



# Hazard Identification and Risk Assessment

## 4.19 Urban Fire / Conflagration

### 4.19.1 Hazard Profile

An urban fire involves a structure or property within an urban or developed area. For hazard mitigation purposes, major urban fires involving large buildings and/or multiple properties are of primary concern. The effects of a major urban fire include minor to significant property damage, loss of life, and residential or business displacement. Explosions are extremely rapid releases of energy that usually generate high temperatures and often lead to fires. The risk of severe explosions can be reduced through careful management of flammable and explosive hazardous materials.

Urban areas defined by the US Census Bureau represent densely developed territory, and encompass residential, commercial, and other non-residential urban land uses. As defined, an urban area comprises a densely settled core of census tracts and/or census blocks that meet minimum population density requirements, along with adjacent territory containing non-residential urban land uses, as well as territory with low population density included to link outlying densely settled territory with the densely settled core. The Census Bureau identifies two types of urban areas: (a) Urbanized Areas (UAs) of 50,000 or more people; and (b) Urban Clusters (UCs) of at least 2,500 and less than 50,000 people. There are three urban areas identified in the CVPDC area: Lynchburg urbanized area, Bedford urban cluster, and Altavista urban cluster (US Census Bureau).<sup>97</sup>

#### 4.19.1.1 Geographic Location/ Extent

Three urban areas occur within the CVPDC area. The City of Lynchburg is located at the center of the surrounding four counties that comprise the area and is significantly the largest urban area. The current population is approximately 82,000 and has a density of 1,677 people per square mile (World Population Review).<sup>98</sup> The other two classified urban areas include the Town of Bedford with a population of approximately 6,600 and the Town of Altavista with a population of approximately 3,400.

#### 4.19.1.2 Magnitude/ Severity

In general, the extensive networks of roads and streets coupled with the number of local fire departments should provide swift access to fire events. It is anticipated that blockage by damage, debris, and operations will be localized and temporary. However, urban fires have the potential to cause extensive damage to residential, commercial, or public property. Damage ranges from minor smoke and/or water damage to the destruction of buildings. People are often displaced for several months to years, depending on the magnitude of the event. Urban fires and explosions can also cause injuries and death. In Virginia, the fire mortality rate is approximately 2.4 deaths and 15.4 injuries per 1,000 fires. This is slightly higher than the national average of 2.3 deaths and 9.3 injuries per 1,000 fires (NFIRS/FEMA).<sup>99</sup> In the most serious urban fire events, the extreme heat of a fire event can damage the underlying infrastructure such as a bridge or tall building.

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<sup>97</sup> 2010 Census Urban and Rural Classification and Urban Area Criteria. <https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural/2010-urban-rural.html>

<sup>98</sup> World Population Review. <http://worldpopulationreview.com/us-cities/lynchburg-va-population/>

<sup>99</sup> Virginia fire loss/fire department profile. NFIRS/FEMA. <https://www.usfa.fema.gov/data/statistics/states/virginia.html>



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## 4.19.1.3 Previous Occurrences

Urban fire events occur daily across the CVPDC area. The Virginia Department of Forestry provided fire statistics recorded in Virginia Fire Incident Reporting System (VFIRS) from January 2008 to December 2018 for the area. The report contains incident type, rescue calls, severe weather, false calls, casualty summary, and fire dollar loss, etc. Table 4-165 is a summary of the VFIRS fire statistics regarding urban fire for the CVPDC area.

Table 4-165 Urban Fire Incidents in CVPDC Area, 2008 - 2018.

Locality	Total Fires	Total Building Fires	Total Rescue Calls	Total Fire Loss (\$)	Civilian Injuries	Civilian Deaths
Amherst	1,385	464	1,964	11,191,292	19	5
Appomattox	518	156	312	4,401,300	0	7
Bedford	2,929	1,062	18,529	28,829,159	54	40
Campbell	2,416	771	5,163	24,306,613	9	18
Lynchburg	3,221	1,289	105,995	24,844,265	86	15
<b>Total</b>	<b>10,469</b>	<b>3,742</b>	<b>131,963</b>	<b>93,572,629</b>	<b>168</b>	<b>85</b>

(Source: Virginia Department of Forestry, Virginia Fire Incident Reporting System)

## 4.19.1.4 Relationship to Other Hazards

Urban fires often begin as a result of other hazards—particularly storms, lightning strikes, drought, transportation accidents, hazardous materials releases, criminal activity (arson), and terrorism. Figure 4-173 shows the interrelationship (causation, concurrence, etc.) between this hazard and other hazards discussed in this plan update.



