- **Enhanced level of analysis for HIRA**. The loss estimates from the previous plan update were produced through a Hazus analysis which used 2000 Census data for its calculations. In this update, the latest version of Hazus software equipped with 2010 Census data was used for HIRA. The assessment of hurricane wind and earthquake were based on Level 1 analysis that utilizes the default data provided by the Hazus. Level 2 analysis was applied for flooding and dam failure hazards to produce a more accurate prediction of damages and losses. The Level 2 analysis improves the results of Level 1 by supplementing default data with user-supplied data such as up-to-date building inventories and flood elevation data. The HIRA involved integrating local, site specific data for all structures in the floodplain and dam failure inundation areas to create a more comprehensive risk assessment.
- **Cascading hazards and multi-hazard interrelationships**. Preparing for and responding to hazard events could be improved by integrating information on hazard interactions and cascading effects. In this update, the management team explored various concurrent and causal interrelations between hazards in the CVPDC area and developed weighted network diagrams to depict relationships between hazards and their impacts. This multi-hazard network model is available as an interactive graph in the CVPDC HMP 2020 Update website.

## 4.2 Introduction

The purpose of the HIRA section of the plan is to:

1. Identify and profile the hazards that could affect the jurisdictions in the CVPDC area,
2. Determine which community assets are the most vulnerable to damage from these hazards, and
3. Estimate social, economic, and environmental losses from these hazards and prioritize the potential risks to the community.

The first step, identifying hazards, will determine all the natural hazards that might affect the area. The next step involves assessing all those hazards to determine how often they occur, where they occur, their magnitudes when they do occur, and documented impacts to help begin to prioritize which ones should be studied further. The last step is to determine estimate potential losses for those hazards which are well documented and those that are not well documented. The hazards are then ranked to determine what hazards are most likely to impact the communities of the CVPDC area. Hazards that are determined to have significant impact will be analyzed in the greatest detail to determine the magnitude of future events and the vulnerability for the community and the critical facilities. Hazards that receive a moderate impact ranking will be analyzed with available data to determine the risk and vulnerability to the specified hazard. The hazards with limited impact will be briefly outlined in the HIRA. This ranking will be used to help determine which mitigation actions to select and which are higher priorities.

### 4.2.1 Critical Facilities and Infrastructure

A comprehensive inventory of critical facilities and infrastructure is not readily available because there is no universally accepted definition of what constitutes critical facilities and infrastructure, nor is one associated with FEMA and DMA 2000 planning requirements. For the purpose of this plan update, a critical facility or infrastructure is defined as a facility in either the public or private sector that provides essential products and services to the general public, is otherwise necessary to preserve the welfare and quality of life in the county, or fulfills important public safety, emergency response, and/or disaster recovery functions. This includes the following facilities and systems based on their high relative importance for the delivery of vital services, the protection of special populations, and other important functions in the CVPDC area:

- Airports
- Attractions (tourism destinations, historic assets)
- Chemical facilities / hazardous material facilities
- Communication facilities
- Emergency Operations Centers (EOCs)
- Energy facilities and infrastructure
- Fire stations
- Hospitals
- Large population venues
- Major road bridges and tunnels
- Police stations
- Public shelters
- Railroad facilities and infrastructure
- Schools and colleges
- Special populations facilities (detention facilities, nursing homes)
- Transportation hubs
- Water storage facilities / potable water facilities
- Wastewater treatment facilities

Critical facilities for the CVPDC area were derived from a variety of sources. The best geospatial data provided by each jurisdiction for this plan update was supplemented with ESRI data, Hazus facilities inventory data, and HIFLD data. This resulted in the identification of over six hundred critical facilities for the CVPDC area. Many of the critical facilities from the previous plan are included in the update (except the dams which have their own chapter). A comprehensive list of critical facilities was given to the project management team for review. Please see Appendix G: Critical Facilities for a full list of critical facilities and their locations.

### 4.2.2 Limitations of Data

Inadequate information posed a problem for developing loss estimates for most of the identified hazards. The data sources used in the hazard identification and loss estimation are varied in their degree of completeness, accuracy, and precision. A major limiting factor for the data was that the hazard mapping precision is often at the jurisdiction or census tract level. Many of the hazards do not have defined damage estimate criteria.

The FEMA guidelines emphasize using “best available” data for this plan. The impact of these data limitations will be shown through the different vulnerability assessments and loss estimation methods used for hazards. Analysis for the CVPDC area was completed using the best available data. The level of detail for the data received from the jurisdictions drove the specifics of the vulnerability analysis. When detailed building footprint data and local parcel information was available, it was used to assess the vulnerability at a building specific level. When building specific data was not available, census tracts or blocks were used to assess the areas vulnerability to specific hazards. In the loss estimates section of the HIRA in this 2020 update, the “best available” data was from 2010 Census data because the 2020 Census data have not been available yet. Population estimates from various sources were used to supplement 2010 census data, such as ACS single-year estimates, Virginia population estimates developed by Weldon Cooper Center at University of Virginia, and LandScan ambient population distribution data developed by ORNL.

In the HIRA section of each hazard chapter, more detail was provided on the data and analysis limitations.

