

SECTION 5 – HAZARD ANALYSIS (*DRAFT*)

The *Hazard Analysis* provides information on historical hazard occurrences in Planning District 14 for the hazards listed below. This includes an assessment of the location and spatial extent of the event as well as best available data regarding the impact on the region.

In developing this section, data from the original Plan was updated using research from a variety of sources. They include The National Climatic Data Center (NCDC), Virginia Department of Forestry (VDOF), and others. Data from Amelia County was added to the Plan as part of the update process. The information gathered was presented to the Project Management Team and interested stakeholders at a series of Hazard Mitigation workshops to gather input. Members of the Project Management Team and participating localities reviewed the data presented in this section for accuracy.

Additionally, this section was updated to include a brief discussion of man-made hazards (which were not covered in the original Plan). The narrative on man-made hazards will not include a detailed hazard analysis based on data collection, but will identify man-made hazards that could impact the region.

- **Flood**
- **Hurricanes, Tropical Storms and Nor'easters**
- **Severe Thunderstorms and Tornadoes**
- **Wildfire**
- **Drought/Extreme Heat**
- **Winter Storms and Freezes**
- **Erosion**
- **Earthquakes**
- **Sinkholes**
- **Landslides**
- **Dam/Levee Failure**
- **Man-made hazards**
 - **Hazardous material/chemical spills**
 - **Bio hazards**
 - **Accidents at fertilizer/other chemical facilities**
 - **Accidents at power plants/substations**
 - **Pipeline explosions**

44 CFR Requirement

44 CFR Part 201.6(c)(2)(i):
The risk assessment shall include a description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

To a large extent, historical records are used to identify the level of risk within the region — with the methodological assumption that the data sources cited are reliable and accurate. Information in this section includes, but is not limited to:

- Number of events (per locality)
- Injuries or deaths (per locality)
- Damages (in dollars, per locality)
- A history of the more significant events for each hazard

HAZARD ANALYSIS (DRAFT)

Flood

Flooding in the region is caused by several different sources. The region is drained by two major river basins: the James and the Roanoke. Major rivers and tributaries in the region include the Appomattox River, Roanoke/Staunton River, Nottoway River, Meherrin River (North, Middle, and South), James River, Bush River, Little Nottoway River, Little Willis River, Willis River, North River, Sandy River, and the Slate River. In addition to these major rivers, there are numerous branches and creeks in the region that can cause flash flooding in times of heavy rain. Maps showing the flood hazard areas for each county can be found in the Appendix.

Flood Insurance Rate Maps (FIRMs) show the flood hazard areas within counties and jurisdictions. On most of the FIRMs within Planning District 14, there are generally two flood zones that are shown: the 100-year floodplain, and the 500-year floodplain. The area of the 100-year floodplain represents the area that stands a 1% chance of being flooded in any given year. The 500-year floodplain represents the area that stands a 0.2% chance of being flooded in any given year. Detailed information on the flood hazard within a jurisdiction can be found in the local Flood Insurance Study (FIS). Maps showing flood hazard for each county are based on FIRM data.

Table 5.1 lists data on several flood events that have occurred in the region since 1993 as reported by the National Climatic Data Center (NCDC). Details for each event have not been included in the Plan because of the large number of events. Details for events recorded in the National Climatic Data Center's database can be obtained by visiting <http://www.ncdc.noaa.gov/oa/ncdc.html>. Based on historical evidence alone, it is clear that there is a high level of occurrence with regard to flood events in the region. The floods referenced below resulted in a total of two (2) deaths, and approximately \$3,447,000 in reported property damages.

Table 5.1
Flood Events in Planning District 14 Since 1993

Location	Number of Flood Events	Deaths	Property Damage*
Amelia County	3	0	\$8,000
Buckingham County	46	0	\$1,408,000
Charlotte County	47	0	\$1,913,000
Cumberland County	7	0	\$0
Lunenburg County	7	0	\$50,000
Nottoway County	5	1	\$18,000
Prince Edward County	5	1	\$50,000
REGIONAL TOTALS	120	2	\$3,447,000

Source: National Climatic Data Center

* Approximate numbers based on NCDC records.

Significant Events (Details from events slightly modified from National Climatic Data Center's storm database):

March 1936 – Successive storms between March 9 and 22 caused extensive flooding from Virginia to Maine. Damages were in the millions, and 150-200 deaths were blamed on this event. Significant amounts of snow fell during the winter. March started with mild temperatures, which were accompanied by heavy rains. Those rains melted the snows, which caused extensive flooding. The first rain, in the second week of March, dumped

HAZARD ANALYSIS (*DRAFT*)

three inches of rain on top of the melting snow – causing rivers to rise. A second storm, on March 17-18, dumped six more inches of rain across the State. The Appomattox River crested at 17.72 feet in **Farmville** (just above flood stage – 16 feet) on March 18, and 25.27 feet in Mattoax (in **Amelia County**) on March 20.

April 1937 – Heavy rains caused flooding over much of the State. Major damage ensued, including washed out bridges and flooded homes. The Appomattox River crested at 20.28 feet in **Farmville** on April 26, and 29.97 feet at Mattoax on April 28. One person died in **Amelia County** when their car dropped into the river where a bridge approach was washed out.

Hurricane Agnes, 1972 – Some of the worst flooding to ever occur in the region resulted from this storm. The remnants of Agnes dropped heavy rains across the region. The Appomattox River in **Farmville** reached 29.7 feet, a record (flood stage is 16 feet).

Hurricane Camille, 1969 – Rain from Camille produced the worst flash flooding in Virginia's history. The James River experienced severe flooding as far east as Richmond, due to the amount of rainfall received in its tributaries and headwaters. More than 100 deaths in Virginia were blamed on Camille, all communication to the outside world was cut off, and damages were estimated at more than \$500 million. The James River crested at 30.00 feet in Scottsville – near Route 20 at the **Buckingham County** line (flood stage is 20 feet) and 39.10 feet at Bremono Bluff – near U.S. 15 at the **Buckingham County** line (flood stage is 19 feet) on August 20. The next day, August 21, the river crested at 33.75 feet at Cartersville in northern **Cumberland County** (flood stage is 20 feet).

