4.13 Wildfire

4.13.1 Hazard Profile

A wildfire is a raging, uncontrolled fire that spreads rapidly through vegetative fuels, exposing and possibly consuming structures. Wildfire is a unique hazard in that it can be significantly altered based on efforts to control its course during the event. The Virginia Department of Forestry (VDOF) indicates that there are three principal factors that can lead to the formation of wildfire hazards: topography, fuel, and weather. The environmental conditions that exist during these seasons exacerbate the hazard. When relative humidity is low and high winds are coupled with a dry forest floor (brush, grass, leaf litter), wildfires may easily ignite.

Years of drought can lead to environmental conditions that promote wildfires. Accidental or intentional setting of fires by humans is the largest contributor to wildfires. Residential areas or "woodland communities" that expand into wild land areas also increase the risk of wildfire threats. Spring and fall are the two seasons for wildfires.

Secondary effects from wildfires can pose a significant threat to the communities surrounding the hazard. During a wildfire, the removal of ground cover that serves to stabilize soil can potentially lead to hazards such as landslides, mudslides, and flooding. In addition, the leftover scorched and barren land may take years to recover and the resulting erosion can be problematic.

4.13.1.1 Geographic Location/ Extent

Wildfires occur throughout wooded and open vegetation areas of Virginia and can occur any time of the year. In Virginia, the greatest number of fires occur in February, March, April, and May. This period is known as Spring Fire Season. Fall Fire Season is in October, November, and December.[70]

4.13.1.2 Magnitude/ Severity

Keetch and Byram (1968) designed a drought index specifically for fire potential assessment. It is a number representing the net effect of evapotranspiration and precipitation in producing cumulative moisture deficiency in deep duff and upper soil layers. It is a continuous index, relating to the flammability of organic material in the ground. The Keetch-Byram Drought Index (KBDI) is the most widely used system by fire managers in the southeastern United States. This mathematical system for relating current and recent weather conditions to potential or expected fire behavior results in a drought index number ranging from 0 to 800. This number accurately describes the amount of moisture that is missing; a rating of 0 defines a point of no moisture deficiency and 800 defines the maximum drought possible.[71] Table 4-140 indicates the potential fire behavior represented by these KBDI numbers.

Prolonged droughts (high KBDI) influence fire intensity since more fuel is available for combustion (*i.e.* fuels have a lower moisture content). In addition, dry organic material in the soil can lead to increased difficulty in fire suppression. High values of the KBDI are an indication that conditions are favorable for the occurrence and spread of wildfires, but drought is not by itself a prerequisite for wildfires. Other weather factors, such as wind, temperature, relative humidity, and atmospheric stability, play a major role in determining the actual fire

[70] Causes of Forest Fires in Virginia. Virginia Department of Forestry. 2014. http://dof.virginia.gov/fire/fire-causes.htm
[71] KBDI/CSI: Introduction. Virginia Department of Forestry. http://dof.virginia.gov/fire/kbdi.htm

danger. The daily KBDI for the state of Virginia can be found on the Virginia Department of Forestry web site. [72]

