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

CHAPTER 3

Hazard Identification and Risk Assessment (HIRA)

Section 3.6:
Local Plan Incorporation

2010

SECTION 3.6

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Section 3.6: Local Plan Incorporation

Summary of Planning Efforts

Virginia currently has 27 local hazard mitigation plans that have been submitted and approved by VDEM and FEMA Region III. The following section addresses local hazard identification, vulnerability and potential losses based on estimates provided in local risk assessment. In this revision of the plan, these results were not compared in detail to the statewide risk assessment as a result of data inconsistencies.

In addition to FEMA requirements for risk assessments, the Virginia Department of Emergency Management (VDEM) has additional requirements for local plan risk assessments. The local plans must include maps for the flood hazard. This would involve an overlay of the Special Flood Hazard Area (SFHA) over the demographic data to determine what infrastructure and populations lie within the floodplain. The second requirement is for local risk assessments to include maps known high hazard areas. Chapter 5 of this plan discusses the steps VDEM goes through for review and approval of local plans and how the state coordinates with the local efforts.

Local Hazard Identification

The most significant hazards identified in the local hazard mitigation plans were flood, hurricane, and winter weather, the same top three hazards that are identified in this revision of the statewide analysis. Local plans identified 21 distinct hazards, Table 3.6-1 below classifies these based on the percentage of localities that ranked the hazard as High, Med-High, Medium, Medium-Low, Low, and Negligible. For example, flooding was given an overall ranking of high for comparison in this plan. Of the 27 plans, 22 plans ranked this as high, 4 as medium and 1 as low resulting in an overall locality ranking as high.

Table 3.6- 1: Summary of local plan hazard ranking.

High	Medium High	Medium	Medium Low	Low	Negligible
Flood	Wind	Wildfire	Tornado	Drought	Erosion
Hurricane				Earthquake	Thunderstorm
Winter Weather				Landslide	Lightning
				Karst	Hail
				Dam	Heat Wave/Excessive Heat
					Excessive Cold
					Tsunami
					HazMat
					Terrorism
					Biological, Radiological & Epidemic

Localities used a variety of approaches, ranging in complexity, to rank the hazards they identified as impacting their regions. Some plans used a blend of various techniques and discussions to arrive at their final ranking. Several of the major ranking/scoring techniques used in the local plans included:

- Quantitative Scoring (based on available historical data, i.e. NCDC)
- Human Judgment/Knowledge of Locality
- Numerical Scoring Worksheets (based on criteria, i.e. FEMA 386-2 worksheets)
- Interactive Activities with Steering Committee Members

FEMA guidance indicates that the jurisdictions at greatest risk to specific hazards should be identified, considering both the characteristics of the hazard and the jurisdictions' degree of vulnerability. A variety of analysis methods may be sufficient to meet these goals; FEMA does not mandate a specific analysis method. As a result, many local and state plans have developed their own ranking system.

None of the ranking techniques used in the local plans are incorrect as there is no standard way to rank hazards that impact specific jurisdictions. Lack of available data for each hazard is often a driving factor in the ranking method's degree of subjectivity. The numerical rankings were frequently performed by different contractors, and different data processing methodologies were utilized. The variability in the ranking systems made it difficult to compare local hazard rankings to the state risk assessment.

Table 3.6-2 shows how each of the local plans ranked the hazards identified in their plans. Some modifications have been made to this table to be able to compare between localities and to the state plan. For example, Accomack-Northampton PDC did not have a hurricane category in their plan and as a result would have otherwise received an "NA" for hurricane during the data compilation. However, when reviewing the results, if a PDC didn't rank hurricane, but did rank flood and wind as "High", then hurricane risk was re-assigned a ranking of "High".

Table 3.6-2 also compares the average ranking of the local plans to the average ranking based on the analysis completed for this revision. Three of the hazard categories that were addressed in the local plans were not considered in the state plan; these include hazardous materials, terrorism, and biological, radiological and epidemics. VDEM has separate plans that address human caused and hazardous materials. Erosion, extreme heat, extreme cold, thunderstorm, lightning, hail, and tsunami have been included as textual descriptions in the major hazard sections. Of the hazards considered in this revision the average rankings in local and state analysis are comparable. Tornado, drought and wildfire all received a "medium-low" ranking for the local plans but were elevated to "medium" risk in the state plan. Earthquake and landslide received a "low" ranking in the local plans and a "medium-low" in the state revision while karst and dam remained the same with a "low" ranking.