Election Day Floods, November 1985 – Excessive flooding was blamed for 22 deaths and caused nearly \$800 million in damage across the State. Heavy rains began on November 4, causing flash flooding. The Roanoke River crested at 23 feet in Roanoke on November 5 (Election Day). Flood waters carried significant amounts of debris, taking out bridges and filling channels with rocks. An estimated \$8 million worth of tobacco was lost in warehouses along the James River. Fifty jurisdictions in Virginia were declared disaster areas, and 19 polling stations had to be moved because of flooding. The Appomattox River crested at 20.03 feet in **Farmville** on November 5. On November 6, the James River crested at 31.77 feet in Scottsville, 40.70 feet at Bremono Bluff, and 32.60 feet at Cartersville.

Hurricane Fran, 1996 – Rains from Hurricane Fran caused the Appomattox in **Farmville** to crest at 24.5 feet, the second highest level on record. It was estimated that the June 1972 flood was nearly equal to a 100-year event while the August 1940 and September 1996 floods were in the range of a 50-year flood.

Local Flooding Concerns:

Amelia County – The following roads have been identified as subject to flooding:

- Route 621 at the Appomattox River
- Route 615 at Deep Creek
- Route 607 at West Creek
- Route 622 at Namozine Creek

HAZARD ANALYSIS (*DRAFT*)

- Route 620 at the Appomattox River
- Route 636 at Flat Creek
- Route 643 at Little Bent Creek
- Route 637 at Jones Lake

Buckingham County – The following roads have been identified as flooding periodically:

- Route 636 (from U.S. 15 to Cumberland County Line)
- Route 605 (from Appomattox County Line to the end of the road)
- Route 664 (from Route 604 to Route 737)
- Route 662 (from Route 607 to Route 663)
- Route 741 (from Route 604 to Route 56)
- Route 720 (from Route 20 to the end of the road)
- Route 657 (from Route 659 to Route 658)
- Route 717 (from Route 613 to Route 610)

Charlotte County – The following roads were identified as having flooded over the last two (2) years:

- Route 619 (from Route 746 to Route 645)
- Route 650 (from Route 47 to Route 649)
- Route 650 (from Route 40 to Route 604)
- Route 616 (from Route 727 to Route 672)
- Route 695 (from Route 727 to Route 617)
- Route 648 (from Route 619 to Route 746)
- Route 619 (from Route 637 to Route 645)
- Route 638 (from Route 691 to Appomattox County line)
- Route 691 (from Route 638 to Route 47)
- Route 701 (from Route 691 to Route 736)
- Route 668 (from Route 667 to Route 40)
- Route 638 (from Route 628 to Route 691)
- Route 649 (from Route 619 to Route 678)
- Route 619 (from Route 693 to Route 620)
- Route 701 (from Route 615 to Route 691)
- Route 618 (from Route 40 to Route 749)
- Route 701 (from Route 736 to Route 691)
- Route 649 (from Route 678 to Route 731)

Cumberland County – The following roads have been identified as subject to frequent flooding:

- Route 600 (between Farmville city limits and Route 702) Appomattox River, no crossing
- Route 600 (between Route 677 and Route 657) Green Creek crossing
- Route 602 (between Route 45 and the Willis River) James River, no crossing

HAZARD ANALYSIS (*DRAFT*)

- Route 605 (between Route 690 and Route 602) Willis River, James River backwater
- Route 612 (between Route 714 and Route 690) Willis River, smaller stream crossing
- Route 612 (between Route 714 and Route 608) Below dam at Trice's Lake
- Route 613 (between Route 672 and Route 608) Below dam at Sports Lake
- Route 615 (between Route 45 and Route 663) Unnamed stream
- Route 615 (between Route 663 and Route 608) Low-lying area between two bridges
- Route 620 (between Route 600 and Amelia County Line) Approach to Appomattox River
- Route 621 (between Route 13 and Amelia County Line) Approach to Appomattox River
- Route 626 (between Route 624 and Route 623) Bonbrook Creek crossing
- Route 626 (between Route 45 and Route 601) Unnamed stream
- Route 644 (between Route 600 and Route 631) Guinea Creek crossing
- Route 647 (between Route 601 and Route 654) Small stream into Muddy Creek
- Route 671 (between Route 696 and Route 672) Willis River backwater
- Route 677 (between Route 600 and End of State Maintenance) Brown Branch crossing
- Route 686 (between Route 610 and Route 604) Unnamed stream
- Route 690 (between Route 602 and Fluvanna County Line) James River, no crossing
- Route 690 (between Route 605 and Route 611) Boston Branch crossing
- Route 695 (between Route 699 and End of State Maintenance) Little Guinea Creek crossing

Lunenburg County – The following roads have been identified as subject to frequent flooding:

- Route 621 between Route 602 and U.S. 1 (in Mecklenburg County)
- Route 621 between Route 620 and Route 637 (in Brunswick County)
- Route 602 between Route 668 and Route 621
- Route 602 between Route 638 and Route 668
- Route 647 between Route 609 and Route 648
- Route 627 between Route 615 and Route 600
- Route 644 between Route 635 and Route 643
- Route 643 between Route 635 and Route 644
- Route 643 between Route 635 and Route 640
- Route 664 between Route 49 and Route 626
- Route 656 between Route 626 and Route 625
- Route 690 between Route 680 and Route 692

HAZARD ANALYSIS (*DRAFT*)

- Route 694 between Route 49 and Route 631
- Route 626 between Route 723 and Route 49
- Route 680 between Route 681 and Route 689

The following roads have been identified as subject to occasional flooding:

- Route 635 between Route 641 and Route 659 (in Mecklenburg County)
- Route 636 between Route 640 and Route 654 (in Mecklenburg County)
- Route 697 between Route 40 and Dead End
- Route 607 between Route 609 and Route 1101
- Route 637 between Route 646 and Route 614
- Route 637 between Route 614 and Route 613
- Route 659 between Route 675 and Route 770
- Route 626 between Route 682 and Route 689
- Route 678 between Route 680 and Route 626
- Route 678 between Route 704 and Route 662

Town of Kenbridge – The local wastewater treatment plant floods any time there is a measurable rainfall.