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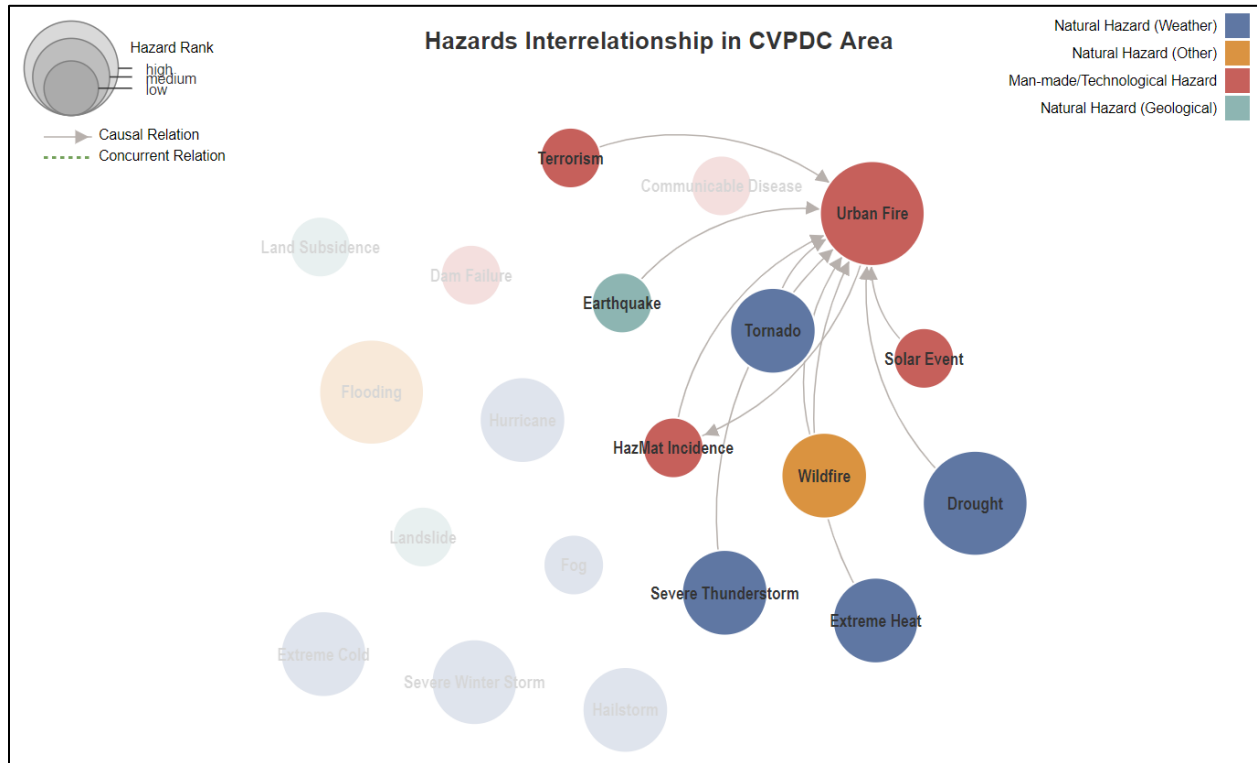


Figure 4-173 Hazards interrelationship

## 4.19.2 Impact and Vulnerability

In the United States, fires cause over 3,000 deaths and approximately 16,000 civilian injuries each year. In 2017, fires in residential structures were responsible for 2,630 deaths and 10,600 injuries, accounting for 77% of all fire deaths and 72% of all injuries (NFPA, 2018). In the CVPDC region, there were 3,742 structural fire incidents, causing 85 civilian deaths and 168 injuries from 2008 to 2018 (Table 4-165).

## 4.19.3 Risk Assessment and Jurisdictional Analysis

Urban fires tend to occur in denser, more urbanized areas like the City of Lynchburg and most often in residential structures. Furthermore, urban fires are a more significant threat in areas of the region with a significant proportion of old buildings, especially those constructed before 1973, which used less restrictive fire protection systems or fire resistance materials.

In 1973, §36-98 Code of Virginia became effective directing the promulgation of the Uniform Statewide Building Code (USBC) which superseded the Virginia Fire Safety Regulations (VFSR) for new construction. According to Virginia's current building and fire codes, an existing building is required to be maintained in accordance with the building code that was in effect at the time the building was constructed and with the requirements of any applicable maintenance provisions of Virginia's fire code. This means that many



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conditions identified in an older building that may not be in full compliance with today's codes are acceptable because these conditions were okay at the time the building was constructed.