### 4.2.3 Types of Hazards

All jurisdictions in the CVPDC area are vulnerable to a wide range of natural, technological, and man-made hazards that threaten the safety of residents, and have the potential to damage or destroy both public and private property, cause environmental degradation, or disrupt the local economy and overall quality of life. While many disasters are possible for any given area in the United States, the most likely hazards to potentially affect the communities in the CVPDC area generally include the hazards in the 2020 plan update shown in Table 4-1.

*Table 4-1 Comparison of Hazards between 2013 and 2020 Plan Updates*

| 2013 Plan update | 2020 Plan update |
|---|---|
| • Drought<br>• Earthquake<br>• Flooding<br>• Hurricane<br>• Landslide and land subsidence<br>• Terrorism<br>• Wildfire<br>• Tornado wind<br>• Winter storm (ice/snow) | Natural hazards<br>• Drought<br>• Earthquake<br>• Extreme temperature: cold / wind chill *<br>• Extreme temperature: excessive heat *<br>• Flooding<br>• Fog *<br>• Hailstorm *<br>• Hurricane<br>• Land subsidence and karst<br>• Landslide<br>• Severe thunderstorm, heavy rain and lightning *<br>• Severe winter storm<br>• Tornado<br>• Wildfire<br>Man-made / technological hazards<br>• Communicable disease *<br>• Dam failure *<br>• Hazardous materials incident *<br>• Solar event *<br>• Terrorism<br>• Urban fire * |

* indicates new hazard in 2020 plan update

### 4.2.4 Hazards Interrelationship

Most hazard mitigation plans at the regional or local level often focus on profiling individual hazards instead of considering connected chains of events. Risk assessment methods in the previous plan only consider one driver or hazard at a time, which likely underestimates risk. Relations and interactions between hazards are not often considered in local hazard mitigation planning and decision making.

Preparing for and responding to hazard events could be improved by integrating information on hazard interactions and cascading effects. In this plan update, the plan management team explored various concurrent and causal interrelations between hazards in the CVPDC area, and developed weighted network diagrams to depict relationships between hazards and their impacts on people, built environment, and infrastructure (Figure 4-1). In the network diagram, natural and man-made hazards are represented by nodes that are connected by edges. The edges represent two types of primary relations between hazards: causal and concurrent. A causal relation is one where one hazard is a prerequisite for a correlated hazard. A concurrent relation means hazards that are probable to occur at the same time due to common root causes. Multi-hazard network models can help develop timelines and guide decision making and planning at local level. These network diagrams could have multiple applications like communicating the risks to local officials and residents. This could be further considered in making zoning and land use decisions for communities with a strong history of multi-hazard events.