Table 3.6- 2: Local HMP summary of hazard ranking and comparison with 2010 statewide hazard ranking results.

PDC/Jurisdiction	Flood	Erosion	Wind	Hurricane	Tornado	Thunder-storm	Lightning	Hail	Winter	Extreme Heat	Extreme Cold	Drought	Earthquake	Tsunami	Wildfire	HazMat	Landslide	Karst	Terrorism	Dam	Bio., Radio. & Epidemic
Lenowisco PDC	High	NA	Medium	Medium	Low	Medium	NA	Medium	Medium-High	Low	NA	Medium	Medium	NA	Medium-High	NA	Medium-High	Low	NA	Medium	NA
Cumberland Plateau PDC	High	NA	Medium	Medium	Low	Medium	NA	Medium	Medium-High	Low	NA	Medium	Medium	NA	Medium-High	NA	Medium-High	Low	NA	Medium	NA
Mount Rogers PDC	High	NA	Medium	Low	Low	Low	Low	NA	High	NA	NA	Medium	Low	NA	Medium	NA	Low	Low	NA	Medium	NA
New River Valley PDC	High	NA	Low	Low	NA	NA	Medium	NA	High	NA	NA	High	Low	NA	Medium	NA	Low	Low	NA	NA	NA
Roanoke Valley-Allegheny RC	High	NA	Medium	Medium	Low	NA	NA	NA	Medium-High	NA	NA	NA	Medium	NA	Medium-High	NA	Medium	NA	NA	NA	NA
Central Shenandoah PDC	High	NA	High	High	Medium	NA	NA	NA	High	NA	NA	High	NA	NA	Medium	NA	Low	Medium	Low	NA	NA
Northern Shenandoah Valley RC	Medium	NA	Low	Low	Low	NA	NA	Low	High	Low	High	Low	NA	NA	Medium	Low	Low	Low	NA	NA	NA
Northern Virginia RC	High	Low	Medium	Medium	High	High	NA	NA	High	Low	Low	Medium	Low	NA	Medium	NA	Low	Low	NA	Low	NA
Rappahannock-Rapidan RC	High	Low	High	High	Medium	Medium	NA	NA	High	NA	NA	Medium	Low	NA	Low	NA	Low	Low	NA	Low	NA
Thomas Jefferson PDC	High	NA	Low	Medium	Low	NA	Low	NA	Medium	Low	Low	Low	Low	NA	Low	NA	Low	NA	NA	Low	NA
Region 2000 LGC	High	NA	Medium	High	Medium	NA	NA	NA	High	NA	NA	High	NA	NA	Medium	NA	Low	Low	Low	Low	NA
West Piedmont PDC	Medium	NA	Medium	Low	Low	NA	NA	NA	High	NA	NA	Low	NA	NA	Low	Medium	NA	NA	Low	High	NA
Southside PDC	High	NA	Medium	High	Medium	Medium	Low	Medium	Medium	Low	NA	Medium	Low	NA	Low	NA	Low	NA	NA	High	NA
Commonwealth RC (Virginia's Heartland)	Medium	Low	High	High	Medium	Medium	NA	NA	High	NA	NA	High	Low	NA	Medium	NA	Low	Low	NA	Low	NA
Richmond Regional PDC	High	NA	Medium	Medium	Low	NA	NA	Low	Medium	Low	NA	Low	NA	NA	Low	NA	Low	NA	NA	NA	NA
George Washington RC	High	NA	Medium	Medium	Medium	High	NA	NA	High	Low	NA	Low	Low	NA	High	Low	Low	NA	NA	Low	Low
Northern Neck PDC	Medium	Medium	High	High	Low	NA	NA	NA	Medium	NA	NA	Low	NA	NA	Low	NA	NA	NA	NA	NA	NA
Middle Peninsula PDC	High	Medium	Medium	High	High	Medium	Low	NA	High	Low	Low	Low	Low	NA	Medium	NA	Low	Low	NA	Medium	NA
Crater PDC	High	NA	Medium	Medium	Low	Medium	NA	Medium	Medium	NA	NA	Low	NA	NA	Low	NA	NA	NA	NA	NA	NA
Accomack-Northampton PDC	High	High	High	High	NA	NA	NA	NA	Medium	Medium	NA	Medium	NA	NA	Low	Low	NA	NA	NA	NA	NA
Southside Hampton Roads PDC	High	Low	High	High	Medium	Medium	Medium	NA	High	Low	Low	Low	Low	Medium	Low	NA	Low	Low	NA	Low	NA
Peninsula Group	High	NA	Medium-High	Medium-High	Medium	Low	NA	NA	Medium-Low	Low	NA	Low	Low	Low	Medium	NA	Low	Low	NA	Low	Low
Amelia County	Low	NA	Low	Low	Medium	Low	Low	Low	Low	NA	NA	Low	Low	NA	Medium	NA	NA	NA	NA	NA	NA
Southampton County	High	Low	High	High	Medium	High	NA	NA	Medium	Low	Low	Medium	Low	NA	Medium	Medium	Low	Low	Low	Low	Medium
City of Chesapeake	High	Low	High	Medium-High	Medium-High	Medium	NA	Medium	Medium	Medium	NA	Medium-High	Low	Low	Medium	NA	NA	Low	NA	NA	NA
City of Franklin	High	Low	High	High	Low	High	NA	NA	Medium	Low	Low	Low	Low	NA	Low	High	Low	Low	Low	Low	Medium
City of Poquoson	High	NA	High	High	NA	NA	NA	NA	Low	NA	NA	NA	NA	NA	Medium	NA	NA	NA	NA	NA	NA
Average Ranking From Local Plans	High	Low	Medium	Medium-High	Medium-Low	Medium-Low	NA	Low	Medium-High	Low	NA	Medium-Low	Low	NA	Medium-Low	Low	Low	Low	NA	Low	NA
2010 Statewide Analysis Ranking	**High**	**NA[1]**	**Medium-High**		**Medium**	**NA[2]**	**NA[2]**	**NA[2]**	**Medium-High**	**NA[3]**	**NA[4]**	**Medium**	**Medium-Low**	**NA[1]**	**Medium**	**NA[5]**	**Medium-Low**	**Low**	**NA[5]**	**Low**	**NA[5]**