Nottoway County – The following roads have been identified as subject to frequent flooding:

- Route 608 between 153 and 609 at Bland Creek
- Route 611 between 615 and 613 at Deep Creek
- Route 611 between 607 and 625 at Woody Creek
- Route 626 between 49 and 723 at Nottoway River
- Route 633 between 49 and 607 at Lazaretto Creek (During excessive hard rains)
- Route 607 between 460 and 633 at Lazaretto Creek (During excessive hard rains)
- Route 633 between 723 and Dead End at Carys Creek
- Route 629 between 628 and 647 at Flat Creek (During excessive hard rains)

These roads have been identified as topographically inclined for special event flooding or that have actually flooded:

- Route 307 at Flat Creek and at Little Creek
- Routes 618, 611, and 614 at Deep Creek
- Routes 642 and 633 at their intersection with Lazaretto Creek
- Route 603 at the confluence of Whitestone Creek and the Little Nottoway River
- Route 640 at the Hobbs Mill on Namozine Creek.
- Route 610 at Sweathouse Creek

Town of Crewe – Wastewater treatment plant subject to routine flooding.

Prince Edward County – Frequent flooding along the Bush River, Little Saylers Creek, and the Appomattox River (often causes road flooding during flash floods). Roads that

HAZARD ANALYSIS (DRAFT)

experience this frequent flooding include Route 637 (Worsham Road), Route 634 (New Bethel Road), Route 636 (Poorhouse Road), Route 620 (Scuffletown Road), Route 608 (First Rock Road), Route 609 (Peaks Road), and Route 652 (Chinquapin Road).

Town of Farmville – Experiences the most flooding problems in the region. Town officials identified the following roads/areas as being subject to flooding:

- North Main Street (Appomattox River-Green Front area)
- Second Street (Dowdy Furniture area)
- North Bridge Street (adjacent to river)
- North Virginia Street (adjacent to river)
- Plank Road (Price Supply area)
- River Road
- South Street
- Fourth Street (adjacent to branch behind First Baptist Church)
- East Third Street (McAdo's area)
- West Third Street (adjacent to Fire Dept. and SCH)



This photo shows flood prone portions of the North Virginia and North Bridge Street area of Farmville, Virginia. (Photo courtesy of the Commonwealth Regional Council)

Historical Crests, local rivers (source – NOAA/National Weather Service):

For this Plan, we will only include the top 15 crests given the amount of data.

Appomattox River at Farmville (flood stage – 16 feet)

	Level	Date
1)	29.70 feet	June 21, 1972 (Hurricane Agnes)
2)	24.54 feet	September 7, 1996 (Hurricane Fran)
3)	23.60 feet	August 15, 1940
4)	21.79 feet	February 25, 1979
5)	21.19 feet	January 26, 1978
6)	21.10 feet	August 12, 1928
7)	21.00 feet	September 20, 1944
8)	20.99 feet	October 28, 1971
9)	20.90 feet	September 19, 1945
10)	20.90 feet	October 26, 1974
11)	20.84 feet	March 5, 1993
12)	20.47 feet	April 29, 1978
13)	20.28 feet	April 26, 1937
14)	20.03 feet	November 5, 1985 (Election Day Flood)
15)	19.88 feet	September 6, 1935

HAZARD ANALYSIS (DRAFT)

Appomattox River at Mattoax (flood stage – 21 feet)

	Level	Date
1)	35.30 feet	August 18, 1940
2)	34.08 feet	June 25, 1972 (Hurricane Agnes)
3)	31.10 feet	October 7, 1972
4)	30.84 feet	February 26, 1979
5)	29.97 feet	April 28, 1937
6)	27.73 feet	January 28, 1978
7)	27.52 feet	September 10, 1996 (Hurricane Fran)
8)	27.38 feet	September 23, 2003
9)	26.64 feet	November 7, 1985 (Election Day Flood)
10)	26.53 feet	August 21, 1955
11)	26.49 feet	December 1, 1993
12)	26.36 feet	March 8, 1993
13)	25.96 feet	April 19, 1987
14)	25.94 feet	August 15, 1928
15)	25.87 feet	March 22, 1998

James River at Scottsville (flood stage – 20 feet)

	Level	Date
1)	34.02 feet	June 22, 1972 (Hurricane Agnes)
2)	31.77 feet	November 6, 1985 (Election Day Flood)
3)	30.00 feet	August 20, 1969 (Hurricane Camille)
4)	28.24 feet	September 7, 1996 (Hurricane Fran)
5)	26.17 feet	April 17, 1987
6)	26.02 feet	January 20, 1996
7)	26.00 feet	September 19, 1944
8)	25.84 feet	August 16, 1940
9)	25.46 feet	March 19, 1936
10)	25.31 feet	April 23, 1992
11)	24.63 feet	March 19, 1975
12)	24.56 feet	September 8, 1987
13)	23.24 feet	October 6, 1972
14)	23.06 feet	September 6, 1935
15)	23.00 feet	October 16, 1942

James River at Bremono Bluff (flood stage – 20 feet)

	Level	Date
1)	44.80 feet	June 22, 1972 (Hurricane Agnes)
2)	40.70 feet	November 6, 1985 (Election Day Flood)
3)	39.10 feet	August 20, 1969 (Hurricane Camille)
4)	36.60 feet	September 7, 1996 (Hurricane Fran)
5)	34.50 feet	September 19, 1944
6)	33.50 feet	August 17, 1940
7)	33.50 feet	January 20, 1996
8)	33.30 feet	April 17, 1987
9)	32.70 feet	September 9, 1987
10)	31.60 feet	April 23, 1992
11)	31.40 feet	March 20, 1975
12)	30.70 feet	December 4, 1949
13)	30.00 feet	February 26, 1979

HAZARD ANALYSIS (DRAFT)

- | | | |
|-----|------------|------------------|
| 14) | 29.80 feet | October 6, 1972 |
| 15) | 29.30 feet | January 28, 1978 |

James River at Cartersville (flood stage – 20 feet)