## *History of Virginia Public Building Safety Regulations*

<b>Date</b>	<b>Event</b>
April 12, 1949	Virginia Fire Hazards Law adopted, Title 27, Chapter 6, art. 2, Code of Virginia
December, 1953	First printing of Virginia Fire Safety Regulations (VFSR) adopted by State Corporation Commission
May 24, 1967	VFSR amended
September 1, 1973	Uniform Statewide Building Code (USBC) adopted by Board of Housing & Community Development (BHCD). USBC supersedes VFSR for new construction.
January 15, 1979	VFSR amended
1981	Virginia Fire Safety Law amended, renamed to Virginia Public Building Safety Law. It requires buildings built after 1973 be maintained in accordance with fire safety provisions of the USBC
July 5, 1982	VFSR amended, Title changed to Virginia Public Building Safety Regulations (VPBSR); Added Part 3.
March 31, 1986	Virginia Fire Hazards Law is repealed. Virginia Statewide Fire Prevention Code Act, Title 27, Section 94-101, Code of Virginia is adopted. Creates Virginia Statewide Fire Prevention Code. (VSFPC)
March 1, 1988	VSFPC 1987 edition is adopted by BHCD. First edition of VSFPC includes an edited version of VPBSR in Addendum A.

<http://www.vafire.com/content/uploads/2017/02/Virginia-Fire-Safety-Regulations.pdf>

Figure 4-174 shows the distribution of old buildings built before 1973 in three urban areas of the PDC area. A darker color pixel indicates more buildings that exist within a 10 acres land area, which represents an area that is at higher risk of urban fire occurrence. Table 4-166 provides the total number of old buildings within each urban area. Table 4-167 is the list of critical facilities constructed before 1973 in these urban areas. The location of fire and rescue stations are overlaid on top of the density map of these old buildings and facilities to identify gaps in fire service coverage (Figure 4-175). Based on this map, areas at high risk of urban fire in three urban areas are well covered by fire service.

*Table 4-166 Statistics of old buildings (constructed before 1973) by jurisdiction in CVPDC Area*

Urban Jurisdiction	A: Total buildings *	B: Total buildings (with known year-of-built)	C: Old buildings (built before 1973)	Ratio C/A	Ratio C/B
Lynchburg Urban Area	50,960	41,862	25,042	49.1%	59.8%
Bedford Urban Cluster	3,250	2,428	1,546	47.6%	63.7%



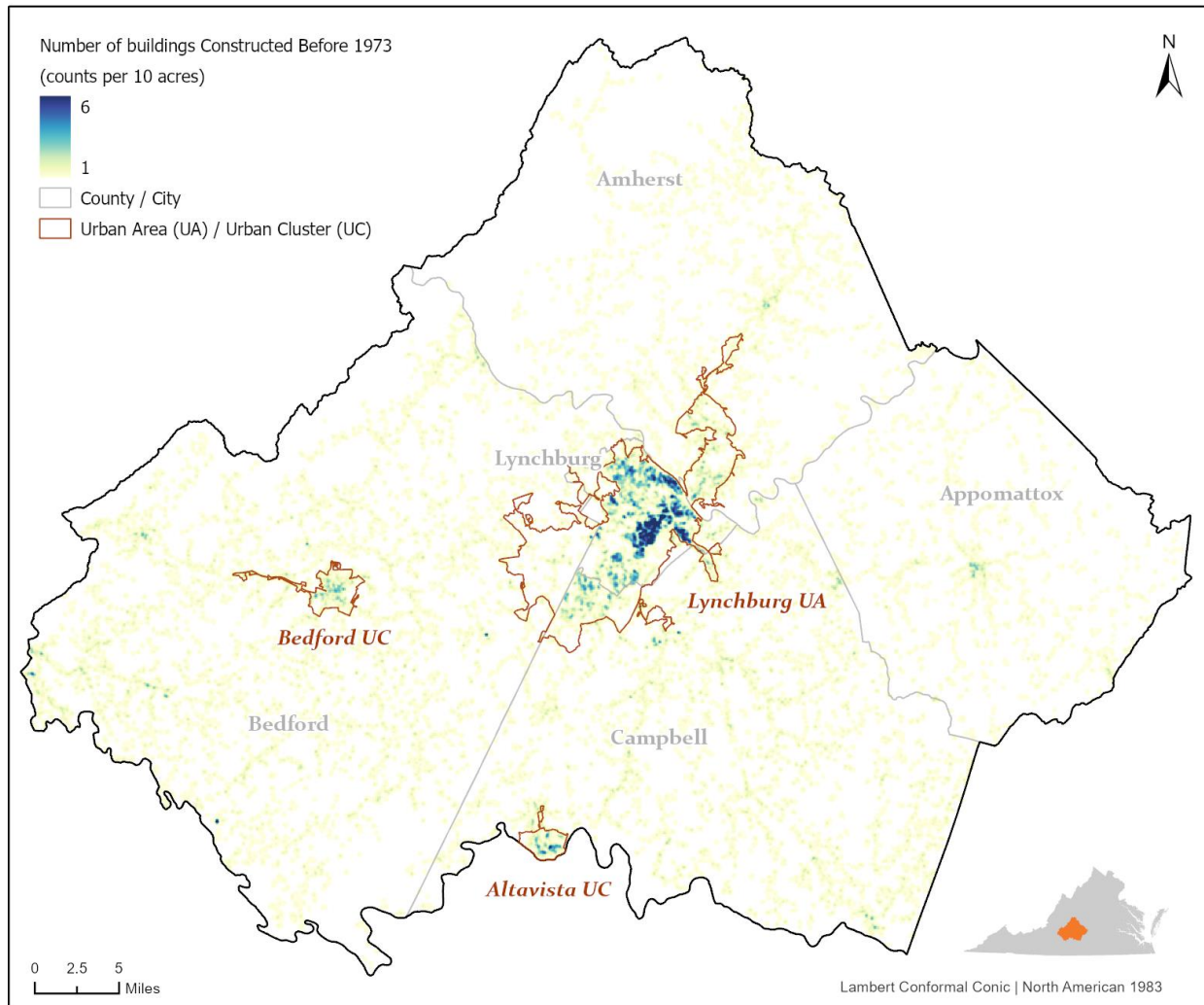
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Altavista Urban Cluster	2,327	1,554	1,165	50.1%	75.0%
CVPDC	175,860	135,751	65,649	37.3%	48.4%