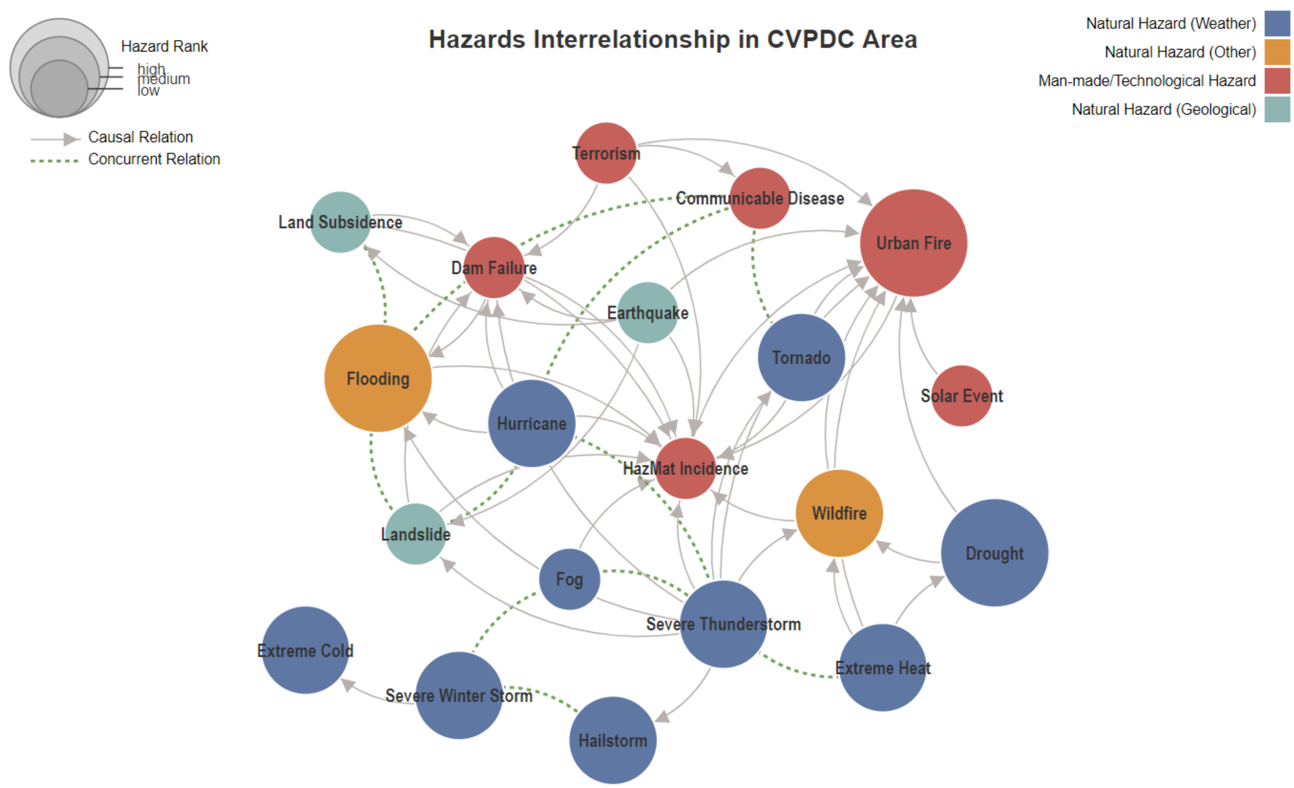


*Figure 4-1 Interrelationship of Hazards for CVPDC area*

### 4.2.5 Hazard Ranking Methodology

Ranking hazards helps the localities set goals and mitigation priorities. To compare the risk of different hazards, and prioritize which are more significant, requires a scoring system for equalizing the units of analysis. As not all hazards assessed in this plan have precisely quantifiable probability or impact data, a scoring system based on multi-criteria decision analysis (MCDA) methodology was developed to rank all of the hazards. This multi-criteria ranking analysis approach prioritizes hazard risk based on a blend of quantitative factors from the available data, such as historical data, local knowledge, public survey, Hazus assessment, and general consensus opinions from the TAC. This hazard ranking analysis assigns varying degrees of risk to five categories for each of the hazards, including: probability (how often it can occur), impact (economic, social, and environmental loss), spatial extent (the size of the area affected), warning time (how long does a community have to prepare for the event), and duration.  Each degree of risk was assigned a value ranging from 1 to 4. The weighting factor derived from a review of best practice plans and TAC's opinion. Some of these hazard characteristics, like probability and impact, are more important than others and are weighted more heavily.

To calculate a rank score value for a given hazard, the assigned risk value for each category was multiplied by the weighting factor. The sum of all five categories represents the final rank score, as demonstrated in the following equation:

*Hazard Score Value = [(Probability x 30%) + (Impact x 30%) + (Spatial Extent x 20%) + (Warning Time x 10%) + (Duration x 10%)]*

Table 4-2 provides the hazard characteristic, level description, level criteria, level index value, and weighting value. The weighting factors were presented to the TAC early in the planning process to get approval.  The final hazard ranking for the CVPDC is presented at the Conclusion section of the HIRA chapter.

*Table 4-2 Hazard Ranking Criteria*

| Hazard Characteristic | Degree of Risk | | | Assigned Weighting Factor |
|---|---|---|---|---|
| | Level | Criteria | Index Value | |
| Probability | Unlikely | Less than 1% annual probability | 1 | 30% |
| | Possible | Between 1 and 10% annual probability | 2 | |
| | Likely | Between 10 and 100% annual probability | 3 | |
| | Highly Likely | 100% annual probability | 4 | |
| Impact | Minor | Very few injuries, in any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities. | 1 | 30% |
| | Limited | Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shudown of critical facilities for more than one day. | 2 | |
| | Critical | Mulitiple deaths/injuires possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical faicliteis for more than one week. | 3 | |
| | Catastrophic | High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more. | 4 | |
| Spatial Extent | Negligible | Less than 1% of area affected | 1 | 20% |
| | Small | Between 1 and 10% of area affected | 2 | |
| | Moderate | Between 10 and 50% of area affected | 3 | |
| | Large | Between 50 and 100% of area affected | 4 | |
| Warning Time | Long | More than 24 hours | 1 | 10% |
| | Moderate | 12 to 24 hours | 2 | |
| | Short | 6 to 12 hours | 3 | |
| | Very short or no warning | less than 6 hours | 4 | |
| Duration | Very short | Less than 6 hours | 1 | 10% |
| | Short | Less than 24 hours | 2 | |
| | Moderate | Less than one week | 3 | |
| | Long | More than one week | 4 | |

### 4.2.6 Declared Disasters

Federal disaster declarations occur when response needed is greater than what state and local governments are capable of providing. The *Robert T. Stafford Disaster Relief and Emergency Assistance Act* of 1988 was enacted to support states and localities recovering from disasters that would otherwise exhaust local resources Funding for recovery comes primarily from the FEMA managed President's Disaster Relief Fund. [3]

[3] A Guide to the Disaster Declaration Process and Federal Disaster Assistance. March 4, 2008. https://www.fema.gov/pdf/rrr/dec_proc.pdf

Table 4-3 lists the major disasters including Presidential declared disasters that have occurred in the CVPDC area. The table shows which hazards impacted each of the jurisdictions in the CVPDC area, as well as the designated federal disaster number. The region has had 18 declared disasters and 5 declared emergencies since 1969; the most prominent disaster types are related to winter weather and flooding. Nine declared severe storms and flooding disasters have been noted for the time period prior to 1969, when FEMA began to denote disasters with declaration numbers. The updated table excludes these nine disasters due to lack of details, while complements the missing events occurred during the 1970s and 1980s in the previous plan. It also includes new declarations that occurred since the 2012 hazard mitigation plan was written. They encompass severe storms and the impact of Hurricane Sandy experienced in 2012, Hurricane Florence and Tropical Storm Michael in 2018, and ongoing pandemic of coronavirus disease (COVID-19) in 2020. Figure 4-2 summarizes the number of disaster declarations in CVPDC by hazard type, jurisdiction, month, and year.

