

Commonwealth of Virginia Emergency Operations Plan  
Standard Hazard Mitigation Support Annex 3  
(Volume II)



**CHAPTER 3**

**Hazard Identification and Risk Assessment  
(HIRA)**

*Section 3.1:  
Overview of the Hazard Identification  
& Risk Assessment Process*

2010

## SECTION 3.1

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## Section 3.1: Overview of the Hazard Identification and Risk Assessment Process

### Background

The Hazard Identification and Risk Assessment (HIRA) for the *Commonwealth of Virginia Emergency Operations Plan Support Annex 3 - Enhanced Hazard Mitigation Plan* was conducted primarily by the Virginia Tech Center for Geospatial Information Technology (CGIT). Sections 3.1 through 3.6 provide background information about available data, local plans, and ranking methodology. The individual hazard sections (3.7 – 3.15) of this chapter will cover the following three main requirements for the HIRA:

- Identifying and Profiling Hazards
- Assessing Vulnerabilities
- Estimating Potential Losses

Two important considerations that permeate this chapter are overall data availability and ability to compare hazards to each other. FEMA guidelines emphasize using “best available data” for this plan. Data availability issues were compounded by the lack of consistency and standardization in the local plans. Inadequate information about local features such as critical facilities and infrastructure still existed for this revision despite all of the local plans being complete. Section 3.4 describes the facility datasets that were used to complete this revision and suggestions for increasing the usability of locally maintained datasets. In the following sections of this chapter, the impact of these data limitations will be shown through different vulnerability assessment and loss estimation methods used for hazards.

Since approval of the *Commonwealth of Virginia Emergency Operations Plan Support Annex 3 –Enhanced Hazard Mitigation Plan*, VDEM contracted CGIT to revise the HIRA and develop a new ranking methodology. Local plans information and data was also uploaded and used to the extent possible as described in section 3.6. Below is a rough timeline of the evolution of the Commonwealth of Virginia’s HIRA development.

### Hazard Identification and Section Overview

A wide range of hazards have the potential to threaten both life and property in Virginia. These hazards were classified as weather related, geological related and other hazards. Local plans were evaluated to make sure those hazards were included as part of this revision. Section 3.6 of this chapter describes these hazards and how they are incorporated into this revision .

During the preparation of this Plan, each of the hazards has been evaluated for its impact on Virginia both on a comparative basis using geographic information systems (GIS) and separately for each hazard. This allows for comparison between



counties of the relative exposures to hazards and sets the groundwork for local hazard mitigation plan updates. It should be noted that the ranking and analysis in this plan is in terms of relative risk to other jurisdictions in the Commonwealth. For example, the tornado ranking and analysis in this chapter is an effort to highlight the jurisdictions within Virginia that are more likely to be at risk. The highest ranking communities in Virginia, when compared to the states in “tornado alley”, would probably be considered low risk. All the hazards addressed in this plan are only relative to the jurisdictions in Virginia.

### ***HIRA Timeline for 2010 FEMA Approval***

- Fall 2003 VDEM contacts CGIT to assist with development of the HIRA
- December 2003 HIRA is presented to HMP committee for review and comment
- September 2004 Standard Hazard Mitigation Plan is approved by FEMA
- March 2007 Hazard Mitigation plans receives enhanced status
- July 2007 VDEM contracts CGIT to revise HIRA and develop new ranking methodology
- November 2007 – VDEM requests local GIS and critical facilities data from local hazard mitigation plans
- April 2008 – HIRA Sub-Committee forms and has first meeting
- October 2008 – Draft Hazard Analysis and GIS maps displayed to HIRA Sub-Committee
- February 2009 – HIRA presented to the State Hazard Mitigation Committee for review and comment
- April 2009 – HIRA final draft formatted and completed

### ***HIRA Section Outline***

The following subsections include the results of the hazard identification and risk assessment process. The process used to identify the hazards that impact Virginia and available data sources was reviewed and endorsed by the HIRA sub-committee during the October 7, 2008 meeting.