(\* Only the primary structure in each parcel is considered; Building information derives from parcel data of each locality, some structures have missing or invalid year-of-built information.)

## Distribution of Old Buildings (Constructed Before 1973) in Central Virginia PDC

Central Virginia PDC Hazard Mitigation Plan Update 2020



Density map of buildings constructed before 1973 in Central Virginia PDC. Darker color represents more buildings exist within a 10 acres land area. Urban fires are a more significant threat in areas of the region with a significant proportion of buildings built before 1973.

Data source: Locality parcel GIS data; Lynchburg eTRACK system; 2010 Census Urban Area Center for Geospatial Information Technology at Virginia Tech. 04/2020



Figure 4-174 Distribution of old buildings (constructed before 1973) in V PDC Area

Table 4-167 Critical facilities constructed before 1973 in Urban areas of CVPDC Area

Locality	Facility Name	Facility Type	Location	Coordinates
Amherst	Sweet Briar College	College	Sweet Briar	37.5563, -79.0797
Amherst	Wamv - Am - Community First	Communication		37.5397, -79.0917



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Locality	Facility Name	Facility Type	Location	Coordinates
	Broadcasters, Inc.	Facility		
Amherst	Wbrg - Am - Tri-County Broadcasting, Inc.	Communication Facility		37.4208, -79.1152
Amherst	W283Az - Fx - Brent Epperson	Communication Facility		37.4208, -79.1152
Amherst	Wrmv-Lp - FI - Fellowship Community Church And Christian Schools	Communication Facility		37.4201, -79.1317
Amherst	Solid Rock Baptist Church	Schools	131 Old Colony Rd	37.4200, -79.1220
Amherst	Central Virginia Training Center	Schools	521 Colony Road	37.4155, -79.1196
Amherst	Amherst County Service Authority Water Office	Service Authority	St Rt 675	37.4313, -79.1229
Bedford	Bedford Fire Department	Fire Stations	315 Bedford Avenue	37.3365, -79.5242
Bedford	Sam Moore Furniture Llc	HazMat Facility	1556 Dawn Dr	37.3388, -79.5035
Bedford	Gran Tee Investments	HazMat Facility	906 Adams St.	37.3350, -79.5093
Bedford	Bedford Police Department	Law Enforcement	215 East Main Street	37.3342, -79.5213
Bedford	Bedford Memorial Hospital	Public Health	1613 Oakwood Street	37.3513, -79.5172
Bedford	Bedford Middle	Schools	503 Longwood Avenue	37.3394, -79.5217
Bedford	Bedford Primary	Schools	807 College Street	37.3407, -79.5320
Bedford	Forest Elementary	Schools	1 Scholar Lane	37.3757, -79.3079
Bedford	Pump Station #9	Sewer Pump Station		37.3412, -79.5171
Bedford	Pump Station #4	Sewer Pump Station		37.3501, -79.5097
Bedford	Pump Station #8	Sewer Pump Station		37.3537, -79.5212
Bedford	Bedford Adult Detention Center	Detention Facility	1000 Broad St	37.3375, -79.5083
Campbell	Lynchburg Rgnl/Preston Glenn Fld Airport	Airport		37.3254, -79.2012
Campbell	Lynchburg Regional Airport Aircraft Rescue Fire Fighting	Fire Stations	984 Airport Road	37.3289, -79.2016
Campbell	Bgf Industries	HazMat Facility	401 Amherst Avenue, Altavista	37.1122, -79.2782
Campbell	Banker Steel Co Llc	HazMat Facility	351 Rangoon Rd	37.3269, -79.1939
Campbell	Schrader-Bridgeport International	HazMat Facility	205 Frazier Rd	37.1253, -79.2856
Campbell	Federal Hill	Historic Site	724 Turkey Foot Rd	37.3106, -79.2837
Campbell	Grove Plantation	Historic Site	151 Closeburn Manor Dr	37.3111, -79.2691
Campbell	Altavista Area Ymca Family Center	Large Population Venue	1000 Franklin Ave, Altavista	37.1140, -79.2889
Campbell	Lynchburg Regional Airport Police Department	Law Enforcement	4308 Wards Road	37.3304, -79.1938
Campbell	Timberlake Christian Schools	Schools	202 Horizon Dr	37.3394, -79.2598
Campbell	Altavista High	Schools	904 Bedford	37.1095, -79.2953