*Table 4-3 Major Disasters Occurred in CVPDC Area*

| Communities Impacted | Date of Declaration | Federal Declaration # | Disaster Type | Federal Description |
|---|---|---|---|---|
| Amherst, Bedford, Campbell | 8/23/1969 | 274 | DR | Hurricane - Severe Storms and Flooding |
| Amherst, Appomattox, Bedford, Bedford City, Campbell, Lynchburg City | 6/23/1972 | 339 | DR | Flood -Tropical Storm Agnes |
| Bedford City | 10/7/1972 | 358 | DR | Flood - Severe Storms and Flooding |
| Amherst, Appomattox, Bedford, Bedford City | 10/10/1972 | 359 | DR | Flood - Severe Storms and Flooding |
| Appomattox, Bedford, Campbell | 10/15/1976 | 3018 | EM | Drought |
| Amherst, Appomattox, Bedford, Campbell | 7/23/1977 | 3046 | EM | Drought |
| Amherst, Appomattox, Bedford, Campbell, Lynchburg City | 11/9/1985 | 755 | DR | Flood - Severe Storms and Flooding |
| Amherst, Bedford, Bedford City, Lynchburg City | 5/19/1992 | 944 | DR | Flood - Severe Storms and Flooding |
| Amherst, Appomattox, Bedford, Bedford City, Campbell, Lynchburg City | 3/25/1993 | 3112 | EM | Snow - Severe Winter Storm |
| Amherst, Appomattox, Bedford, Bedford City, Campbell, Lynchburg City | 3/10/1994 | 1014 | DR | Snow - Severe Ice Storms, Flooding |
| Amherst, Appomattox, Bedford, Campbell | 4/11/1994 | 1021 | DR | Severe Storms - Severe Winter Ice Storm |
| Amherst, Bedford, Bedford City, Campbell, Lynchburg City | 7/1/1995 | 1059 | DR | Severe Storm - Severe Storms and Flooding |
| Amherst, Appomattox, Bedford, Bedford City, Campbell, Lynchburg City | 1/13/1996 | 1086 | DR | Snow - Blizzard of 96 (Severe Snow Storm) |

| Communities Impacted | Date of Declaration | Federal Declaration # | Disaster Type | Federal Description |
|---|---|---|---|---|
| Amherst, Appomattox, Bedford, Bedford City, Campbell, Lynchburg City | 9/6/1996 | 1135 | DR | Hurricane - Hurricane Fran and Associated Severe Storm Cond |
| Amherst, Appomattox, Bedford, Campbell, Lynchburg City | 2/28/2000 | 1318 | DR | Severe Storms - Severe Winter Storms |
| Bedford, Bedford City, Campbell | 5/5/2002 | 1411 | DR | Severe Storms - Severe Storms, Tornadoes, and Flooding |
| Appomattox | 3/27/2003 | 1458 | DR | Severe Storms - Severe Winter Storms, Record/Near Record Snowfall, Heavy Rain, Flooding, and Mudslide |
| Amherst, Appomattox, Bedford, Bedford City, Campbell, Lynchburg City | 9/18/2003 | 1491 | DR | Hurricane - Hurricane Isabel |
| Amherst, Appomattox, Bedford, Bedford City, Campbell, Lynchburg City | 9/12/2005 | 3240 | EM | Hurricane - Hurricane Katrina Evacuation |
| Amherst, Bedford | 2/16/2010 | 1874 | DR | Snow - Severe Winter Storms and Snowstorm |
| Appomattox | 4/27/2010 | 1905 | DR | Snow - Severe Winter Storms and Snowstorm |
| Amherst, Appomattox, Bedford, Bedford City, Campbell, Lynchburg City | 7/27/2012 | 4072 | DR | Severe Storms - Severe Storms and Straight-Line Winds |
| Amherst, Appomattox, Bedford, Bedford City, Campbell, Lynchburg City | 10/29/2012 | 3359 | EM | Hurricane - Hurricane Sandy |
| Amherst, Appomattox, Bedford, Campbell, Lynchburg City | 9/13/2018 | 3403 | EM | Hurricane - Hurricane Florence |
| Appomattox, Campbell, Lynchburg City | 10/9/2018 | 4411 | DR | Severe Storms - Tropical Storm Michael |
| Amherst, Appomattox, Bedford, Campbell, Lynchburg City | 1/20/2020 | 3448 | EM | Pandemic - Covid-19 |
| Amherst, Appomattox, Bedford, Campbell, Lynchburg City | 1/20/2020 | 4512 | DR | Pandemic - Covid-19 |

