1,039,137,958	0	0.0%	\$0	0.0%
<b>Camden County (Total)</b>	<b>190,168</b>	<b>\$285,246,246,457</b>	<b>2,287</b>	<b>1.2%</b>	<b>\$7,028,841,541</b>	<b>2.5%</b>

Source: Camden County GIS 2021; NJDEP 2019; MODIV 2020; RSMMeans 2020; NJFFS 2009

Notes: B = Borough, C = City, Twp = Township, % = Percent, < = Less Than

### Impact on Critical Facilities and Lifelines

In Camden County, there are 30 critical facilities located in the wildfire hazard area. Of the 30 critical facilities that intersect the wildfire hazard area, 28 are considered lifelines for the County. Majority of the lifelines that intersect the wildfire hazard area are hazardous material and food, water, and shelter facilities. As mentioned previously, wildfires can have an impact on the water supplies throughout the County because of residual pollutants like char or debris landing in water resources which can clog wastewater pipes, culverts, etc. Refer to Table 4.3.7-9 through Table 4.3.7-14, for a summary of wildfire impacted critical facilities and lifelines distributed by jurisdiction, critical facility type, and FEMA lifeline category type.

Table 4.3.13-6. Critical Facilities and Lifelines Located in the Extreme, Very High, and High Wildfire Fuel Hazard Area

Municipality	Total Critical Facilities Located in Municipality	Total Lifelines Located in Municipality	Number of Critical Facilities and Lifeline Facilities Located in the Extreme, Very High, and High Wildfire Fuel Hazard Area			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Audubon (B)	30	28	0	0.0%	0	0.0%
Audubon Park (B)	6	6	0	0.0%	0	0.0%
Barrington (B)	28	26	0	0.0%	0	0.0%
Bellmawr (B)	35	32	1	2.9%	1	3.1%
Berlin (B)	37	31	1	2.7%	1	3.2%
Berlin (Twp)	12	12	0	0.0%	0	0.0%
Brooklawn (B)	20	19	0	0.0%	0	0.0%
Camden (C)	201	196	0	0.0%	0	0.0%
Cherry Hill (Twp)	231	202	0	0.0%	0	0.0%
Chesilhurst (B)	13	13	0	0.0%	0	0.0%

Municipality	Total Critical Facilities Located in Municipality	Total Lifelines Located in Municipality	Number of Critical Facilities and Lifeline Facilities Located in the Extreme, Very High, and High Wildfire Fuel Hazard Area			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Clementon (B)	29	24	1	3.4%	1	4.2%
Collingswood (B)	38	37	0	0.0%	0	0.0%
Gibbsboro (B)	39	34	2	5.1%	1	2.9%
Gloucester City (C)	53	49	0	0.0%	0	0.0%
Gloucester (Twp)	164	147	1	0.6%	1	0.7%
Haddon (Twp)	45	42	0	0.0%	0	0.0%
Haddon Heights (B)	27	24	0	0.0%	0	0.0%
Haddonfield (B)	34	32	0	0.0%	0	0.0%
Hi-Nella (B)	4	4	0	0.0%	0	0.0%
Laurel Springs (B)	14	13	0	0.0%	0	0.0%
Lawnside (B)	16	16	1	6.3%	1	6.3%
Lindenwold (B)	43	43	0	0.0%	0	0.0%
Magnolia (B)	6	6	0	0.0%	0	0.0%
Merchantville (B)	23	21	0	0.0%	0	0.0%
Mount Ephraim (B)	17	17	0	0.0%	0	0.0%
Oaklyn (B)	28	24	0	0.0%	0	0.0%
Pennsauken (Twp)	141	128	2	1.4%	2	1.6%
Pine Hill (B)	21	21	1	4.8%	1	4.8%
Pine Valley (B)	2	2	0	0.0%	0	0.0%
Runnemede (B)	38	36	0	0.0%	0	0.0%
Somerdale (B)	34	32	2	5.9%	2	6.3%
Stratford (B)	27	24	0	0.0%	0	0.0%
Tavistock (B)	0	0	0	0.0%	0	0.0%
Voorhees (Twp)	81	75	4	4.9%	4	5.3%
Waterford (Twp)	33	31	2	6.1%	2	6.5%
Winslow (Twp)	150	140	12	8.0%	11	7.9%
Woodlynne (B)	12	12	0	0.0%	0	0.0%
<b>Camden County (Total)</b>	<b>1,732</b>	<b>1,599</b>	<b>30</b>	<b>1.7%</b>	<b>28</b>	<b>1.8%</b>

