

A photograph of a road scene. In the foreground, a large tree branch has fallen across the road. In the background, a car is driving on the road. There are utility poles and power lines on the left side of the road. The text "HAZARD IDENTIFICATION AND RISK ASSESSMENT" is overlaid on the image in white, bold, sans-serif font.

HAZARD IDENTIFICATION AND RISK ASSESSMENT



4.0 Hazard Identification and Risk Assessment (HIRA)

4.1 2020 Update - Summary of Changes

The updated HIRA chapter differs from the previous plan in the following ways:

- **Planning area changes.** Since the previous plan update, Bedford City reverted to a town in Bedford County in 2013. The Region 2000 Planning District Commission was renamed to the Central Virginia Planning District Commission in 2019. As such, all development and demographic information include updated data pertaining to these new changes.
- **Updated demographic information.** Demographic, social, economic, and housing data for the study area were updated with best available information from Census Bureau and other data sources. The 2010 census data was used for updating hazard analyses to replace the 2000 census data. In addition to the American Community Survey (ACS) Data which serves as primary data source, Virginia population estimates developed by Weldon Cooper Center at University of Virginia and LandScan ambient population distribution data developed by Oak Ridge National Laboratory (ORNL) were also incorporated into the hazard analysis.
- **Updated inventory of critical facilities and infrastructure.** The inventory of critical facilities and infrastructure was updated by combining several data sources, including local data submitted by jurisdictions, ESRI data, Hazus inventory data, and Homeland Infrastructure Foundation-Level Data (HIFLD). Additional types of facilities were taken into account for the inventory, such as public shelters (*e.g.*, cooling centers), water storage facilities (*e.g.*, water tanks), energy facilities (*e.g.*, energy pipelines and electrical substations), tourist destinations (*e.g.* National D-Day Memorial), and large crowd venues (*e.g.* Lynchburg Hillcats minor league baseball stadium). More than 600 facilities were identified for the CVPDC area.
- **Additional natural, technological, and man-made hazards.** The previous plan analyzed 8 natural hazards plus 1 man-made hazard (Terrorism). This plan update expanded the list to 20 hazards, including 15 natural hazards and 5 man-made/technological hazards. (See Table 4-1 for the new hazards included in this plan update.)
- **Updated hazard history.** The historical occurrence of hazards was updated with information from FEMA Disaster Declarations Summary, National Center for Environmental Information (NCEI) Storm Events Database, Virginia Department of Conservation and Recreation, Virginia Department of Forestry, and other authoritative sources.²
- **High hazard potential dams.** High Hazard Potential means where an impounding structure failure could cause loss of life or serious economic damage. Compared to the previous plan, the new Dam Failure chapter added details about the impacts of high hazard dam failure for those high hazard dams listed in the Virginia Dam Safety Inventory System including general site information, mapped dam failure inundation zones, and vulnerable structures in the CVPDC area.

² Since the 2013 plan, the National Climatic Data Center – NCDC – has been renamed as the National Centers for Environmental Information, or NCEI



Hazard Identification and Risk Assessment

- **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