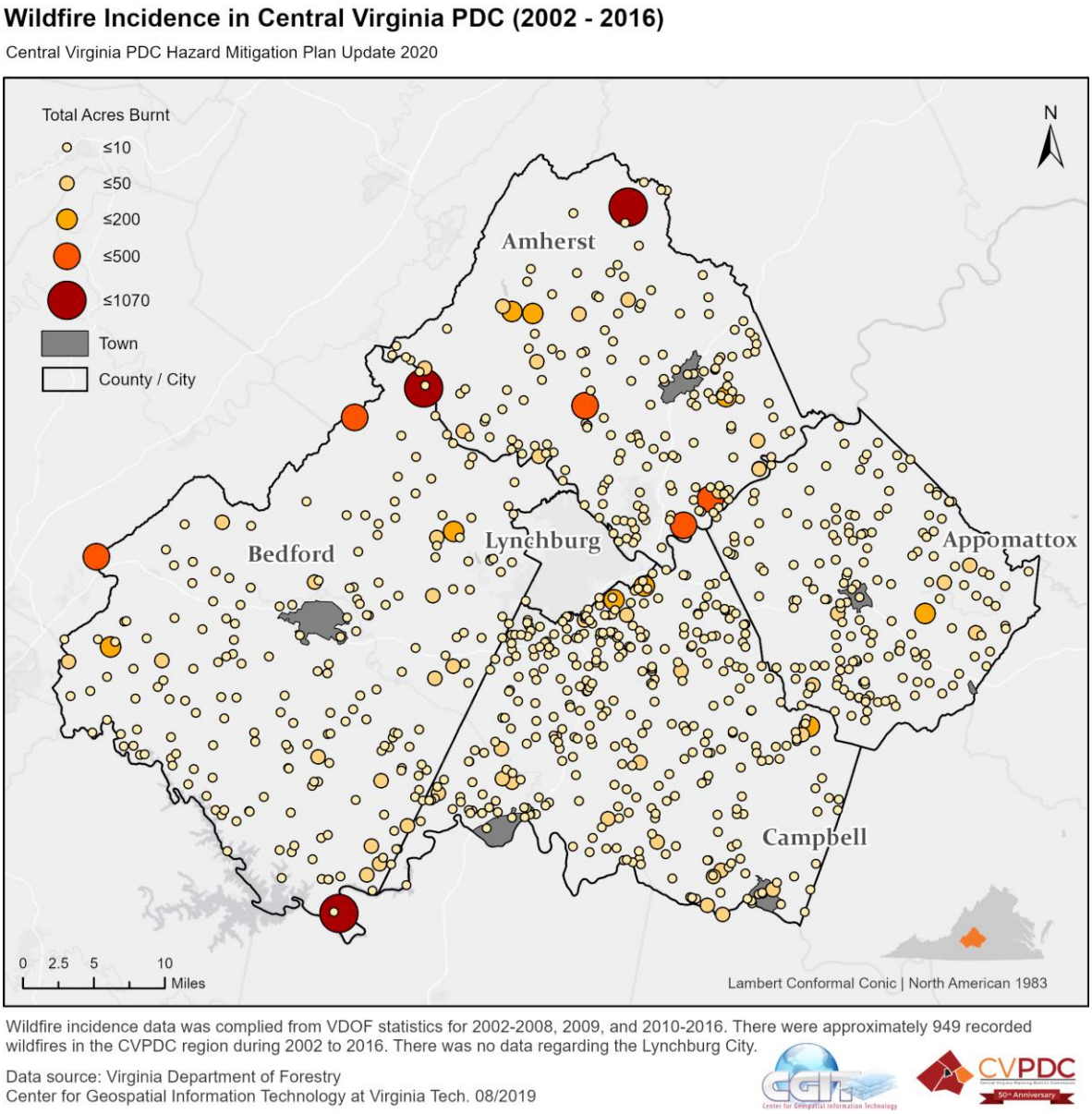
Table 4-140 Keetch-Byram Drought Index (KBDI) and correlated potential fire behavior

KBDI Number	Potential fire behavior
0 - 200	Soil moisture and large class fuel moistures are high and do not contribute much to fire intensity. Typical of spring dormant season following winter precipitation.
200 - 400	Typical of late spring, early growing season. Lower litter and duff layers are drying and beginning to contribute to fire intensity
400 - 600	Typical of late summer, early fall. Lower litter and duff layers actively contribute to fire intensity and will burn actively
600 - 800	Often associated with more severe drought with increased wildfire occurrence. Intense, deep burning fires with significant downwind spotting can be expected. Live fuels can also be expected to burn actively at these levels

4.13.1.3 Previous Occurrences

According to the statistics from the Insurance Information Institute, there were 1,266 reported wildfire incidents in Virginia which burned 15,224 acres in 2018. In the past two decades, 2002 was the fourth busiest year, showing the severity of the abnormal summertime wildfire season. Virginia Department of Forestry documents wildfire occurrences across the Commonwealth. There were approximately 949 recorded wildfires in the CVPDC area (there was no data regarding the City of Lynchburg) during 2002 to 2016. Table 4-141 reflects the statistics for the CVPDC area, and Figure 4-144 depicts the location of these fires. It is worth noting that the data received from VDOF is for private or state-owned lands only. No fires on federal (U.S. Forest Service, National Park Service) should be included.

[72] Statewide Forest Fire Summation Report. http://dof.virginia.gov/fire/sit-rep.htm



(Source: Virginia Department of Forestry)

Figure 4-144 Wildfire incidence in CVPDC Area, 2002 - 2016.

Table 4-141 Wildfire Incidence and Burned Area in the CVPDC Area, 2002 - 2016

County	Number of Wildfires	Total Acres Burnt
Amherst County	177	2893.8
Appomattox County	173	487
Bedford County	225	3183.1
Campbell County	374	990.4
Total	**949**	**7554.3**

Towns included in the county numbers.

The leading causes of wildfires in Virginia are the result of human actions, including open burning, arson, smokers, equipment use, railroads, lightning, campfires, and so on.[73] These fire incidents can be prevented by using common sense, following fire safety rules, and obeying fire laws. Figure 4-145 and Table 4-142 show a summary about the cause of wildfire occurred in the CVPDC area between 2010 and 2016.