Source: Camden County Planning Partnership 2021; Camden County GIS 2021; NJFFS 2009

Notes: B = Borough, C = City, Twp = Township, % = Percent

Table 4.3.13-7. Critical Facilities by Type Located in the Extreme, Very High, and High Wildfire Fuel Hazard Area

Municipality	Critical Facilities Located in the Wildfire Hazard Area (Extreme, Very High, High)										
	Assisted Living	Communication Tower	Day Care	Emergency Staging Area	Food Distribution	Hazardous Material Facility	Potable Water Pump Station	Potable Well	Resource Extraction/Recycling Facility	Secondary Education	Wastewater Lift Station
Audubon (B)	0	0	0	0	0	0	0	0	0	0	0
Audubon Park (B)	0	0	0	0	0	0	0	0	0	0	0
Barrington (B)	0	0	0	0	0	0	0	0	0	0	0
Bellmawr (B)	0	0	0	0	0	1	0	0	0	0	0
Berlin (B)	0	0	0	0	0	1	0	0	0	0	0
Berlin (Twp)	0	0	0	0	0	0	0	0	0	0	0
Brooklawn (B)	0	0	0	0	0	0	0	0	0	0	0
Camden (C)	0	0	0	0	0	0	0	0	0	0	0
Cherry Hill (Twp)	0	0	0	0	0	0	0	0	0	0	0
Chesilhurst (B)	0	0	0	0	0	0	0	0	0	0	0
Clementon (B)	0	0	0	0	0	1	0	0	0	0	0
Collingswood (B)	0	0	0	0	0	0	0	0	0	0	0
Gibbsboro (B)	0	0	0	0	0	1	0	0	1	0	0
Gloucester City (C)	0	0	0	0	0	0	0	0	0	0	0
Gloucester (Twp)	0	0	0	0	0	0	0	0	0	0	1
Haddon (Twp)	0	0	0	0	0	0	0	0	0	0	0
Haddon Heights (B)	0	0	0	0	0	0	0	0	0	0	0
Haddonfield (B)	0	0	0	0	0	0	0	0	0	0	0
Hi-Nella (B)	0	0	0	0	0	0	0	0	0	0	0
Laurel Springs (B)	0	0	0	0	0	0	0	0	0	0	0
Lawnside (B)	0	0	0	0	0	1	0	0	0	0	0
Lindenwold (B)	0	0	0	0	0	0	0	0	0	0	0
Magnolia (B)	0	0	0	0	0	0	0	0	0	0	0

Municipality	Critical Facilities Located in the Wildfire Hazard Area (Extreme, Very High, High)										
	Assisted Living	Communication Tower	Day Care	Emergency Staging Area	Food Distribution	Hazardous Material Facility	Potable Water Pump Station	Potable Well	Resource Extraction/Recycling Facility	Secondary Education	Wastewater Lift Station
Merchantville (B)	0	0	0	0	0	0	0	0	0	0	0
Mount Ephraim (B)	0	0	0	0	0	0	0	0	0	0	0
Oaklyn (B)	0	0	0	0	0	0	0	0	0	0	0
Pennsauken (Twp)	0	0	0	0	0	2	0	0	0	0	0
Pine Hill (B)	0	0	0	0	0	0	0	0	0	0	1
Pine Valley (B)	0	0	0	0	0	0	0	0	0	0	0
Runnemede (B)	0	0	0	0	0	0	0	0	0	0	0
Somerdale (B)	0	0	0	1	1	0	0	0	0	0	0
Stratford (B)	0	0	0	0	0	0	0	0	0	0	0
Tavistock (B)	0	0	0	0	0	0	0	0	0	0	0
Voorhees (Twp)	4	0	0	0	0	0	0	0	0	0	0
Waterford (Twp)	0	1	0	0	0	0	0	1	0	0	0
Winslow (Twp)	0	1	1	0	0	3	2	1	0	1	3
Woodlynne (B)	0	0	0	0	0	0	0	0	0	0	0
<b>Camden County (Total)</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>10</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>5</b>