Source: FEMA Disaster Declarations Summary - Open Government Dataset. [4] DR—Major Disaster Declaration; EM—Emergency Declaration

[4] https://data.fema.gov/views/DisasterDeclarations_OpenFEMA/DisasterDeclarations

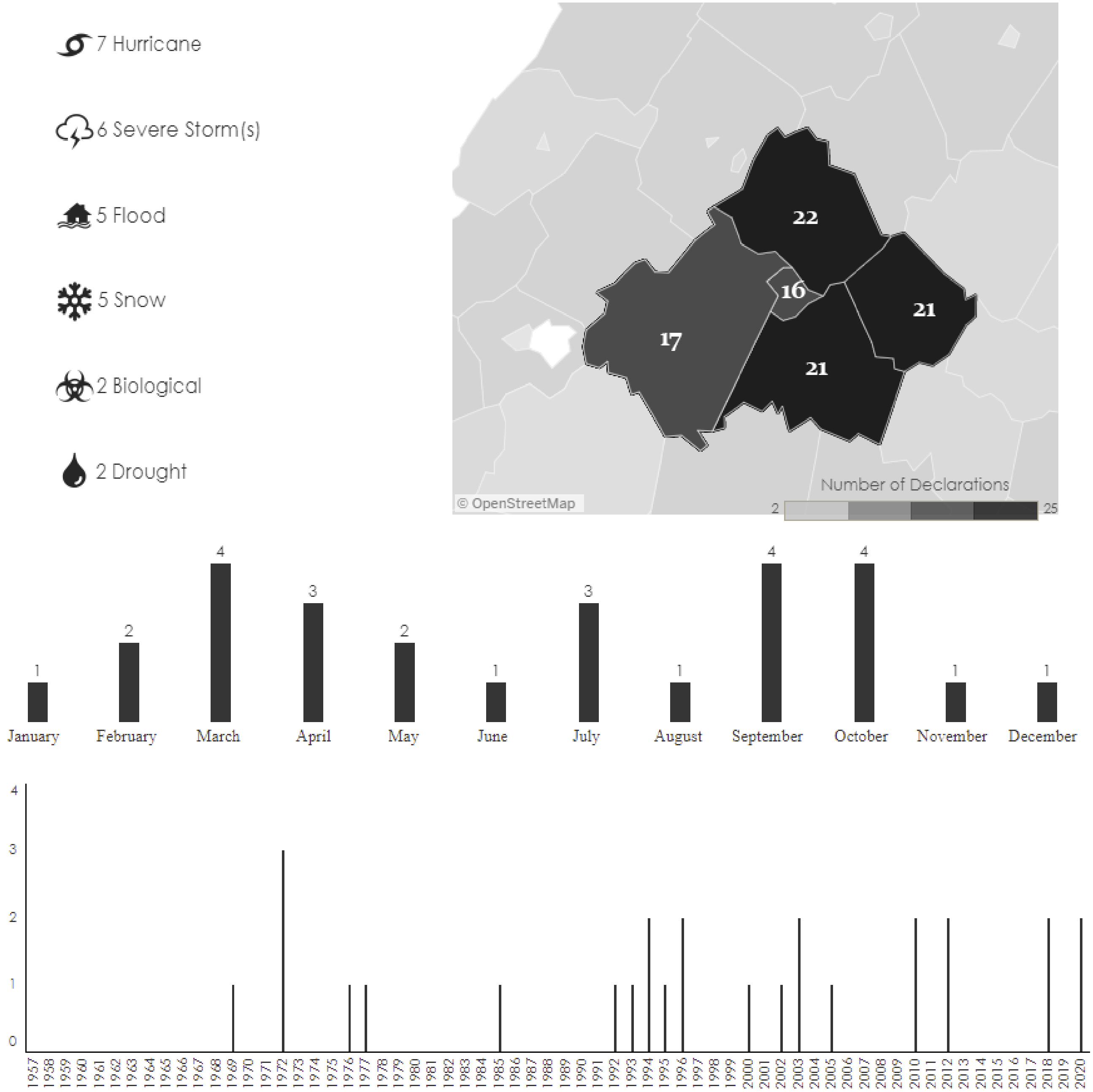


*Figure 4-2 A Summary of Disaster Declarations in CVPDC Area*

#### 4.2.7 Hazus

Hazus is a geographic information system (GIS)-based, multi-hazard risk assessment computer program for analyzing potential losses. It is developed and freely distributed by FEMA. Hazus Version 4.2 was utilized for loss estimates of flooding, dam failure, earthquakes, and hurricanes in this plan update.

Hazus models the earthquake, flood, and hurricane risk in three steps. First, it calculates the exposure for a selected area and hazard scenario. Second, it characterizes the level or intensity of the hazard affecting the exposed area. Lastly, it uses the exposed area and the hazard scenario to calculate the potential losses in terms of economic loss, structural damage, displaced households, shelter requirements, and casualties (earthquake only).