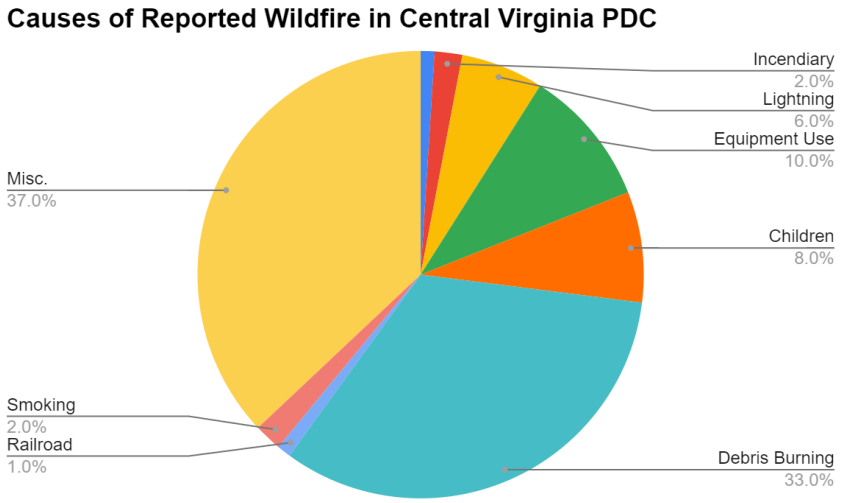


Figure 4-145 Causes of Reported Wildfire Incidence in CVPDC Area, 2010-2016

Table 4-142 Number of Wildfires Incidence and Their Causes in the CVPDC Area, 2010-2016

Causes \ County	Amherst County	Appomattox County	Bedford County	Campbell County
Number of fires	66	72	119	122
Camp Fire	0	1	0	0
Incendiary	0	1	0	1
Lightning	2	1	2	1
Equipment Use	3	0	0	7
Children	3	1	1	3
Debris Burning	4	9	1	19
Railroad	0	0	0	1
Smoking	0	0	0	2
Misc.	9	3	6	19
Not Reported	45	56	109	69

Towns included in the county numbers.

4.13.1.4 Relationship to Other Hazards

Figure 4-146 shows the interrelationship (causation, concurrence, *etc.*) between this hazard and other hazards discussed in this plan update.