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Locality	Facility Name	Facility Type	Location	Coordinates
			Avenue	
Campbell	Brookville High	Schools	100 Laxton Road	37.3457, -79.2355
Campbell	Brookville Middle	Schools	320 Bee Drive	37.3458, -79.2396
Campbell	Leesville Road Elementary	Schools	19965 Leesville Road	37.3278, -79.2186
Campbell	Tomahawk Elementary	Schools	155 Bee Drive	37.3438, -79.2375
Campbell	Timberlake Baptist Church Pump Station	Sewer Pump Station	460	37.3308, -79.2464
Lynchburg	Lynchburg Museum	Attractions	901 Court St	37.4137, -79.1443
Lynchburg	Point Of Honor Museum	Attractions	112 Cabell St	37.4206, -79.1439
Lynchburg	Legacy Museum Of African American History	Attractions	403 Monroe St	37.4142, -79.1543
Lynchburg	Ann Spencer House & Garden Museum	Attractions	1313 Pierce St	37.4038, -79.1520
Lynchburg	Maier Museum Of Art	Attractions	1 Quinlan St	37.4393, -79.1699
Lynchburg	Old City Cemetery	Attractions	301 Monroe St	37.4149, -79.1565
Lynchburg	Historic Sandusky Foundation - Civil War Museum	Attractions	757 Sandusky Dr	37.3803, -79.1963
Lynchburg	Amazement Square Child Museum	Attractions	27 9Th St	37.4162, -79.1403
Lynchburg	Virginia University Of Lynchburg	College		37.3951, -79.1515
Lynchburg	Lynchburg College	College		37.3977, -79.1842
Lynchburg	Randolph College	College		37.4374, -79.1708
Lynchburg	Central Virginia Community College	College		37.3589, -79.1844
Lynchburg	Liberty University	College		37.3503, -79.1797
Lynchburg	Centra College Of Nursing	College		37.4169, -79.1714
Lynchburg	Lynchburg Fire Department Station 5 - Peakland	Fire Stations	4800 Boonsboro Road	37.4461, -79.2148
Lynchburg	Lynchburg Fire Department Station 2 - Grace Street	Fire Stations	2006 Grace Street	37.4025, -79.1400
Lynchburg	Lynchburg Fire Department Station 3 - Fort Hill	Fire Stations	4701 Fort Avenue	37.3821, -79.1813
Lynchburg	Lynchburg Fire Department Station 6 - Miller Park	Fire Stations	2084 Fort Avenue	37.4026, -79.1590
Lynchburg	R R Donnelley Incorporated Fire Brigade	Fire Stations	4201 Murray Place	37.3782, -79.1683
Lynchburg	Westrock Converting Company	HazMat Facility	1801 Concord Turnpike	37.4032, -79.1277
Lynchburg	Hanson Industries Inc	HazMat Facility	3300 John Capron Rd.	37.3721, -79.1607
Lynchburg	U.S. Pipe	HazMat Facility	10 Adams Street	37.4208, -79.1413
Lynchburg	Gnb Inc	HazMat Facility	2800 Carroll Ave.	37.3893, -79.1575
Lynchburg	Slocum Adhesives Corporation	HazMat Facility	1409 Buchanan Street	37.4024, -79.1521
Lynchburg	Old Dominion Wood Products	HazMat Facility	800 Craddock Street	37.4061, -79.1583
Lynchburg	Allen-Morrison Signage Company	HazMat Facility	319 Rutherford Street	37.3889, -79.1678
Lynchburg	Parker Hannifin Corporation -	HazMat Facility	3700 Mayflower Dr	37.3719, -79.1631