- | | Level | Date |
|-----|------------|---------------------------------------|
| 1) | 37.87 feet | June 22, 1972 (Hurricane Agnes) |
| 2) | 33.75 feet | August 21, 1969 (Hurricane Camille) |
| 3) | 32.60 feet | November 6, 1985 (Election Day Flood) |
| 4) | 29.60 feet | September 20, 1944 |
| 5) | 28.96 feet | September 7, 1996 (Hurricane Fran) |
| 6) | 28.77 feet | March 19, 1936 |
| 7) | 28.34 feet | August 17, 1940 |
| 8) | 27.96 feet | April 18, 1987 |
| 9) | 27.80 feet | September 6, 1935 |
| 10) | 27.73 feet | April 26, 1937 |
| 11) | 27.14 feet | October 16, 1942 |
| 12) | 27.12 feet | October 6, 1972 |
| 13) | 27.00 feet | December 5, 1948 |
| 14) | 26.70 feet | December 30, 1901 |
| 15) | 26.40 feet | January 21, 1996 |

Hurricanes, Tropical Storms and Nor'easters

Since 1851, one Category 3 hurricane (Hazel), one Category 2 (Unnamed 1878) and 11 Category 1 hurricanes have passed within 75 miles of Planning District 14 (**Map 5.1**). More than 70 tropical systems have passed within 75 miles of the region or are otherwise noteworthy in the region's hurricane history. Thirty-six were tropical storms with the remainder classified as tropical depressions and extra tropical systems (Refer to the *Hazard Identification* section for explanation of the Saffir-Simpson scale, associated damage classifications and other background information with regard to tropical cyclones). Some of the more significant events have been listed in **Table 5.2**.

Table 5.2
Significant Hurricane/Tropical Storm History in Planning District 14 (1851–2010)

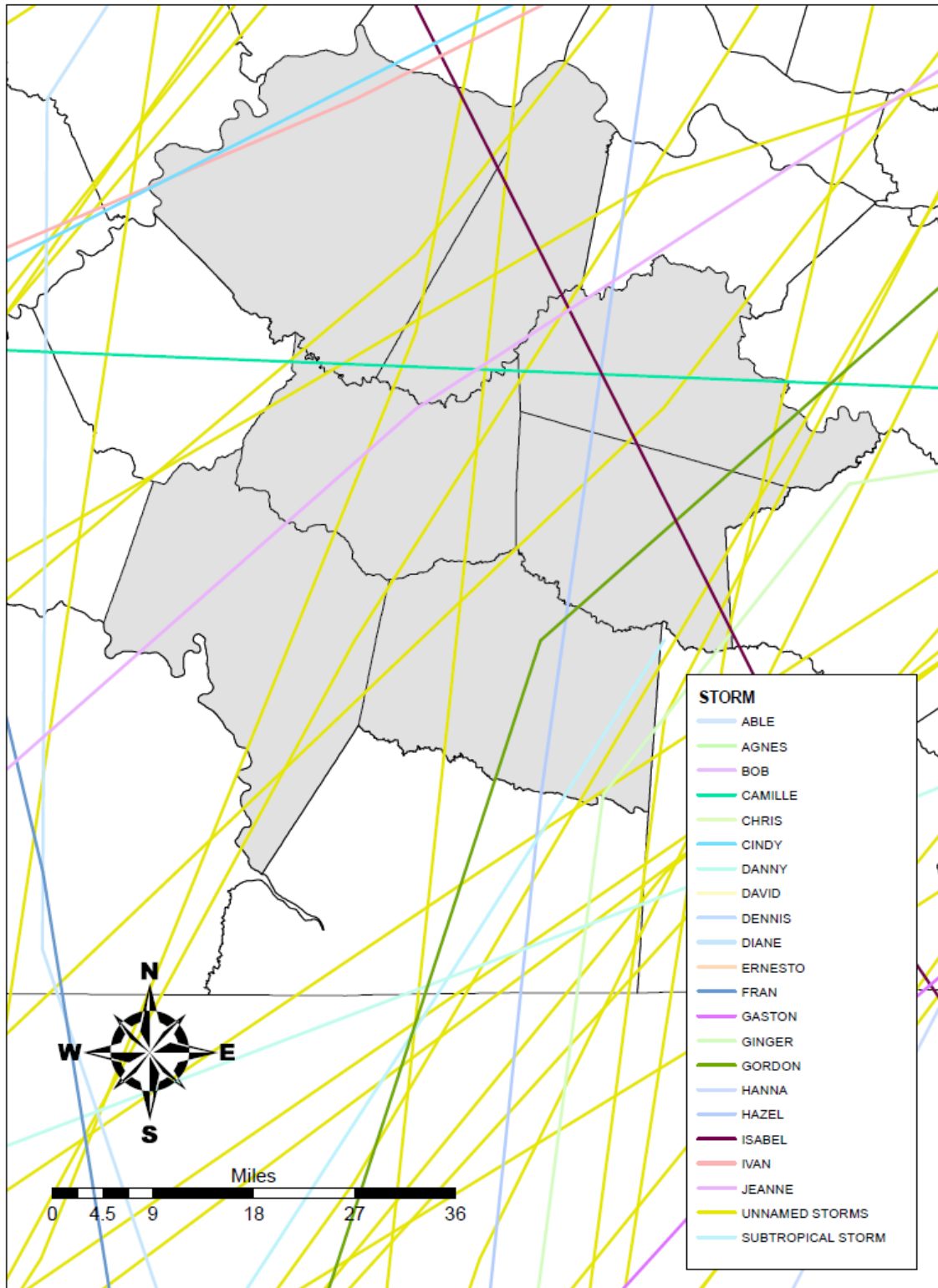
Name of Storm	Date of Occurrence
Not Named	1878
Hazel	1954
Camille	1969
Agnes	1972
Bertha	1996
Fran	1996
Dennis	1999
Isabel	2003
Gaston	2004
Frances	2004
Ivan	2004
Ernesto	2006
Hanna	2008

Sources: National Hurricane Center, National Climatic Data Center, National Weather Service and NOAA Coastal Services Center

HAZARD ANALYSIS (DRAFT)

Map 5.1 shows historical hurricane tracks through the region.