Source: Camden County Planning Partnership 2021; Camden County GIS 2021; NJFFS 2009

Notes: B = Borough, C = City, Twp = Township

Table 4.3.13-8. Number of Lifelines by FEMA Lifeline Category Located in the Extreme, Very High, and High Wildfire Fuel Hazard Area

FEMA Lifeline Category	Number of Lifelines	Number of Lifelines Located in the Wildfire Hazard Area (Extreme, Very High, High)
Communications	31	2
Energy	14	0
Food, Water, Shelter	336	10
Hazardous Material	307	10
Health and Medical	92	4
Safety and Security	719	2
Transportation	100	0
<b>Camden County (Total)</b>	<b>1,599</b>	<b>28</b>

Source: Camden County Planning Partnership 2021; Camden County GIS 2021; FEMA 2020; NJFFS 2009

Additionally, wildfires can have a major impact on transportation routes in the County, particularly roadways that are adjacent to or are built within the wildfire fuel hazard area. In general, roads and bridges surrounding the areas of fire risk are important because they provide ingress and egress to large areas and, in some cases, to isolated neighborhoods. Fires can create conditions that block or prevent access and can isolate residents and emergency service providers.

Overall, out of the 204.1 miles of evacuation routes in the County, approximately 0.5-percent (i.e., 1.1 miles) of evacuation routes are located in the extreme, very high, and high wildfire fuel hazard area. Furthermore, approximately 2.8-percent (i.e., 65.9 miles) of all roadways in the County are located in extreme, very high, and high wildfire fuel hazard area.

Refer to Table 4.3.13-9 and Table 4.3.13-10 for a summary of transportation routes by type located in the wildfire hazard area.

Table 4.3.13-9. Number of Miles Transportation Routes Are Located in the Extreme, Very High, and High Wildfire Fuel Hazard Area

Transportation Route Type	Total Miles	Miles of Transportation Route Located in the Extreme, Very High, and High Wildfire Fuel Hazard Area	Percent of Total
Evacuation Routes	204.1	1.1	0.5%

Source: Camden County GIS 2021; NJFFS 2009

Notes: % = Percent

Table 4.3.13-10. Number of Miles Roadways by Type Are Located in the Extreme, Very High, and High Wildfire Fuel Hazard Area

Roadway Type	Total Miles	Miles of Roadway Located in the Extreme, Very High, and High Wildfire Fuel Hazard Area	Percent of Total
Local	1,757.2	44.4	2.5%
County	392.8	20.4	5.2%
State	93.0	0.3	0.3%
US Highway	49.6	0.8	1.7%
Interstate	40.2	<0.1	<0.1%
Federal	45.4	0.0	0.0%
<b>Camden County (Total)</b>	<b>2,378.2</b>	<b>65.9</b>	<b>2.8%</b>

Source: NJOIT 2017; NJFFS 2009

Notes: % = Percent

### Impact on the Economy

Wildfire events can have major economic impacts on a community from the initial loss of structures and the subsequent loss of revenue from destroyed business. These events may cost thousands of taxpayer dollars to suppress and control and may involve hundreds of operating hours on fire apparatus and thousands of volunteer man hours from the volunteer firefighters. There are also many direct and indirect costs to local businesses that excuse volunteers from working to fight these fires.

Due to a lack of data regarding past structural and economic losses specific to Camden County or its municipalities, it is not possible to estimate future losses due to wildfire events currently.