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Locality	Facility Name	Facility Type	Location	Coordinates
	Powertrain Division			
Lynchburg	Lynchburg Foundry Co Lower Basin Plant	HazMat Facility	Garnet Street And Concord Turnpike	37.4071, -79.1318
Lynchburg	Banker Steel Co Llc - 30997	HazMat Facility	1619 Wythe Rd	37.3913, -79.1621
Lynchburg	Delta Star Inc.	HazMat Facility	3550 Mayflower Drive	37.3693, -79.1646
Lynchburg	Simplimatic Eng Co	HazMat Facility	1320 Wards Ferry Road	37.3527, -79.1890
Lynchburg	Davis Frost Inc	HazMat Facility	3420 Candler's Mountain Rd	37.3675, -79.1730
Lynchburg	Cb Fleet Co	HazMat Facility	4615 Murray Place	37.3735, -79.1713
Lynchburg	Westover Dairy	HazMat Facility	2801 Fort Ave	37.3977, -79.1655
Lynchburg	Rr Donnelley Printing Company	HazMat Facility	4201 Murray Place	37.3783, -79.1694
Lynchburg	Porters Group Llc	HazMat Facility	3726 Cohen Pl	37.3699, -79.1615
Lynchburg	Flowserve Corporation	HazMat Facility	5114 Woodall Road	37.3739, -79.1746
Lynchburg	Tri Tech Laboratories Inc	HazMat Facility	1000 Robins Rd	37.3981, -79.1412
Lynchburg	City Stadium	Large Population Venue	3176 Fort Ave, Lynchburg	37.3924, -79.1664
Lynchburg	Liberty Vines Convocation Center	Large Population Venue	1971 University Blvd, Lynchburg	37.3489, -79.1811
Lynchburg	Academy Center Of The Arts	Large Population Venue	600 Main St, Lynchburg, Va 24504	37.4174, -79.1441
Lynchburg	Liberty University Police Department	Law Enforcement	1971 University Boulevard	37.3581, -79.1757
Lynchburg	Lynchburg Police Department	Law Enforcement	905 Court Street	37.4134, -79.1442
Lynchburg	Central Virginia Community College Police	Law Enforcement	3506 Wards Road	37.3589, -79.1845
Lynchburg	Lynchburg General Hospital	Public Health	1901 Tate Springs Road	37.4171, -79.1711
Lynchburg	Salvation Army	Cooling Center	2215 Park Ave, Lynchburg, Va 24501	37.4047, -79.1628
Lynchburg	Virginia Episcopal School	Schools	400 V E S Rd	37.4533, -79.1909
Lynchburg	Holy Cross Regional Catholic School	Schools	2125 Langhorne Rd	37.4125, -79.1778
Lynchburg	James River Day School	Schools	5039 Boonsboro Rd	37.4446, -79.2268
Lynchburg	New Vistas School	Schools	520 Eldon St	37.3987, -79.1724
Lynchburg	Rivermont School	Schools	3024 Forest Hills Cir	37.4171, -79.2055
Lynchburg	Lynchburg Day Services	Schools	1517 Jackson Street	37.4057, -79.1441
Lynchburg	Laurel Regional Special Education Center	Schools	401 Monticello Avenue	37.4044, -79.1798
Lynchburg	Fort Hill Community School	Schools	1350 Liggates Road	37.3863, -79.1744
Lynchburg	Hutcherson Early Learning Center	Schools	409 Perrymont Avenue	37.3895, -79.1882
Lynchburg	Linkhorne Elementary	Schools	2501 Linkhorne Drive	37.4184, -79.1953
Lynchburg	Linkhorne Middle	Schools	2525 Linkhorne	37.4167, -79.1931





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Locality	Facility Name	Facility Type	Location	Coordinates
			Drive	
Lynchburg	Paul Munro Elementary	Schools	4641 Locksview Road	37.4515, -79.2067
Lynchburg	Perrymont Elementary	Schools	409 Perrymont Avenue	37.3895, -79.1882
Lynchburg	Robert S. Payne Elementary	Schools	1201 Floyd Street	37.4057, -79.1512
Lynchburg	Sandusky Elementary	Schools	5828 Apache Lane	37.3808, -79.2037
Lynchburg	Sandusky Middle	Schools	805 Chinook Place	37.3796, -79.2022
Lynchburg	Sheffield Elementary School	Schools	115 Kenwood Place	37.3658, -79.1898
Lynchburg	T.C. Miller Elementary For Innovation	Schools	600 Mansfield Avenue	37.3978, -79.1670
Lynchburg	William M. Bass Elementary	Schools	1730 Seabury Avenue	37.3918, -79.1410
Lynchburg	Lynchburg Juvenile Detention Home	Schools	1400 Florida Avenue	37.3940, -79.1373
Lynchburg	Crossroads / Single Point Of Entry	Schools	405 Cabell Street	37.4227, -79.1467
Lynchburg	Bedford Hills Elementary	Schools	4330 Morningside Drive	37.4384, -79.2112
Lynchburg	E.C. Glass High	Schools	2111 Memorial Avenue	37.4074, -79.1660
Lynchburg	Medical Care Center	Nursing Home	2200 Landover Place	37.4127, -79.1760
Lynchburg	Guggenheimer Health And Rehab Center	Nursing Home	1902 Grace Street	37.4026, -79.1419
Lynchburg	Williams Home Incorporated	Nursing Home	1201 Langhorne Road	37.4358, -79.1848
Lynchburg	Avante At Lynchburg	Nursing Home	2081 Langhorne Road	37.4130, -79.1824
Lynchburg	Lynchburg Regional Juvenile Detention Center	Detention Facility	1400 Florida Ave	37.3940, -79.1371
Lynchburg	Kemper Street Station	Transportation Hub	825 Kemper St	37.4065, -79.1571
Lynchburg	Ground Storage Tank, 1,400,000 Gallon	Water Storage Facility	525 Taylor Street	37.4114, -79.1549
Lynchburg	Reservoir 10,500,000 Gallon	Water Storage Facility	525 Taylor Street	37.4113, -79.1542
Lynchburg	Ground Storage Tank, 4,500,000 Gallon	Water Storage Facility	525 Taylor Street	37.4107, -79.1548
Lynchburg	Fort Avenue Storage Tank #1, 2,000,000	Water Storage Facility	Fort Avenue	37.3819, -79.1819
Lynchburg	Storage Tank #2, 500,000 Gallons	Water Storage Facility	Fort Avenue	37.3817, -79.1821