Map 5.1
Historic Hurricane Tracks through Planning District 14 – 1851-2010



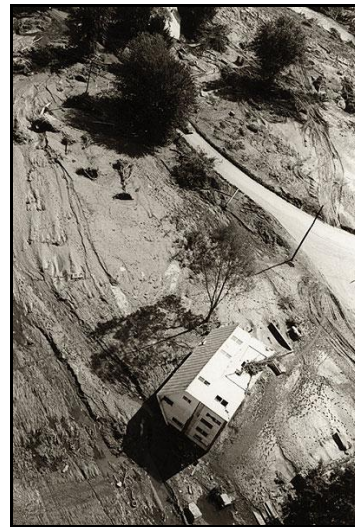
Source: NCDC/NOAA

HAZARD ANALYSIS (DRAFT)

Unnamed hurricanes, 1878 – Two storms impacted Virginia this year. The first came from the Caribbean and hit southern Florida in September, then drifted around the state and went out over the Atlantic. The storm made a second landfall over South Carolina, and moved through North Carolina and Virginia. At least nine deaths were attributed to the storm, though more is possible. The second storm came from the Caribbean and moved over southeast [Florida](#) and the [Bahamas](#), then made a second landfall over North Carolina with winds of 100 mph. The storm moved up the east coast, causing more than \$2 million in estimated damages and at least 72 casualties.

Hurricane Hazel, October 1954 – Maintained hurricane force winds up the East Coast and produced a number of record wind gusts. The Town of Blackstone had 63 mph sustained winds with gusts to 92 mph. Hundreds of thousands of trees were destroyed. Half of the phone and electric lines in the state were knocked out equaling \$2 million in damages. Five to 6 inches of rain fell in the region causing flooding of small streams. The storm was blamed for 13 deaths in Virginia, and damages were estimated (conservatively) at \$15 million.

Hurricane Camille, August 1969 – Made landfall on the Louisiana Coast and maintained hurricane strength for 150 miles up the Mississippi Valley. The storm turned east and headed for Virginia, where it tapped into the warm and humid air over the southern Gulf Stream and drew it northwest toward the Virginia Mountains – triggering heavy rains in Central Virginia. An area 100 miles long and 25 miles wide received more than 10 inches of rain. Rain from Camille produced the worst flash flooding in Virginia's history. The James River experienced severe flooding as far east as Richmond, due to the amount of rainfall received in its tributaries and headwaters. More than 100 deaths in Virginia were blamed on Camille, all communication to the outside world was cut off, and damages were estimated at more than \$500 million.



Rains from Hurricane Camille caused catastrophic flooding and landslides. This aerial view shows a house in Nelson County that was removed from its foundation and washed away.

Photo by Bill Whitehead (courtesy *The Virginian-Pilot* – www.Pilotonline.com)

Hurricane Agnes, June 1972 – Made landfall along the Florida panhandle as a category 1 hurricane, then weakened as it moved up the coast (east of the Appalachians) and reorganized as a tropical storm as it passed into Virginia, Agnes caused some of the most devastating flooding in Virginia's recorded history, with severe flooding along the James and Appomattox River Basins. Pressures fell to 29.10" at Norfolk. Langley Air Force Base experienced wind gusts to 54 mph. Approximately 49,000 phones were put out of service by downed lines, 103 highways were destroyed or damaged across the state, and 13 deaths were blamed on the storm. Damages were estimated at \$222 million. **Farmville** received its worst flooding in history as a result of this storm. The Appomattox River crested at 29.70 feet (flood stage is 16 feet).

HAZARD ANALYSIS (*DRAFT*)

Hurricane Bertha, July 1996 – Made landfall between Wrightsville and Topsail Beaches, North Carolina, then moved up the east coast toward Canada and Greenland. Damage was minimal in Virginia, though there was significant damage in North Carolina and flooding was reported along the storm's path. Eight deaths were blamed on the storm.

Hurricane Fran, September 1996 – Made landfall at Cape Fear on the North Carolina coast and moved north, entering Virginia near Danville. In just one hour, some areas saw 3.5 inches of rain. All rivers in the central part of the State experienced major flooding, and 100 people were rescued from floodwaters caused by Fran's excessive rains. Damages totaled \$350 million, and six deaths were blamed on the storm. Rain bands produced tropical storm force winds with gusts as high as 79 mph (Big Meadows) with measured gusts to 60 mph at lower elevation areas. Scattered tree damage occurred throughout much of the state with many trees uprooting from the combination of strong winds and saturated ground. During the height of the storm, 78 primary roads and 853 secondary roads were closed due to flooding and downed trees. Estimated damages to state roads were \$37 million. Access to and from isolated communities continued to be a problem for a couple weeks due to washed out bridges and roads. A record number of people (560,000) in Virginia experienced power outages. Agricultural damages appeared to be severe and extensive to what would have been a bumper crop from the cooler, wetter than normal summer. Agricultural damages were estimated in excess of \$50 million.

Hurricane Dennis, August/September 1999 – Moved along the southeast U.S. Coast, dumping heavy rains and causing beach erosion in North Carolina, then made landfall and moved through North Carolina and Virginia before continuing through the Mid-Atlantic region. Many parts of Virginia received significant rainfall from the storm (giving the region some much-needed rain on the heels of a summer-long drought), and the southeastern part of the State experienced tropical storm force winds.

Hurricane Isabel, September 2003 – Made landfall in North Carolina, and passed through Central Virginia during the afternoon and evening. The storm caused the loss of electricity and knocked down several large trees across the region, but most of the area was spared any major flooding and/or damage. Damage to agriculture was reported too, but reported losses were minimal. Governor Warner declared a state of emergency, and President Bush issued a federal disaster declaration (**Amelia, Buckingham, Lunenburg, Nottoway, and Prince Edward Counties** were covered under this declaration).