[1]Addressed in flood section 3.7; [2]Addressed in wind section 3.8; [3]Addressed in drought section 3.10; [4]Addressed in winter weather section 3.9; [5]Addressed in other sections of the COVEOP; chapter 5 for local plan assistance and chapter 7 enhanced plan

Addressing Uncertainty in Hazard Identification

Future revisions of the local plans may help with some of the ambiguity between hazard naming conventions if VDEM outlines what applicable hazard names should be. VDEM will encourage local plan revisions to approach classifying hazards in a similar fashion as done in this revised risk assessment. Table 3.6-3 below provides an outline of what types of events fall within the designated HIRA hazard categories. For this risk assessment the following hazards were evaluated: Flood, Wind, Tornado, Land Subsidence (Karst), Landslide, Winter Weather, Drought, Wildfire, and Earthquake. There were discussions on how to determine what belongs in the hazard category of wind. Hurricanes are one of the Commonwealth's most costly hazards; however it is a combination of two hazards, wind and flood. Since the impacts of high wind, excluding tornado, are the same whether it be from a tropical system or a severe thunderstorm it was decided they should be grouped together in a non-rotational wind category.

Table 3.6- 3: Summary of hazard events by HIRA category hazards.

Flood	Non-Rotational Wind	Winter Weather	Tornado	Drought	Wildfire
Riverine Coastal Tsunami Erosion Hurricane Nor'Easter	Wind Thunderstorm Hurricane	Snow Ice Extreme Cold Nor'Easter	Tornado	Drought Extreme Heat	Wildfire Lightning

Earthquake	Land Subsidence (karst)	Landslide	Dam Inundation	Human Caused
Earthquake	Land Subsidence	Landslide	Dam Failure	Accident Crime Terror

Assessment of Local Vulnerability and Potential Losses

Local hazard rankings are highly variable; as a result each one has its own set of criteria to develop monetary loss values and is not consistent across the 27 plans. This variability does not lend itself to being able to compare relative loss values for each hazard in the statewide plan. Annualized loss values were pulled out of the local plans and brought into a GIS for comparison. Flood and hurricane were the two dominate hazards that had annualized loss values associated with them. The results of this are shown in Figures 3.6-1 and 3.6-2. Hurricane loss values range from no estimates given (8 plans) up to $5.3 billion in damages per year. However, annualized loss for hurricanes in local plans was a combination of flooding (surge) and wind. Flood loss values range from no estimates given (10 plans) up to $726 million in damages per year.