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## Location of Fire Stations in Urban Area / Urban Cluster in Central Virginia PDC

Central Virginia PDC Hazard Mitigation Plan Update 2020

Distribution of old buildings (constructed before 1973) in Central Virginia PDC. Darker color represents more buildings exist within a 10 acres land area. Urban fires are a more significant threat in areas of the region with a significant proportion of old buildings.

Data source: Locality parcel GIS data; Lynchburg eTRACK system; 2010 Census Urban Area Center for Geospatial Information Technology at Virginia Tech. 04/2020

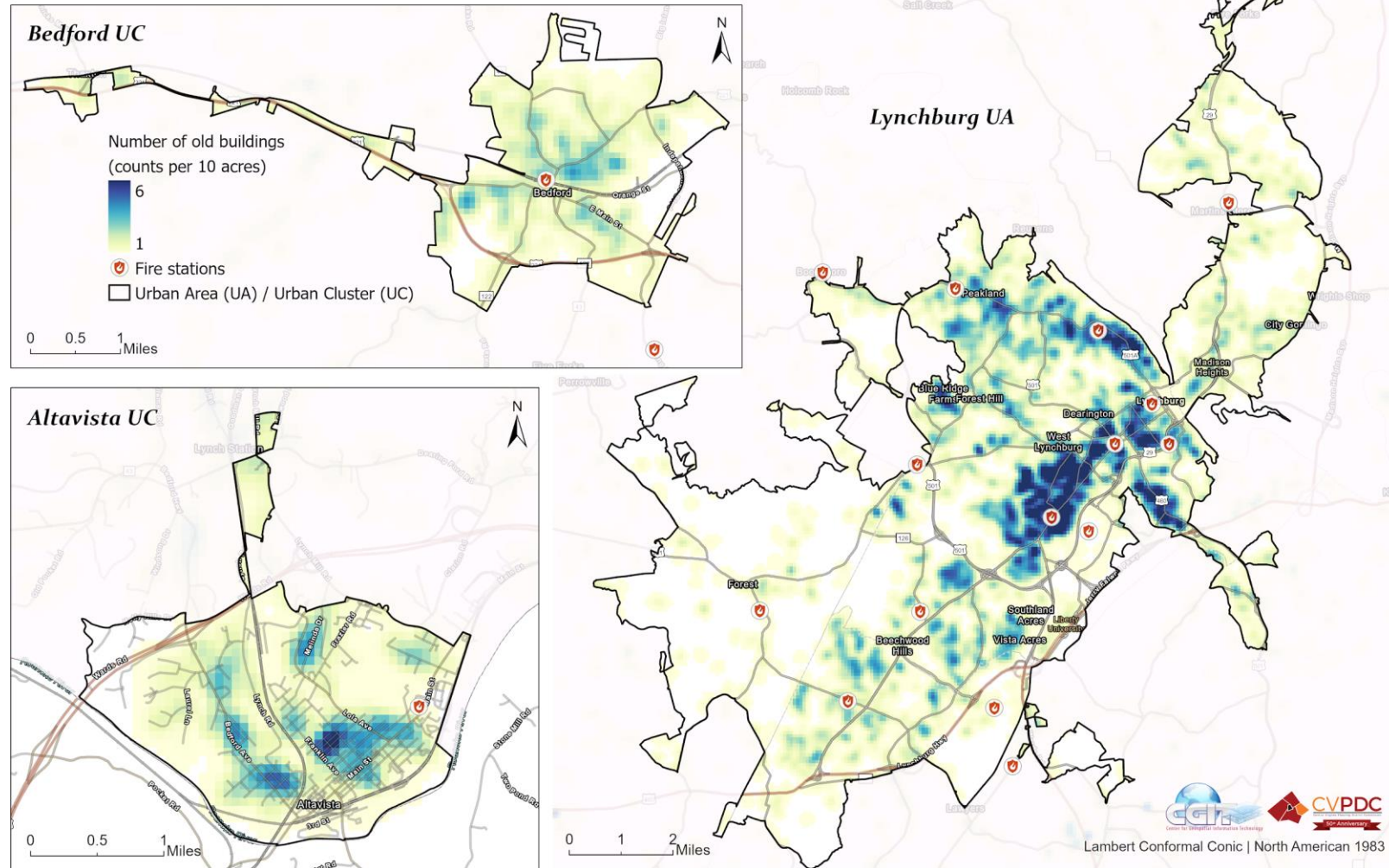


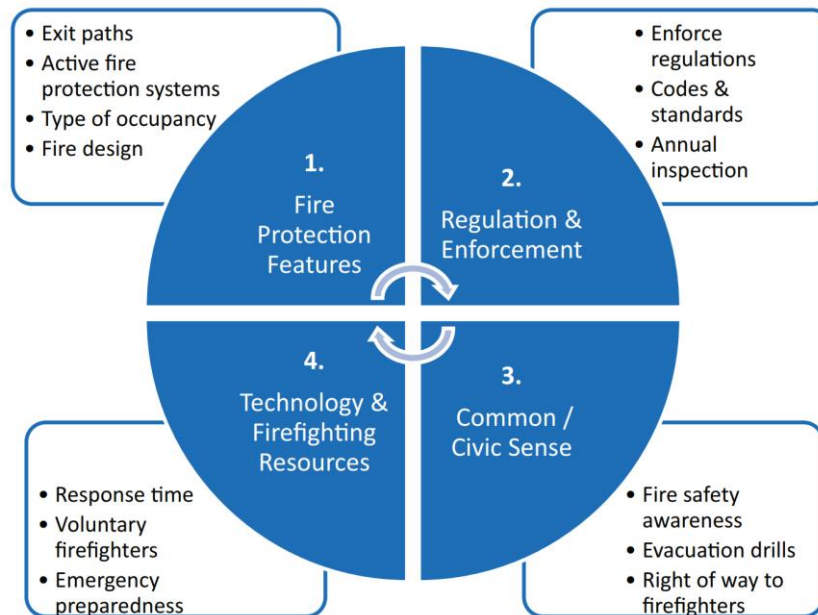
Figure 4-175 Location of fire stations in urban area / urban cluster in CVPDC Area



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## 4.19.4 Probability of Future Occurrences

There are many factors that contribute to the cause of urban fires. Minor urban fires can be expected every day in the CVPDC area, while major fires could occur several times a year, particularly in dense, urban areas with aging building stock. However, the probability of future occurrences may decrease with the construction of new buildings to building codes that address fire prevention, detection, and extinguishment. Also, continued efforts to increase public awareness of the dangers of urban fires will help to mitigate injury, death, and property loss. (See Figure 4-176 for more fire safety improvement strategies.)



(Source: Kodur, et. al. 2019)