### Impact on the Environment

According to the USGS, post-fire runoff polluted with debris and contaminants can be extremely harmful to ecosystem and aquatic life (USGS 2021). Furthermore, water supply reservoirs might experience hydrologic changes due to wildfire induced snowmelt runoff. Source water chemistry can also become altered, which impacts the drinking water supply.

### Future Changes That May Impact Vulnerability

Areas targeted for potential future growth and development in the next five years have been identified across Camden County at the municipal level. Refer to the jurisdictional annexes in Volume II of this HMP update.

### Projected Development

As discussed and illustrated in Section 3 (County Profile), areas targeted for future growth and development have been identified across the County. The New Jersey Pinelands Commission has identified Pinelands Management Area Boundaries, including regional growth areas and rural

development areas that may also provide insight to where development and growth may occur in the County. In addition, each community was requested to provide recent and anticipated new development and infrastructure projects; summarized in Section 9 (Jurisdictional Annexes).

A spatial analysis was conducted to determine the intersection of potential new development identified by municipalities and the wildfire hazard area. The exposure analysis shows three of these new development locations will be built in wildfire hazard areas; refer to Figure 4.3.13-4.

### Projected Changes in Population

Camden County has experienced population decline since 2010. According to the U.S. Census Bureau, the County's population has decreased 1.3-percent between 2010 and 2019 (U.S. Census Bureau 2020). Even though the population has decreased, any changes in the density of population can impact the number of persons exposed to the wildfire hazard. Fire suppression capabilities are high at the State and local levels. However, new development and changes in population with a mix of additional structures, ornamental vegetation, and wildland fuels will require continued assessment of the hazard and mitigation risk.

### Climate Change

According to the U.S. Fire Service (USFS), climate change will likely alter the atmospheric patterns that affect fire weather. Changes in fire patterns will, in turn, impact carbon cycling, forest structure, and species composition. Climate change associated with elevated greenhouse gas concentrations may create an atmospheric and fuel environment that is more conducive to large, severe fires (McKenzie, Heinsch, and Heilman 2011). Under a changing climate, wildfires are expected to increase by 50% across the U.S. (McKenzie, Heinsch, and Heilman 2011). However, a study from the National Interagency Fire Center of the USGS shows that the number of acres burned by wildfires in New Jersey has decreased by 0.25 acres per square mile from events that took place in 2000 to 2014 compared to events that took place in 1984 and 1999 (USGS 2016).

Understanding the climate/fire/vegetation interactions is essential for addressing issues associated with climate change that include:

- Effects on regional circulation and other atmospheric patterns that affect fire weather
- Effects of changing fire regimes on the carbon cycle, forest structure, and species composition, and
- Complications from land use change, invasive species and an increasing WUI (McKenzie, Heinsch, and Heilman 2011).

As discussed earlier, average temperatures are anticipated to increase in New Jersey, therefore, suitability of habitats for specific types of trees potentially changes, altering the fire regime and resulting in more frequent fire events and changes in intensity. Prolonged and more frequent heat waves have the potential to increase the likelihood of a wildfire. The increased potential combined with stronger winds may make it harder to contain fires and thus increase the County's vulnerability to this hazard.

### Change of Vulnerability Since the 2017 HMP

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Since the 2017 analysis, population statistics have been updated using the 2015-2019 American Community Survey population estimates. The building inventory was updated using building footprints from the 2021 Camden County footprint dataset, footprint boundaries from the New Jersey Department of Environmental Protection's 2019 impervious surface layer, and updated parcels from the 2020 MODIV tax assessor dataset. RS Means 2020-dollar values were used to develop a structure-level building inventory and estimate replacement cost value for each building. The 2017 critical facility was also reviewed and updated by the Planning Partnership. The NJFFS Wildfire Fuel Hazard spatial layer has not been updated since the last HMP; therefore, changes and increased in overall wildfire hazard exposure are attributed to increases in population and new development.

These changes provide an up-to-date look at the entire building stock for Camden County and gives more accurate results for the exposure and loss estimation analysis.

DRAFT

Figure 4.3.13-4. Recent and Anticipated New Development and the Wildfire Hazard Area in Camden County