The HIRA chapter has been structured in the following way:

1. Introduction to HIRA – *Describes the overall process that was used to revise the HIRA.*
2. Introduction to Virginia – *Describes the political, demographic, and physiographic boundaries of the Commonwealth. Local and statewide land use and development patterns are addressed.*
3. Federally Declared Disasters & National Climatic Data Center (NCDC) Hazard Histories: *Describes past declared disasters and hazard events that have happened in the Commonwealth. Utilized datasets are fully described in this section.*
4. State and Critical Facilities: *Describes the available datasets for state and critical facilities and the limitations of this data. Local datasets are evaluated and discussed.*
5. Ranking Methodology: *Standardizes terminology, describes the development of the ranking methodology and parameters used.*
6. Local Plan Incorporation: *Review of the local hazard mitigation plan, comparison of local rankings. Issues of standardization of risk assessment and loss estimates are discussed.*
7. Flooding: *Flooding impacts the entire Commonwealth. Discussion of repetitive loss structures and FEMA map modernization efforts. Simplified analysis is performed using digital flood insurance rate maps (FIRMs, U.S. Census data and Benefit-Cost Analysis (BCA) assumptions.*
  - i. *Riverine flooding: analysis of critical and state facilities, jurisdictional risk, and annualized loss estimates.*
  - ii. *Coastal flooding and Storm Surge: analysis of critical and state facilities.*
  - iii. *Coastal erosion: textual description only.*
  - iv. *Tsunami: textual description only.*
8. Wind: *Distinctions in wind type were necessary to be able to determine relevant historical events and to develop methodology to calculate future probability, vulnerability and impact. Non-Rotational wind includes hurricane and all events that are not tornadic.*
  - i. *Non-rotational Wind: analysis of critical and state facilities, jurisdictional risk, and annualized loss estimates.*
  - ii. *Tornado Wind: analysis of critical and state facilities, jurisdictional risk, and annualized loss estimates.*
  - iii. *Thunderstorm: included in non-rotational wind*
  - iv. *Lightning: textual description only.*
  - v. *Hail: textual description only.*



9. Winter Weather: *Includes discussion of different types of winter weather and the limitations of analysis.*
  - i. Winter Weather: *analysis of critical and state facilities, jurisdictional risk, and annualized loss estimates.*
  - ii. Extreme Cold: *textual description only.*
10. Drought: *Includes discussion of the different types of drought and the criteria used for determining the severity of droughts.*
  - i. Drought: *textual description only.*
  - ii. Extreme Heat: *textual description only.*
11. Wildfire: *analysis of critical and state facilities, jurisdictional risk, and annualized loss estimates.*
12. Landslide: *analysis of critical and state facilities, jurisdictional risk, and annualized loss estimates.*
13. Earthquake: *analysis of critical and state facilities, jurisdictional risk, and annualized loss estimates.*
14. Land Subsidence (Karst): *analysis of critical and state facilities, jurisdictional risk, and annualized loss estimates.*
15. Dam Inundation: *textual description only.*
16. Overall Hazard Results: *Provides a summarization of the individual hazard sections. Overall conclusions regarding risk areas and mitigation projects.*

For the purposes of compliance with the Disaster Mitigation Act as further specified by Interim Final Rule 44 CFR Section 206.401(c)(2)(i), this Plan addresses in full only the hazards in the above hazard identification sub-section. Additional hazards will be more fully addressed during future Plan updates as their respective significance emerges. Additional information of this is available in section 3.6 and 3.16 of this chapter. Technological, Radiological, Hazardous Materials, and Terrorism related hazards are addressed in other volumes of the COVEOP. Appendix O includes the updated hazard matrices for human-caused, hazardous materials, and technological hazards.



*Changes in this Version*

The risk assessment in this plan consolidates, updates, and streamlines content from the 2004 SHMP. Content has been restructured to cover a broad range of emerging hazards, vulnerabilities, and risk issues. Significant changes have been made that include standardized terminology, new GIS-based ranking methodology which assesses hazard risk by jurisdiction, new analysis for all major hazards, development of annualized loss by jurisdiction and review of local risk assessments, land use planning, and development.