Table 3.6-4 illustrates the wide range in loss estimates that have been pulled from the local plans. Without proper documentation and data these values cannot be compared in their current form. Some of the local plans used FEMA's HAZUS software for this analysis, while others may have used a combination of past event damages and years of record. One goal of this revision is to standardize the data analysis process in order for future versions of this plan to be consistent and comparable.

Table 3.6- 4: Local Hazard Mitigation plan loss estimates.

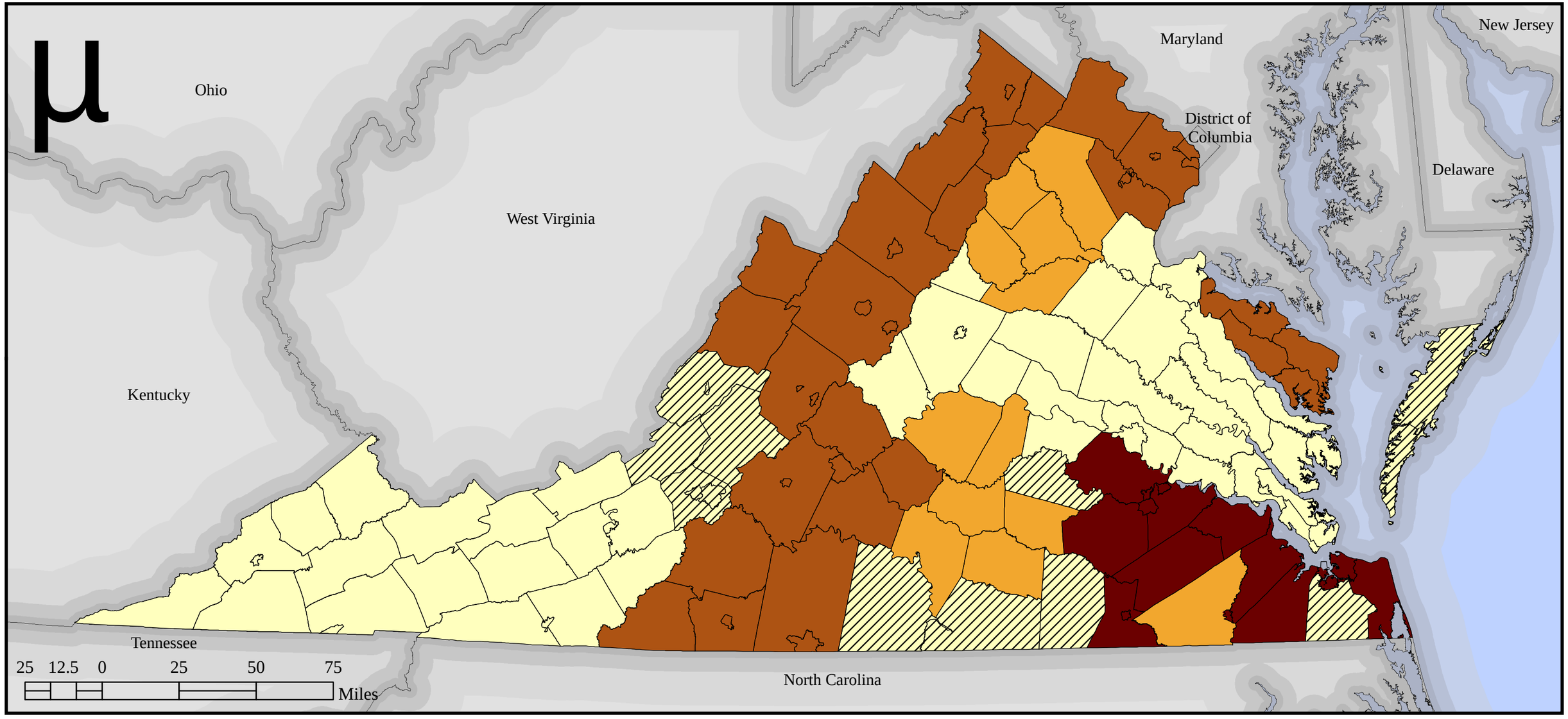
PDC/Jurisdiction	Total Flood Loss	Hurricane Wind Loss
Accomack-Northampton PDC	$279,500,000*	$226,900,000*
Amelia County	$107,507*	NA
Central Shenandoah PDC	$3,681,938	$1,095,990**
City of Chesapeake	$144,628,865*	$5,307,117,817*
Commonwealth RC (Virginia's Heartland)	$1,443,916**	$698,000**
Crater PDC	$5,145,573	$27,093,020**
Cumberland Plateau PDC	N/A	N/A
City of Franklin	$8,687,000**	$341,000**
George Washington RC (RADCO)	N/A	N/A
Lenowisco PDC	N/A	N/A
Middle Peninsula PDC	N/A	$1,021,000,000*
Mount Rogers PDC	N/A	N/A
New River Valley PDC	N/A	N/A
Northern Neck PDC	$2,838,730	$4,820,740**
Northern Shenandoah Valley RC	$4,137,773	$815,887**
Northern Virginia RC	$3,912,000	$33,723,000**
Peninsula Planning Group	N/A	N/A
City of Poquoson	N/A	$21,963,000*
Rappahannock-Rapidan RC	$1,597,725	$1,050,000**
Region 2000 LGC	$2,194,531	$1,421,500**
Richmond Regional PDC	N/A	$13,889,700**
Roanoke Valley-Alleghany RC	$726,914,005*	N/A