Tropical Storm Gaston, August 2004 – The storm skirted the region, causing some localized flooding. Specifically, the **Town of Kenbridge** reported flooding of the sewer plant and Police Department. The tin roof at Mt. Nebo Church in **Nottoway County** was partially blown off and a tree limb damaged a trailer. Several tops of trees were reported damaged in **Nottoway County**. The **Town of Drakes Branch** received 3.5 inches of rain, but reported no local flooding. Several roads in the region were closed and, in some cases, washed out. **Lunenburg County** was the hardest hit in the region. The bridge over the South Meherrin River was submerged by floodwaters and a swift water rescue was performed to rescue two stranded motorists.

Hurricane Frances, September 2004 – Made landfall in Florida as a category 2 hurricane, but weakened to a tropical depression by the time it reached Virginia. Minimal damage was reported in the region. Two mobile homes were damaged in **Buckingham**

HAZARD ANALYSIS (DRAFT)

County and the sewer plant in the **Town of Kenbridge** flooded. A tornado hit Buckingham Branch Railroad seven miles north of **Dillwyn**, near Route 622, at about 5:00 pm. Railroad crews had to clear trees from approximately two miles of track. Otherwise, locally heavy rains fell throughout the region and caused some localized flooding.

Hurricane Ivan, September 2004 – This storm caused a possible tornado in **Prince Edward County**, between **Farmville** and Prospect. A few trees and large limbs were downed. There were areas of heavy downpours that caused flash flooding across the region; otherwise the region was spared any major damage.

Tropical Storm Ernesto, August/September 2006 – Made its first U.S. landfall in southern Florida, then went out over the Atlantic Ocean and made a second U.S. landfall near Long Beach, North Carolina. The storm affected eastern parts of Virginia, causing an estimated \$90 million in losses throughout the State. Parts of eastern Virginia received 8-12 inches of rainfall. **Lunenburg County** was one of 25 localities in the State (22 counties and three cities) eligible for public assistance from the federal disaster declaration related to Ernesto.

Hurricane/Tropical Storm Hanna, September 2008 – Strengthened into a hurricane over the Atlantic, then weakened into a tropical storm before making landfall near the North Carolina/South Carolina border. The storm moved across eastern North Carolina, then turned northeast across the southeastern part of Virginia and eventually moved across the Chesapeake Bay and Delaware and back out over the Atlantic before making a second landfall over Long Island, New York. The storm was blamed for approximately 500 deaths in Haiti. Only minor damage was reported in the U.S., but the storm produced heavy rain and tropical storm force winds across northern and central Virginia. Rainfall amounts totaled around 4 to 8 inches across many locations with locally higher amounts over 9 inches. Numerous roads were closed throughout Northern and Central Virginia due to flash flooding, and the storm downed trees and power lines across northern and central Virginia.

Nor'easters:

Nor'easters also impact the region. Unlike hurricanes and tropical storms that typically come and go within one tidal cycle, nor'easters can linger for days. One of the largest nor'easters to impact the region occurred on January 23 and 24, 1940 as a storm dumped 24 inches of snow on **Farmville** in 24 hours. Businesses were closed for a couple of days and some schools were closed for a week. There were 12 deaths attributed to the storm in Virginia and damages statewide were estimated at half a million dollars. With fresh snow on the ground, temperatures fell. On the six days following the storm, low temperatures dropped below zero with the coldest day setting a new all time record of -12°F.

Significant Events (Nor'easters):

January 30-31, 1966 – A blizzard struck Virginia and the northeast United States. This was the second snowstorm to hit Virginia in a week. The first storm dumped 15 inches in Richmond and 9 inches in Norfolk. With snow still on the ground, arctic air settled in and temperatures dropped into the teens. The second storm dumped 1 to 2 feet of snow over a large part of the state: Lynchburg—11 inches; **Farmville**—23 inches; Partlow—20 inches; Fredericksburg—15.5 inches; Manassas—13 inches; and Arlington—14 inches

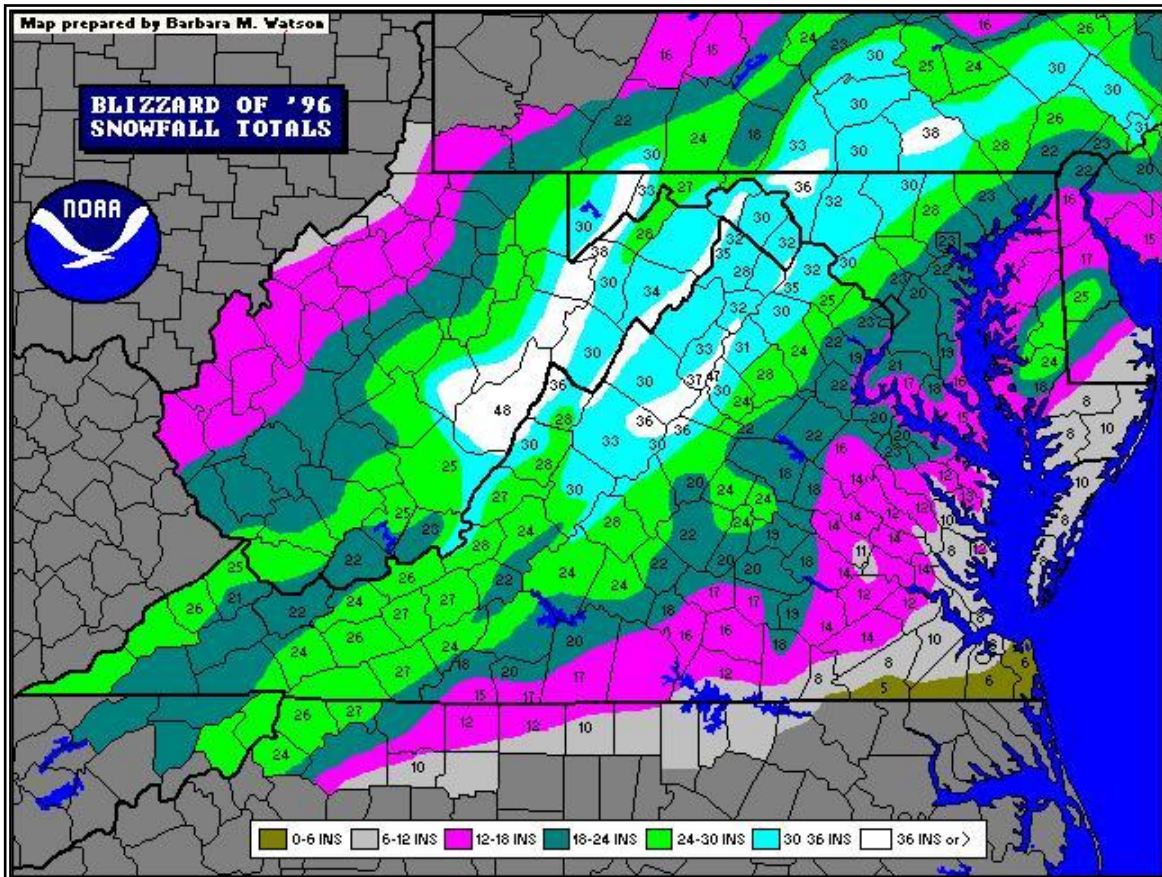
HAZARD ANALYSIS (DRAFT)