[73] http://www.dof.virginia.gov/fire/fire-causes.htm

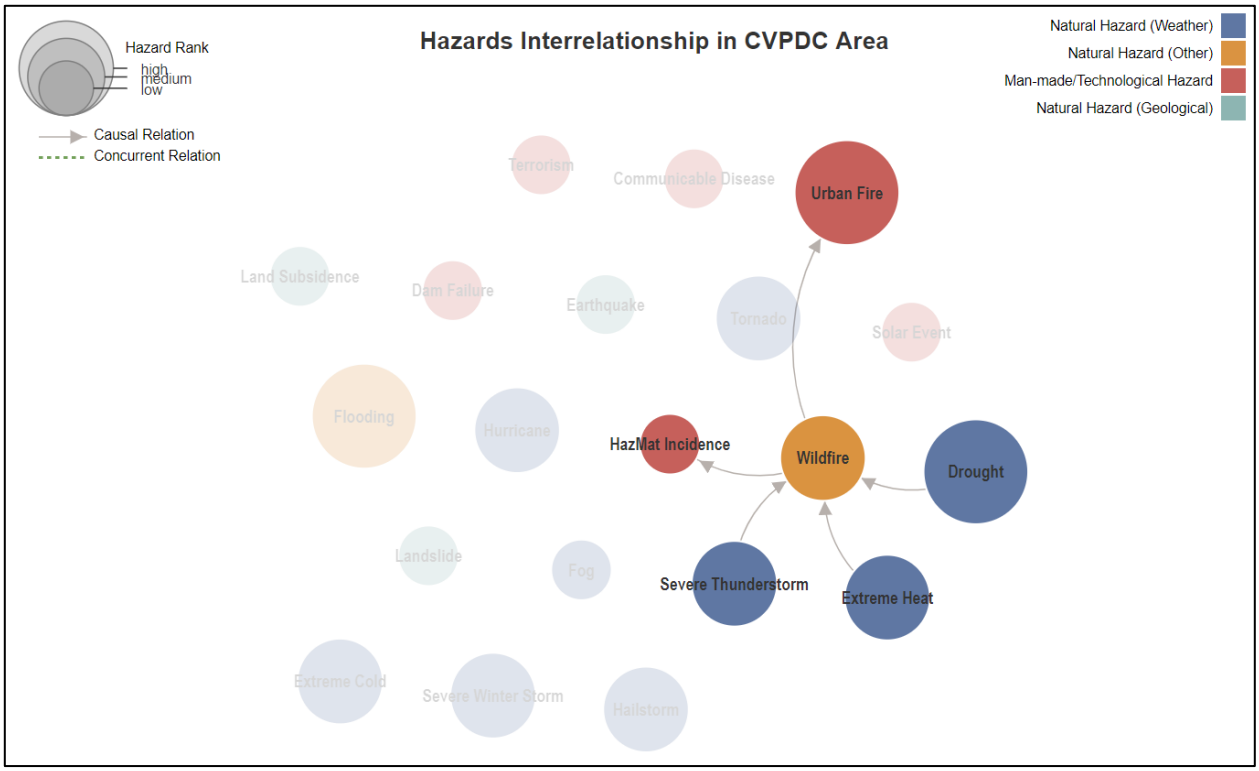


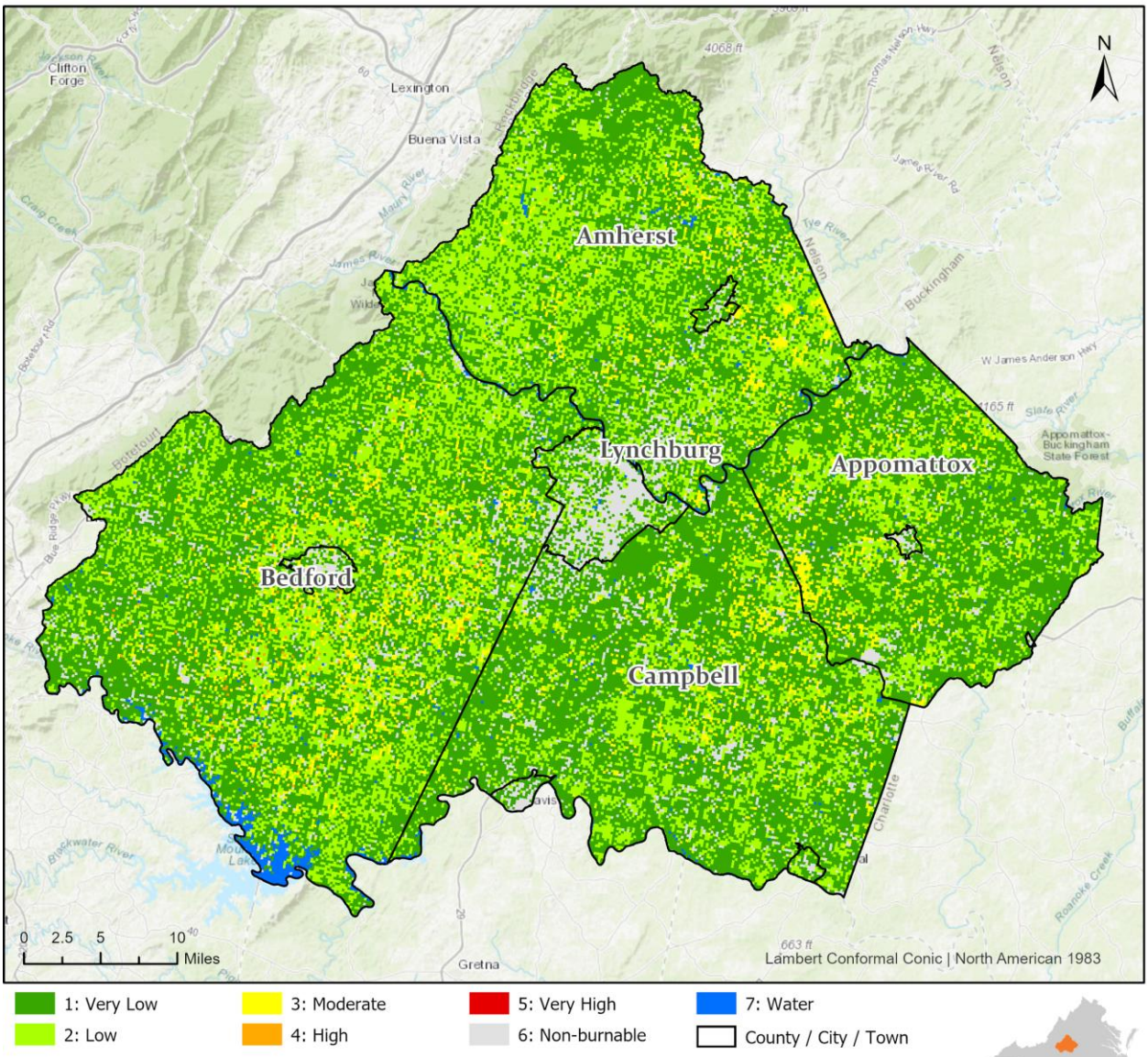
Figure 4-146 Hazards interrelationship

4.13.2 Impact and Vulnerability

A variety of factors like land cover, weather, etc. influence the vulnerability to wildfires. The impacts of wildfires are numerous and wide-ranging. They can have significant impacts on the economy, environment, heritage, and social fabric of the region. Economic costs of wildfires range from prevention to loss of income, livelihood, and property damage. Wildfires destroy the habitats and the intricate relationships of diverse flora and fauna, leading to loss of ecosystems and biodiversity. People who live and work in isolated areas or in the countryside are particularly vulnerable to wildfires. In addition, wildfires have the potential to affect the lives of communities well outside the immediate area of incident. Smoke can travel long distances, affecting the air quality and visibility of the surrounding regions.

4.13.3 Risk Assessment and Jurisdictional Analysis

The USDA Forest Service Fire Modeling Institute produced the classified wildfire hazard potential (WHP) map to approximate relative wildfire risk for long-term strategic land management planning and fuels management. Areas mapped with higher WHP values represent fuels with a higher probability of experiencing torching, crowning, and other forms of extreme file behavior under conducive weather conditions, based primarily on landscape conditions. Overall, the CVPDC region has relatively low to moderate potential for wildfire. Some sparse areas that have high to very high potential to highly valued assets and facilities are within Bedford County (Table 4-143 and Figure 4-147).