The data provided in the Hazus software provides a uniform look at building stock in the study area and serves as the default when a user does not have better data available. There are approximately 108,471 buildings in the CVPDC area as estimated by Hazus, categorized as residential, commercial, industrial, agricultural, religious, government, and education. Table 4-4 provides information on the building counts provided by Hazus.

*Table 4-4 General building stock in CVPDC area*

| Occupancy | Building Count | Percentage |
|---|---|---|
| Residential | 100,600 | 93% |
| Commercial | 4,717 | 4% |
| Other | 3,154 | 3% |

Note: building stock inventory data was available from the earthquake or hurricane module of Hazus software.

Table 4-5 provides summary statistics for building stock exposure by general building occupancy for the CVPDC area. It shows the dollar exposure by use of the structure. Residential structures have the highest exposure in terms of dollar exposure followed by commercial structures. Agriculture and government structures have the lowest exposure. Agricultural land has the least number of permanent structures and government buildings are rarely situated in flood prone areas. In total, the region has $29.9 billion of buildings exposed to hurricanes in all occupancy categories. Residential buildings account for 78.6% of this total. Note the differences between the totals in the tables are due to rounding in the calculations in Hazus. Please note that the exposure values are structural replacement values and not market values.

*Table 4-5 Building Stock Exposure by General Occupancy*

| Locality | Residential ($K) | Commercial ($K) | Industrial ($K) | Ag. ($K) | Religion ($K) | Gov. ($K) | Education ($K) | Total ($K) |
|---|---|---|---|---|---|---|---|---|
| Amherst | 2,826,608 | 284,733 | 151,703 | 12,799 | 79,066 | 18,524 | 47,837 | 3,421,270 |
| Appomattox | 1,398,689 | 117,788 | 39,479 | 5,853 | 25,290 | 8,624 | 12,246 | 1,607,969 |
| Bedford | 7,298,433 | 552,598 | 265,843 | 32,357 | 117,849 | 26,184 | 47,770 | 8,341,034 |
| Bedford City | 558,700 | 172,723 | 122,475 | 897 | 27,491 | 16,623 | 17,582 | 916,491 |
| Campbell | 4,509,713 | 666,734 | 516,703 | 23,648 | 121,800 | 18,133 | 64,610 | 5,921,341 |
| Lynchburg | 6,909,983 | 1,717,534 | 604,807 | 17,212 | 308,508 | 26,722 | 119,087 | 9,703,853 |
| **Total** | **23,502,126** | **3,512,110** | **1,701,010** | **92,766** | **680,004** | **114,810** | **309,132** | **29,911,958** |

Table 4-6 provides summary statistics for building stock exposure by building type for each jurisdiction. It shows the dollar exposure by construction type. In the CVPDC area, wooden structures account for $17,238,166,000 (*i.e.* 57% of the total building exposure), followed by Masonry as $ 7,705,473,000 (i.e. 26% of the total building exposure). The wood exposure is highest due to the construction practices in this region of the country although Lynchburg City and some towns have high masonry exposure.

*Table 4-6 Building Stock Exposure by Building Type*

| Locality | Wood ($K) | Masonry ($K) | Concrete ($K) | Steel ($K) | MH* ($K) | Total ($K) |
|---|---|---|---|---|---|---|
| Amherst | 2,053,510 | 868,738 | 109,901 | 294,765 | 94,357 | 3,421,271 |
| Appomattox | 1,014,495 | 393,737 | 24,765 | 96,028 | 78,944 | 1,607,969 |
| Bedford | 5,420,698 | 2,065,408 | 118,038 | 461,837 | 275,057 | 8,341,038 |
| Bedford City | 430,623 | 246,756 | 57,069 | 176,142 | 5,900 | 916,490 |
| Campbell | 3,348,321 | 1,460,891 | 161,222 | 698,221 | 252,685 | 5,921,340 |
| Lynchburg | 4,975,940 | 2,665,518 | 633,205 | 1,404,939 | 24,252 | 9,703,854 |
| **Total** | **17,243,587** | **7,701,048** | **1,104,200** | **3,131,932** | **731,195** | **29,911,962** |

*Note: Manufactured Housing (MH)

The transportation system and utility system dollar exposure values are derived from the default Hazus facility inventory data for the CVPDC area (Table 4-7 and Table 4-8).

*Table 4-7 Transportation System Dollar Exposure - Hazus*

| Locality | Highway ($K) | Railway ($K) | Bus Facility ($k) | Airport ($K) | Total ($K) |
|---|---|---|---|---|---|
| Amherst County | 840,892 | 67,968 | - | - | 908,860 |
| Appomattox County | 356,733 | 30,493 | - | - | 387,226 |
| Bedford County | 1,583,822 | 130,073 | - | 48,615 | 1,762,510 |
| Campbell County | 999,280 | 174,163 | - | 135,194 | 1,308,638 |
| Lynchburg | 552,309 | 86,953 | 1,014 | 48,615 | 688,891 |
| **Total** | **4,333,036** | **489,650** | **1,014** | **232,424** | **5,056,125** |