(this is on top of the previous snow). Lynchburg set a monthly record with almost 32 inches (31.8), and Roanoke set a monthly record with 41.2 inches. Strong winds and drifting snow kept roads closed for several days after the storm. Temperatures dropped into the single digits with some falling below zero, with dangerous wind chills. The Richmond area set a record for the calendar year with 41.6 inches.

Winter of 1995-1996 – Much of the State north and west of Richmond had either a record seasonal snow total or totals in the top three for the century. **Buckingham County** saw 67 inches for the season. Some schools lost as many as 15 days, and school systems compensated by adding hours to their days, adding Saturdays or teacher conference days, or staying in session through most of June.

Blizzard of '96 (January 6-13, 1996) – Part of the winter mentioned above, this storm resulted in snow for every county in the State, and dumped 16 to 24 inches of snow in the region. See map below for snowfall totals across the region.

Map 5.2
Blizzard of '96 Snowfall Totals



Source: National Oceanic and Atmospheric Administration

November 2009 Nor'easter – Even though this storm did not have a great effect on the region, a state of emergency was declared by Governor Kaine and a number of Virginia localities received federal disaster designations – making the entire State eligible for HMGP funding.

HAZARD ANALYSIS (DRAFT)

December 18 to December 20, 2009 – A nor'easter dumped heavy snow from North Carolina northward along the Eastern Seaboard to New England and the Canadian Maritime Provinces. Heavy snow began in Virginia around midday on December 18, and snow rapidly accumulated to the point where winter storm warnings were issued for much of the State. Travel was rendered extremely difficult for several days, and numerous vehicle accidents were attributed to this storm. According to NCDC data, final snow totals ranged from less than 6 inches in the southeast part of the State to more than 25 inches in the western and southwestern parts of Virginia. Nearly 50 Virginia localities were directly affected by the ensuing Presidential Disaster Declaration (issued on February 16, 2010).

Winter Storms/Freezes

According to the National Climatic Data Center, the counties in Planning District 14 have experienced 288 winter storm events since 1993. These events together are accountable for a total of approximately \$102,887,000 in reported property damages and six injuries.

Table 5.3
Winter Storm Activity in Planning District 14

Location	Number of Events	Property Damage by County	Injuries	Span of Recorded Events (Years)	Annualized Losses
Amelia County	47	\$20,315,000	0	17	\$1,195,000
Buckingham County	33	\$108,000	0	17	\$6,352
Charlotte County	24	\$405,000	0	17	\$23,823
Cumberland County	52	\$20,570,000	2	17	\$1,210,000
Lunenburg County	37	\$20,580,000	2	17	\$1,210,588
Nottoway County	40	\$20,317,000	0	17	\$1,195,118
Prince Edward County	55	\$20,592,000	2	17	\$1,211,294
TOTAL	288	\$102,887,000	6	-----	\$6,052,175

Source: National Climatic Data Center

Significant events:

March 13-14, 1993 – The “**Superstorm of March '93**” affected the eastern United States from Florida and Alabama through New England. The storm was blamed for approximately 200 deaths and cost several billion dollars in damages and snow removal. As the storm made its way into Virginia, some weather stations recorded their lowest recorded pressures ever. Unlike most large winter storms that move up the Virginia coast, this storm took a more inland track across Richmond and the Chesapeake Bay. It brought snow, ice, rain and some high winds to the region. The icy conditions caused slick roads and downed power lines, and some portions of the region were without power for 14-15 days. In the State, 11 people died during and immediately following the storm from over-exertion and heart attacks shoveling snow or from exposure and hypothermia. Snow removal and clean-up costs were estimated at \$16 million.

December 23 to December 25, 1998 – The “**Christmas Ice Storm**” is estimated to have caused approximately \$20 million in damage across several states including

HAZARD ANALYSIS (*DRAFT*)

Virginia. At least three deaths in Virginia were blamed on the storm, all elderly people who died of hypothermia after they lost power in their homes. Central and Southeast Virginia were hit particularly hard, including many localities in Planning District 14. A prolonged period of freezing rain and sleet resulted in accumulations ranging from ½-inch to one inch in many locations, and ice on trees and power lines resulted in widespread power outages (it is estimated that as many as 400,000 customers in Virginia were without power at one point), some lasting as long as 10 days. Roads and bridges/overpasses were slick, and some secondary roads were rendered impassable due to fallen limbs or – in some cases – entire trees that blocked roadways.

March 2009 – most significant statewide winter weather event in over 8 years. Most areas received over 4 inches of snow. Amounts range from a dusting in VA Beach to 10-11 inches in Richmond through the Northern Neck area. This caused travel disruptions and widespread power outages. Schools throughout the region were closed, and the Emergency Operations Center was activated in **Charlotte County**.

December 2009 – A winter storm moved from the Gulf Coast through North Carolina and Virginia, dumping heavy snow across the State. Heavy snow began in Virginia around midday on December 18, and snow rapidly accumulated to the point where winter storm warnings were issued for much of the State. Travel was rendered extremely difficult for several days, and numerous vehicle accidents were attributed to this storm. According to NCDC data, final snow totals ranged from less than 6 inches in the southeast part of the State to more than 25 inches in the western and southwestern parts of Virginia. Nearly 50 Virginia localities were directly affected by the ensuing Presidential Disaster Declaration (issued on February 16, 2010).