(Source: USDA Forest Service, 2018)

Figure 4-147 Wildfire Hazard Potential in CVPDC Area

Table 4-143 Areas in Different Wildfire Risk Category in CVPDC Area

Locality	Wildfire Risk Area (per Wildfire Hazard Potential category)					
	Very Low	Low	Moderate	High to Very High	Non-burnable	Water
Amherst County	155,370	120,712	13,258	72	14,771	2,612
Town of Amherst	1,801	594	126	0	649	0
Appomattox County	131,376	58,906	13,114	0	10,394	991
Town of Appomattox	522	216	54	0	685	0
Town of Pamplin	72	0	0	0	108	18
Bedford County	265,021	154,722	32,659	2,882	29,381	12,087
Town of Bedford	2108	973	252	0	2,270	36
Campbell County	204,855	76,667	15,708	0	25,580	1,855
Town of Altavista	1,621	180	0	0	1,477	0
Town of Brookneal	1,333	558	0	0	414	18
Lynchburg City	11,583	4,918	126	0	14,465	540

(Unit: acre; Source: USDA Forest Service, 2018)

4.13.3.1 Wildland-Urban Interface

The wildland-urban interface (WUI) is the area where houses and wildland vegetation meet or intermingle. It is also the area where wildfires pose the greatest risk to people, due to the proximity of flammable vegetation. Wildfires frequently burn houses in the WUI and are most difficult to fight there. Furthermore, the WUI is where people often ignite wildfires and the vast majority of fires are human-caused. Federal wildfire management policy prioritizes fuel treatments and the promotion of fire-adapted communities in the WUI, while local jurisdictions use a variety of land use planning tools to limit the environmental impacts of housing growth in the WUI (Radeloff, *et al.* 2018).

Woodland Home Communities (WHC) are the clusters of homes located along forested areas at the WUI that are particularly susceptible to a nearby wildfire incident. The characteristics of WHC areas include: (1) Located close to wildland fuels (primarily forested areas); (2) contain greater than 10 addressable structures; and (3) have been geographically isolatable. WHCs pose two problems related to wildfires. First, there will be more wildfires-prone due to human ignitions. Second, wildfires that occur will pose a greater risk to lives and homes, they will be harder to fight, and letting natural fires burn becomes impossible.

Figure 4-148 shows the location of all 120 WHCs in the CVPDC area, according to the classification and assessment by VDOF. Eighty-one of them are under high wildfire risk and the rest are under moderate risk. Table 4-144 and Figure 4-149 present the location and number of homes of 81 WHCs that are at high wildfire risk. According to the statistics of VDOF, a total of over 2,500 homes, in 12 communities in Amherst County, 2 in Appomattox County, 38 in Bedford County, and 29 in Campbell County, are at risk.