PDC/Jurisdiction	Total Flood Loss	Hurricane Wind Loss
Southampton County	$361,142**	$480,390**
Southside Hampton Roads	$48,172,702**	$33,546,000**
Southside PDC	$216,070*	$13,398,000 *
Thomas Jefferson PDC	N/A	$48,000,000*
West Piedmont PDC	$4,635,928	$4,835,928**
Total	**$1,238,175,405**	**$6,963,039,942**

**Estimates have not been annualized. Analysis techniques vary.*

***HAZUS-MH used for analysis*

Figure 3.6-1: Local Plan Annualized Flood Loss



Center for Geospatial Information Technology

VIRGINIA DEPARTMENT OF EMERGENCY MANAGEMENT

DATA SOURCES:

CGIT Local Plan Research
VGIN Jurisdicational Boundaries
ESRI State Boundaries

PROJECTION: *VA Lambert Conformal Conic*
North American Datum 1983

DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards. In order to identify potential risk in the Commonwealth available data has been used beyond the original intent.

LEGEND:

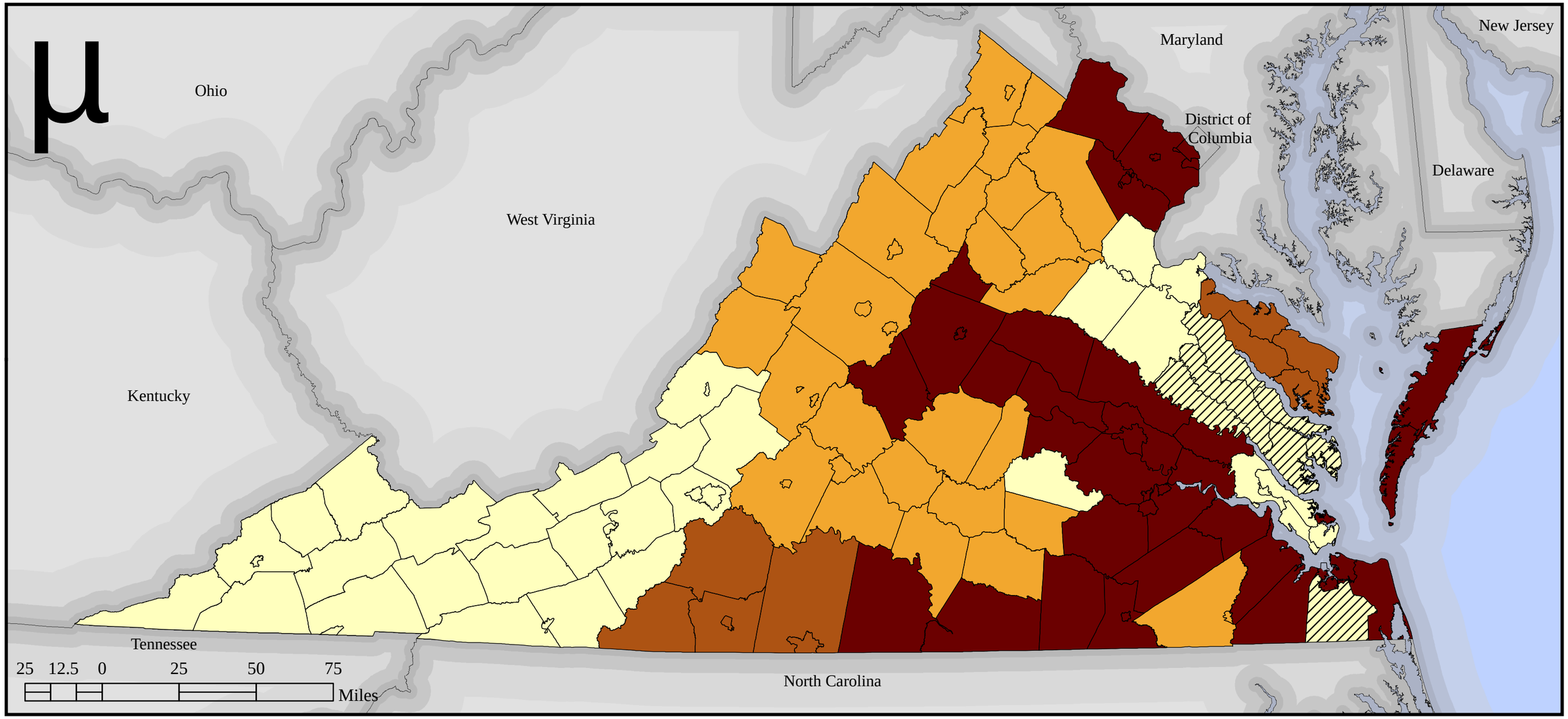
Annualized Flood Loss

- Estimates have not been annualized
- No estimate provided
- < $1.9 Million
- $2 Million - $4.9 Million
- > $5 Million

DATA DESCRIPTION:

Each local plan used slightly different criteria to develop monetary loss values and are not consistent across the 27 plans. Annualized loss values are from the approved local plans from 2004 through 2006. Flood loss values range from no estimates given (9 plans) up to $48 million in damages per year. Five local plans provided loss estimates that do not appear to be annualized.

Figure 3.6-2: Local Plan Annualized Hurricane Loss



DATA SOURCES:

CGIT Local Plan Research
VGIN Jurisdicational Boundaries
ESRI State Boundaries

PROJECTION: *VA Lambert Conformal Conic*
North American Datum 1983

DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards. In order to identify potential risk in the Commonwealth available data has been used beyond the original intent.

LEGEND:

Annualized Hurricane Loss

- Estimates have not been annualized
- No estimate provided
- < $1.9 Million
- $2 Million - $4.9 Million
- > $5 Million

DATA DESCRIPTION:

Each local plan used slightly different criteria to develop monetary loss values and are not consistent across the 27 plans. Annualized loss values are from the approved local plans from 2004 through 2006. Hurricane loss values range from no estimates given (7 plans) up to $226 million in damages per year.

Data Collection

There is currently no hazard and critical facility datasets for the Commonwealth. Various local plans have used different datasets, based upon the geographic and subject-matter scope of each plan. Requests for data used in the local hazard mitigation plans were sent out to the designated representatives in November 2007, asking for any spatial data that was used in the creation of the local plan. Several localities were able to provide facility related datasets for use but no hazard related datasets were furnished. Section 3.4, State and Critical Facility Analysis, further discusses this and Figure 3.4-5 in that section shows the local plans that provided critical facilities data.

Future Revisions

Localities are currently starting their first round of revisions for the local hazard mitigation plans. Guidelines proposed in this revision will undoubtedly streamline local efforts and allow for accurate comparisons among jurisdictions.

VDEM has provided, and will continue to provide, technical assistance to locals to develop their mitigation plans. VDEM in coordination with local jurisdictions, have held and will continue to hold a series of planning workshops, technical reviews, and financial resources.

There are numerous statewide mitigation actions that can be adapted for local mitigation plans. Local governments updating their plans are urged to review these, as well as the individual hazard sections in this report, and contact VDEM for additional assistance.

Integration of the local plans into the statewide plan is an ongoing process as local plans are reviewed and standardization issues are addressed. See the State and Critical facility Section 3.4 of this chapter for more information on standardization of facility datasets.