*Table 4-8 Utility System Dollar Exposure*

| Locality | Potable Water ($K) | Waste Water ($K) | Electric Power ($K) | Communication ($K) | Total ($K) |
|---|---|---|---|---|---|
| Amherst County | 30,969 | 185,814 | - | 1,116 | 217,899 |
| Appomattox County | 30,969 | - | - | 186 | 32,169 |
| Bedford County | 92,907 | 247,752 | - | 651 | 651 |
| Campbell County | 61,938 | 309,690 | - | 558 | 372,186 |
| Lynchburg | - | 61,938 | 102,300 | 186 | 164,424 |
| **Total** | **216,783** | **805,194** | **102,300** | **2,697** | **787,329** |

### 4.2.8 Surveys

#### *4.2.8.1 Locality Hazard Ranking Survey*

The project management team asked the jurisdictions to evaluate the hazards that impact their community based on their local knowledge through a Locality Hazard Ranking Survey. The survey was available in Virginia Tech Qualtrics on March 2019. Nineteen local officials, city employees, and institutional and organizational partners from the localities completed this survey. The participants ranked the probability of occurrence and consequence of impact for natural, technological, and man-made hazards. The results of the survey are provided in Figure 4-3 and Figure 4-4.

#### *4.2.8.2 Public survey*

Area residents, stakeholders, and the business community were encouraged to provide input through a public survey. The Central Virginia Pre-Disaster Mitigation Plan Public Survey, which ran from November 20 - December 13, 2019 was designed to help the project management team identify the community's concerns about natural hazards, and to better understand the community needs in reducing risk and loss from such hazards. It was used to collect information from the public about household preparedness for hazards, the level of knowledge about tools and techniques for reducing loss from hazards, and areas of public concern about hazards, among others. The web-based survey tool “Survey Monkey” was advertised throughout the region, and every locality provided messaging and links on their websites and social media platforms. The survey also provided opportunities for additional comment. Some respondents provide feedback on their concerns and how they and their community prepare to be more resilient from natural disaster impacts. For example, identification and removal of dangerous trees that could fall over properties during extreme weather conditions; equipment and training of local fire/EMS agencies to mitigate and respond accordingly in the event of a disaster; and education and training opportunities to residents on disaster preparedness were some of the recommendations. Others commented that hazard mitigation planning is not only a key element of survival but also a mindset.