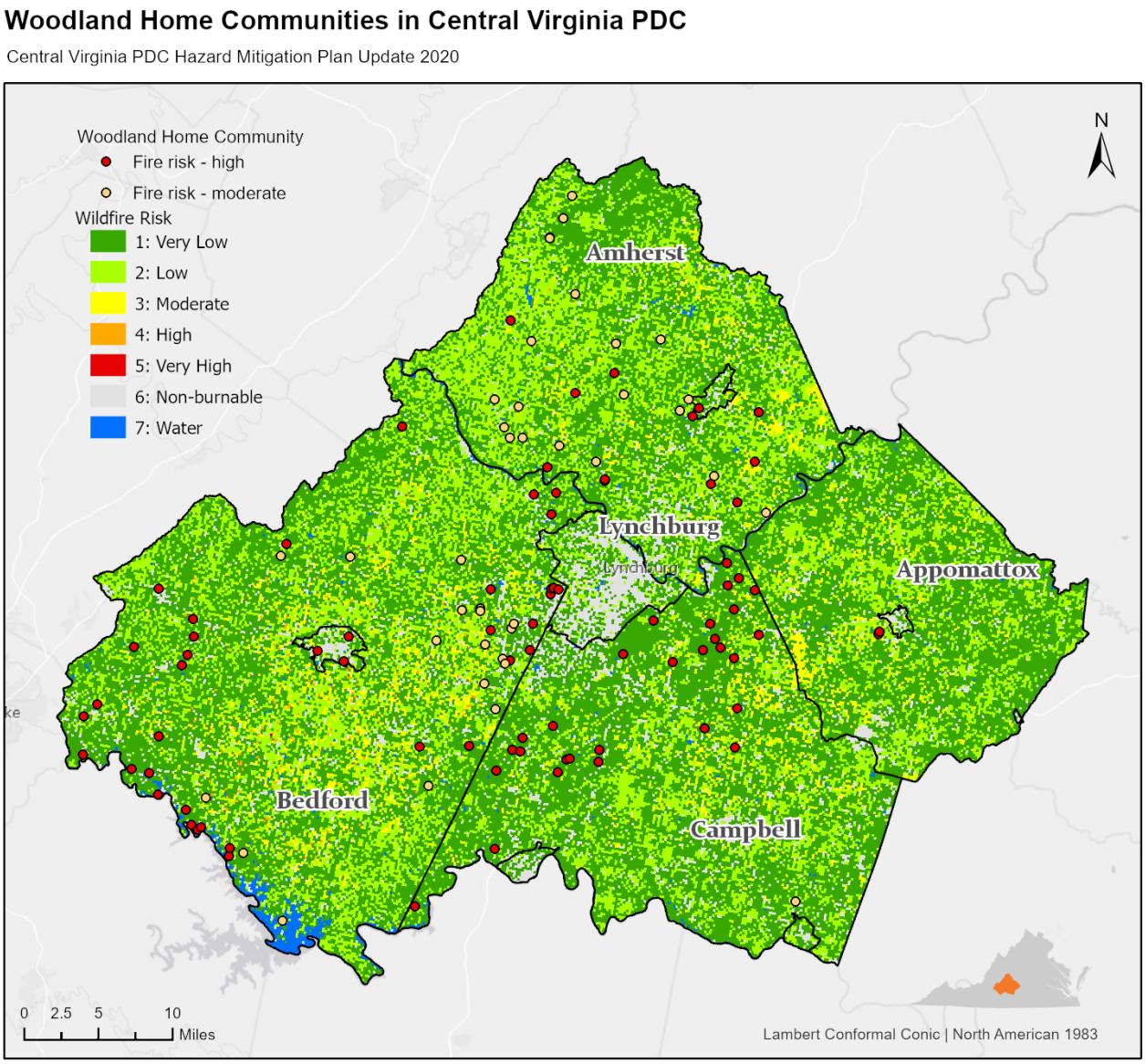


Figure 4-148 Woodland Home Communities in CVPDC Area

Table 4-144 Woodland home community with high wildfire risk in CVPDC Area

Locality	Community	Community Type	Number of homes	Coordinates
Amherst	Robinson Gap Rd	Intermix	18	-79.301, 37.655
Amherst	Tinsley Rd	Intermix	13	-79.257, 37.512
Amherst	Forest Of Pedlar Dr	Intermix	17	-79.222, 37.584
Amherst	Johns Creek Rd	Intermix	32	-79.187, 37.498
Amherst	Ridgeview Rd	Intermix	33	-79.186, 37.500

Locality	Community	Community Type	Number of homes	Coordinates
Amherst	Grants Hollow Rd	Intermix	12	-79.174, 37.603
Amherst	Woodland Rd	Intermix	17	-79.079, 37.561
Amherst	Sunset Dr	Intermix	17	-79.071, 37.569
Amherst	Stallion Rd	Intermix	26	-79.057, 37.494
Amherst	Hayshed Rd	Intermix	37	-79.024, 37.477
Amherst	Victoria Dr	Intermix	12	-79.003, 37.516
Amherst	Pierces Mill Rd	Intermix	11	-78.997, 37.564
Appomattox	Walton Drive	Interface	33	-78.852, 37.347
Appomattox	Charles Drive	Interface	21	-78.851, 37.349
Bedford	Dean Drive	Interface	21	-79.501, 37.346
Bedford	Hill Drive	Interface	16	-79.539, 37.332
Bedford	Fairview Drive	Interface	30	-79.507, 37.322
Bedford	Windhaven Tri	Intermix	22	-79.827, 37.230
Bedford	Glendale Drive	Interface	25	-79.825, 37.267
Bedford	Cascade Drive	Intermix	40	-79.809, 37.279
Bedford	Woodlake Drive	Intermix	20	-79.767, 37.216
Bedford	Woodcroft Road	Intermix	10	-79.764, 37.336
Bedford	Hemlock Shores Drive	Intermix	25	-79.745, 37.213
Bedford	Dewey Road	Intermix	16	-79.734, 37.393
Bedford	Morris Road	Intermix	20	-79.734, 37.191
Bedford	Hidden Forest Drive	Intermix	26	-79.733, 37.249
Bedford	Country Lane	Interface	16	-79.706, 37.317
Bedford	Westin Ridge Drive	Interface	14	-79.699, 37.328
Bedford	Tosh Lane	Interface	12	-79.701, 37.176
Bedford	Misty Ridge Lane	Intermix	14	-79.692, 37.363
Bedford	Sliding Lane	Intermix	10	-79.691, 37.346
Bedford	Shidow Drive	Intermix	15	-79.693, 37.162
Bedford	Lakeview Estate	Intermix	45	-79.685, 37.157
Bedford	Point Road	Intermix	15	-79.682, 37.159
Bedford	Forest Way Circle	Intermix	22	-79.648, 37.131
Bedford	Waterfront Drive	Intermix	45	-79.646, 37.139
Bedford	Peaks Road	Intermix	43	-79.578, 37.436
Bedford	Dahlia Court	Intermix	19	-79.435, 37.551
Bedford	Ivy Woods Drive	Intermix	22	-79.327, 37.392
Bedford	Lake Vista Drive	Intermix	42	-79.254, 37.387
Bedford	Forest Oaks Drive	Intermix	11	-79.253, 37.393
Bedford	Woodville Drive	Intermix	45	-79.250, 37.393
Bedford	Brookfield Road	Intermix	46	-79.244, 37.392
Bedford	Thompson Lane	Intermix	15	-79.327, 37.352
Bedford	Mill Spring Drive	Intermix	65	-79.304, 37.322
Bedford	Brookwood Drive	Intermix	10	-79.354, 37.239
Bedford	Prosperity Drive	Intermix	32	-79.414, 37.238
Bedford	Paul Revere/William Penn Rds	Intermix	150	-79.280, 37.332
Bedford	Eagle Eyrie Drive	Interface	32	-79.274, 37.485