Figure 4-176 Integrated framework to implement strategies for improving fire safety in buildings.

Generally, the probability of future occurrence may increase in communities whose populations are growing and where new areas are developed.

## 4.19.5 References

- Evarts, Ben, and National Fire Protection Association (NFPA). *Fire Loss in the United States During 2017*. Quincy, MA: National Fire Protection Association, October 2018. <https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/US-Fire-Problem/osFireLoss.pdf>.
- Pennsylvania Emergency Management Agency (PEMA). *Pennsylvania 2018 State Hazard Mitigation Plan Update*. Harrisburg, PA, 2018. <https://pahmp.com/wp-content/uploads/2018/07/PA-2018-HMP-FEMA-Review-Full-Plan.pdf>.



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- NFIRS/FEMA. *Virginia fire loss/fire department profile*. <https://www.usfa.fema.gov/data/statistics/states/virginia.html>. (Accessed on June 18, 2019)
- U.S. Census Bureau. *2010 Census Urban and Rural Classification and Urban Area Criteria*. <https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural/2010-urban-rural.html>
- Venkatesh Kodur, Puneet Kumar, and Muhammad Masood Rafi. *Fire hazard in buildings: review, assessment and strategies for improving fire safety*. PSU Research Review. 2019
- Virginia Department of Fire Programs. *VFIRS Facts and Figures*. <https://www.vafire.com/vfirs-facts-and-figures/>. (Accessed on June 18, 2019)
- World Population Review. *Population Density statistics*. <http://worldpopulationreview.com/us-cities/lynchburg-va-population/>. (Accessed on September 26, 2019)