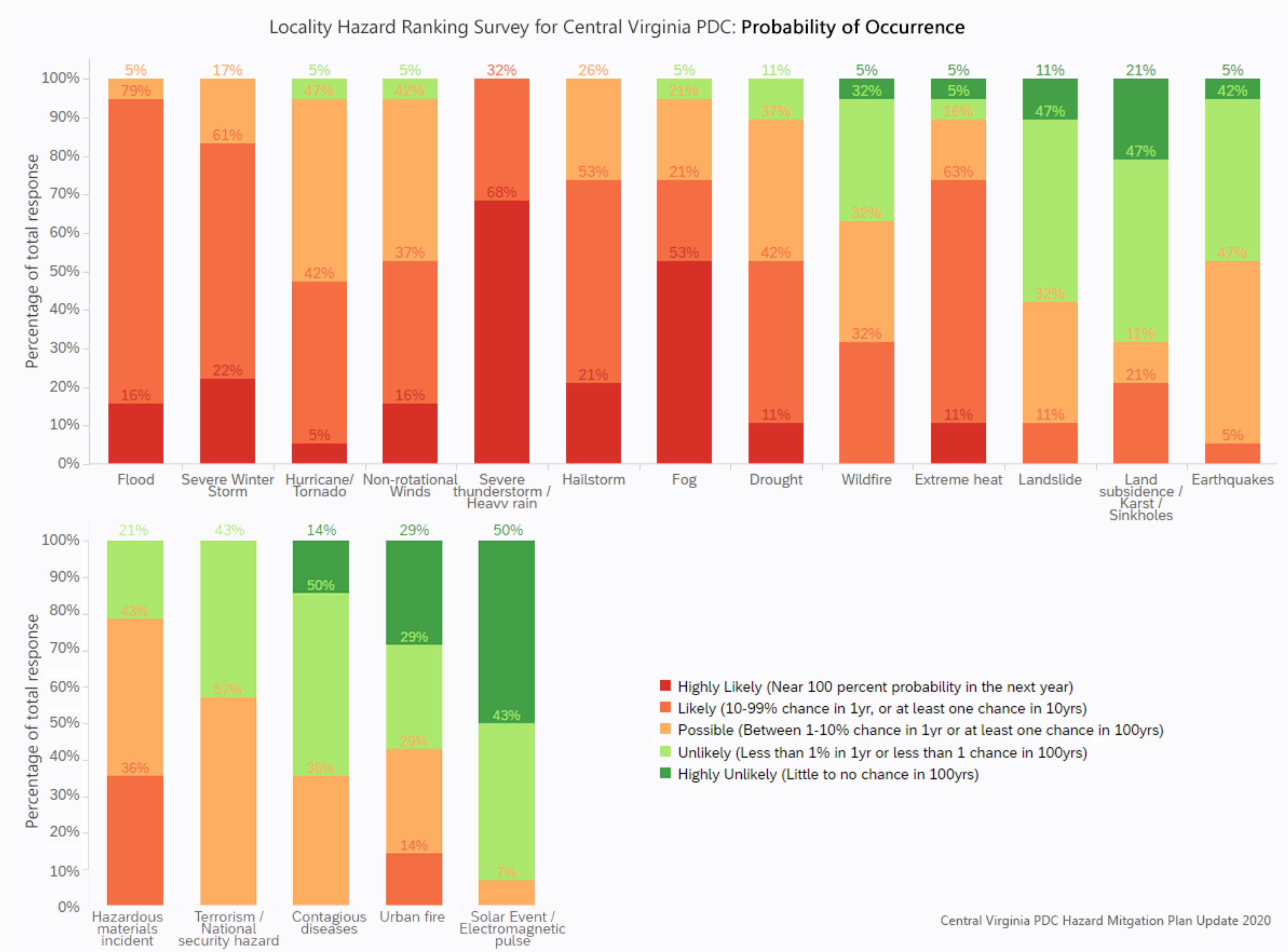


*Figure 4-3 Locality Hazard Ranking Survey for CVPDC: Probability of Occurrence*

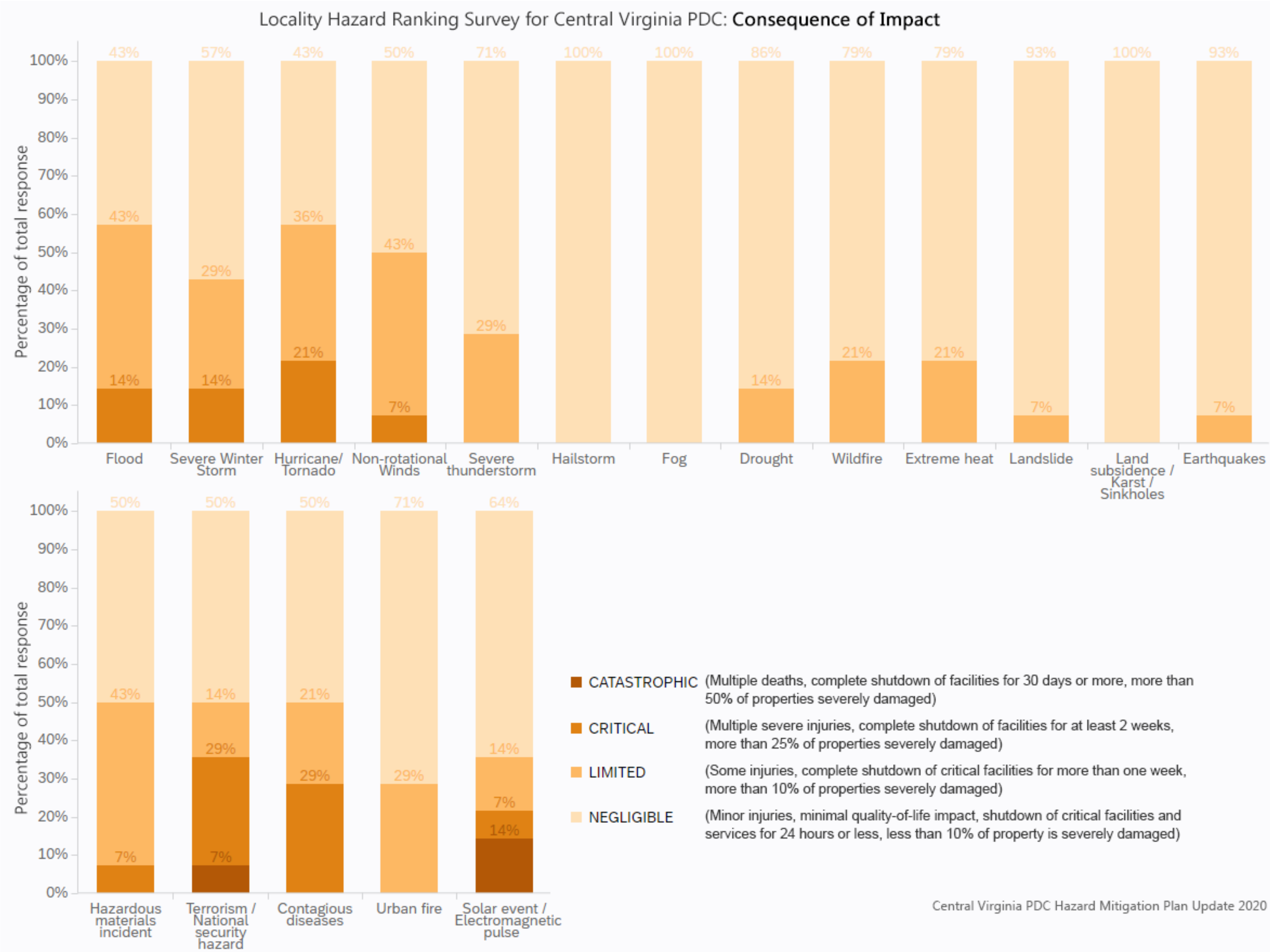


*Figure 4-4 Locality Hazard Ranking Survey for CVPDC: Consequence of Impact*