Locality	Community	Community Type	Number of homes	Coordinates
Bedford	Jefferson Woods Drive	Intermix	75	-79.275, 37.359
Bedford	Ivy Ridge Lane	Intermix	12	-79.252, 37.466
Bedford	Abert Road	Intermix	10	-79.246, 37.486
Campbell	Johnson Mt Rd	Intermix	16	-79.320, 37.214
Campbell	Cowan Rd	Intermix	20	-79.301, 37.235
Campbell	Church Ln	Intermix	88	-79.291, 37.233
Campbell	Plateau Dr	Intermix	36	-79.288, 37.247
Campbell	Doe Run Ln	Intermix	20	-79.251, 37.258
Campbell	Autumn Dr	Intermix	41	-79.245, 37.213
Campbell	Crescent Hill Dr	Intermix	16	-79.235, 37.226
Campbell	Hallwood Rd	Intermix	50	-79.231, 37.227
Campbell	Hawkins Rd	Intermix	111	-79.195, 37.223
Campbell	Elwood Ln	Intermix	18	-79.195, 37.235
Campbell	Shercell Ln	Intermix	63	-79.165, 37.329
Campbell	Camp Hydaway Rd	Intermix	120	-79.128, 37.361
Campbell	Beaver Creek Xing	Intermix	49	-79.104, 37.320
Campbell	Kingswood Ln	Intermix	14	-79.067, 37.332
Campbell	Stormcrest	Intermix	18	-79.066, 37.256
Campbell	Hiley Ter	Intermix	10	-79.058, 37.357
Campbell	Smoky Hollow Rd	Intermix	12	-79.053, 37.343
Campbell	Holiday Ln	Intermix	80	-79.045, 37.334
Campbell	Mt Athos Rd	Intermix	65	-79.038, 37.417
Campbell	Petigrew Dr	Intermix	27	-79.036, 37.395
Campbell	Mt Olivet Church Rd	Intermix	54	-79.029, 37.372
Campbell	Anslem Dr	Intermix	22	-79.029, 37.324
Campbell	Greenfields Rd	Intermix	25	-79.029, 37.237
Campbell	Birdcage Ln	Intermix	26	-79.023, 37.402
Campbell	Hardwood Ter	Intermix	19	-79.026, 37.275
Campbell	Archer Mill Rd	Intermix	22	-79.003, 37.390
Campbell	Sunset Dr	Intermix	21	-78.999, 37.347
Campbell	Old Pocket Rd	Intermix	30	-79.323, 37.138
Campbell	Mt Airy Rd	Intermix	78	-79.421, 37.082

4.13.3.2 Critical Facility and Infrastructure

Critical facilities and infrastructures at wildfire risk were identified using the high and very high WHP category in the aforementioned USDA WHP map. Several facilities are located in or adjacent to high risk areas; most are south of the Town of Bedford (Table 4-145 and Figure 4-149). Other critical infrastructure exposed to high risk areas include a portion of hazardous liquid pipeline in Centerville / Thaxton, and Norfolk Southern railroad tracks near Meador pass in Bedford County.

Table 4-145 Critical facility and infrastructure located at high wildfire hazard potential areas in CVPDC Area

Locality	Facility Name	Facility Type	Location	Coordinates
Amherst	Temperance Elementary	Schools	1981 Lowesville Road	37.6931, -79.0817

Locality	Facility Name	Facility Type	Location	Coordinates
Bedford	Hawk Ridge Airport	Airport		37.2887, -79.4469
Bedford	Bedford County Department of Fire and Rescue - Headquarters	Fire Stations	1305 Falling Creek Road	37.3092, -79.5023
Bedford	Bedford County Emergency Operations Center	Emergency Operations Center	1345 Falling Creek Road	37.3116, -79.5052
Bedford	Bedford County Sheriff's Office - Headquarters	Law Enforcement	1345 Falling Creek Road	37.3115, -79.5054
Bedford	Bedford County Nursing Home	Nursing Home	1229 County Farm Road	37.3116, -79.5016
Bedford	Pump Station #12	Sewer Pump Station		37.3189, -79.5029

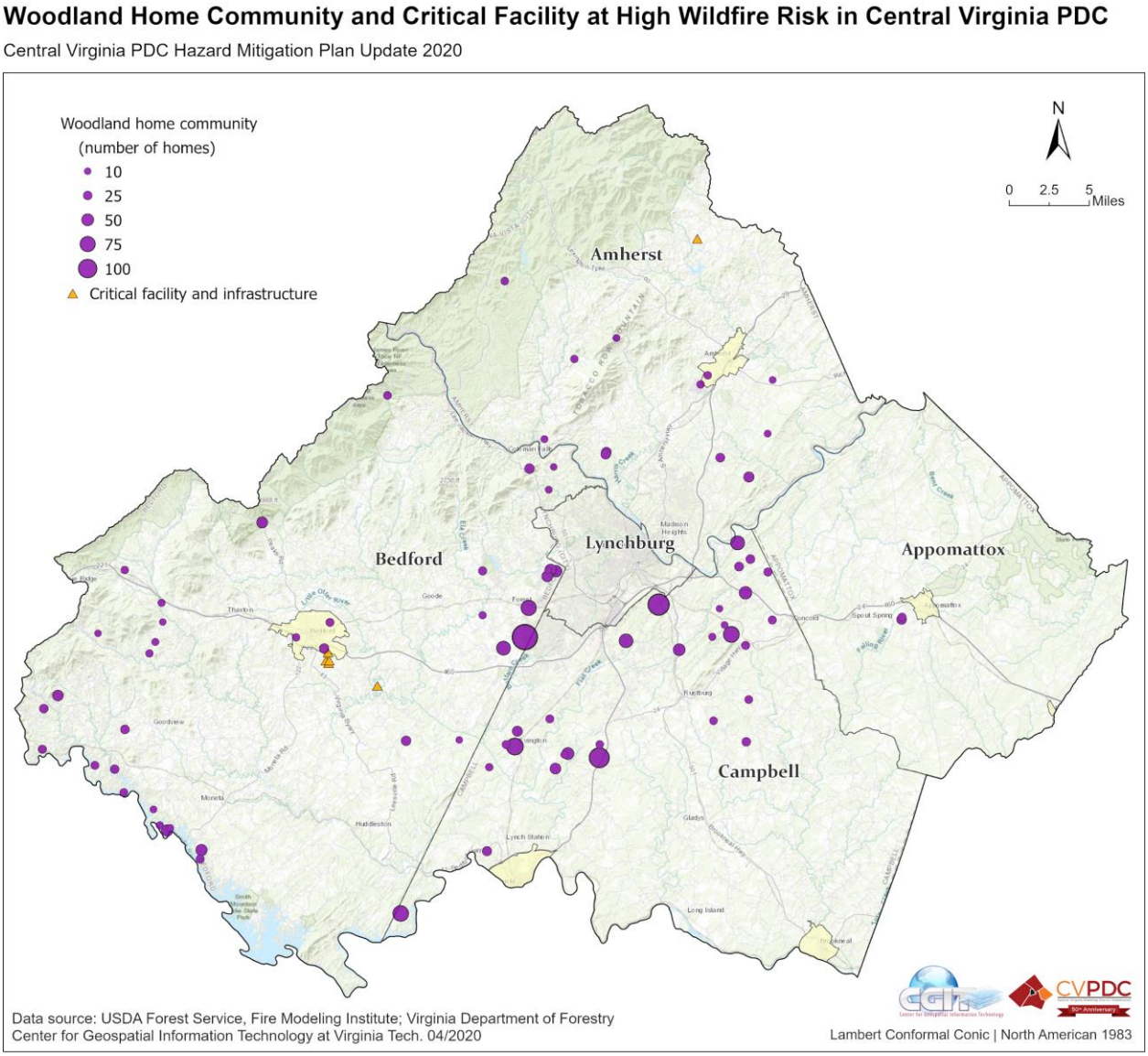


Figure 4-149 Woodland Home Community and Critical Facility at High Wildfire Risk in CVPDC Area

4.13.4 Probability of Future Occurrences

Future wildfire incidents are difficult to predict, as the factors influencing wildfire generation vary greatly with changing weather conditions, and human activities. Other natural hazards (such as tornadoes and hurricanes) can influence the structure and fuel distribution of forests, leading to a change in wildfire intensity and risk. The occurrence and frequency of wildfires also depends greatly upon the type of forests in Central Virginia, such as oak-hickory, loblolly-shortleaf pine, and mixed oak-pine. The likelihood of wildfires increases during drought cycles and abnormally dry conditions. In addition, increased development throughout the region leads to increased vulnerability.

There are some studies projecting an increase in the wildfire incidents in the United States. The U.S. Department of Agriculture (USDA), Pacific Northwest Research Station assessed future conditions of forest

resources in the United States relative to climatic variability and change. There will be significant short-term effects on forest ecosystems caused by altered disturbance regimes. As a consequence, "wildfire will increase throughout the United States, causing at least a doubling of area burned by the mid-21st century".[74] Currently, there are no quantitative estimates of future wildfire probability for specific regions of the state.

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[74] USDA Tech. Rep. PNW-GTR-870