January 25 and January 30, 2010 – Two storms impacted parts of the region just a few days apart. The first, on January 25, dumped six to 12 inches of snow across Central Virginia. Snowfall amounts varied, with six to 10 inches in **Prince Edward County** and 10 inches in **Cumberland and Amelia Counties**. No damages were reported from this storm, but the snow remained on the ground for several days in many areas due to below-average temperatures. Then, on January 30, a significant ice storm caused an estimated \$200,000 in damages across Central and Eastern Virginia. What started out as a mix of snow, sleet, and freezing rain turned into all freezing rain. Ice accumulations ranged from ¼ inch to ¾ inch in **Nottoway and Amelia Counties**. Downed trees and power lines resulted in widespread power outages (an estimated 285,000 customers in Central Virginia were without power at one point).

February 5-11, 2010 – On the heels of the December 2009 nor'easter and the January 2010 ice storm, another storm dumped record snowfalls across the Mid-Atlantic region and dumped significant snow in parts of Virginia. Deaths in Mexico, New Mexico, Maryland, and Virginia were attributed to this storm. Some parts of Virginia (in particular, Northern Virginia) received between 20 and 40 inches of snow, bringing travel to a halt. To give just one example, rail service south and west of Washington, D.C. was suspended and rail service from Washington to Boston was suspended for a time. In this region, snow totals ranged from two inches in **Lunenburg County** to 10 inches in **Amelia County**. A Presidential Disaster Declaration for this event was issued on April 28, 2010. Locally, **Buckingham County** was included in this declaration.

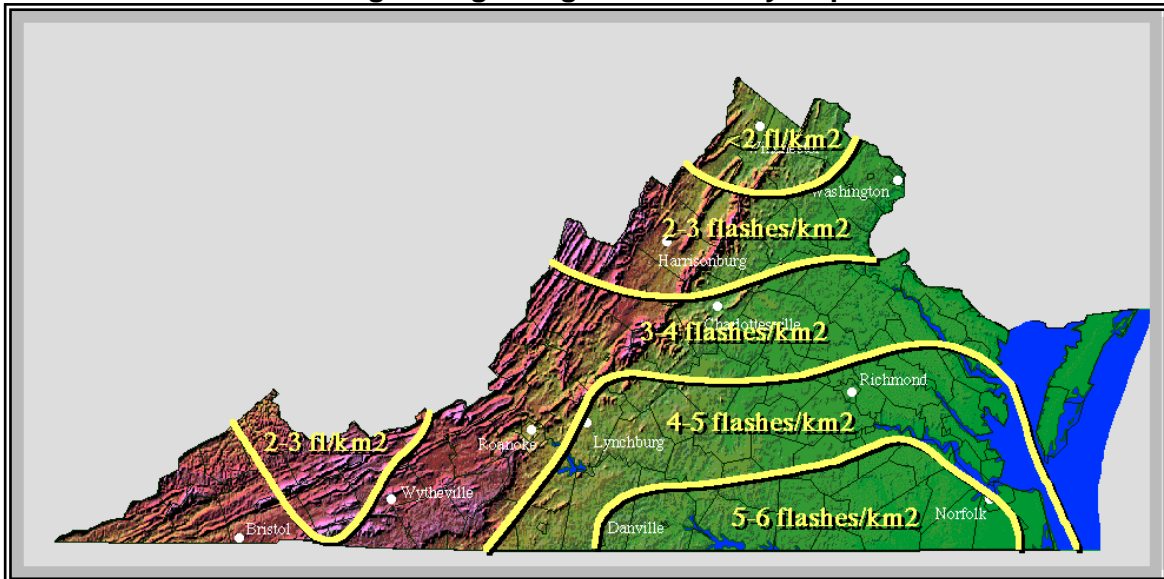
HAZARD ANALYSIS (DRAFT)

Severe Thunderstorms and Tornadoes

Thunderstorms

Thunderstorms are common throughout the State of Virginia, and have been known to occur during all calendar months. In addition to the high winds associated with these events, thunderstorms can also bring dangerous lightning that can cause fires, property damage and may cause death or serious injury to humans. A thunderstorm with wind gusts in excess of 58 mph (50 knots) and/or hail with a diameter of 0.75 inches or more is classified as a “severe thunderstorm.” Hail is another element of this form of inclement weather, and can cause varying degrees of property and crop damage. **Map 5.3** shows lightning strike density in the State of Virginia. **Table 5.4** provides summary information of thunderstorms and lighting events reported to the National Climatic Data Center (NCDC).

Map 5.3
Virginia Lightning Strike Density Map



Source: Virginia State Climatology Office

Note: This map is based upon lightning strike data for the year 1989. Strikes were identified by the detector network established by the Electric Power Research Institute.

HAZARD ANALYSIS (DRAFT)

Table 5.4
Severe Thunderstorm Activity in Planning District 14*

Location	Number of Events	Property Damage	Deaths	Span of Recorded Events (Years)	Annualized Losses
Amelia County	65	\$119,000	1	35	\$3,400
Buckingham County	77	\$598,494	1	44	\$15,750
Charlotte County	76	\$615,130	0	35	\$21,211
Cumberland County	32	\$545,000	0	21	\$36,333
Lunenburg County	51	\$479,000	0	35	\$16,517
Nottoway County	75	\$51,500	0	55	\$1,051
Prince Edward County	54	\$144,500	0	53	\$3,074
TOTAL	430	\$2,552,624	2	-----	\$97,336

Source: National Climatic Data Center (* Approximate numbers based on NCDC records)

NOTE: These numbers do not include the April 2011 storm, which caused significant damage across Virginia and spawned a number of tornadoes.

Table 5.5
Hail Events in Planning District 14

County	Number of Hail Events	Property Damage	Crop Damage
Amelia County	18	\$12,000	\$0
Buckingham County	39	\$52,000	\$0
Charlotte County	36	\$46,000	\$10,000
Cumberland County	16	\$0	\$0
Lunenburg County	25	\$201,000	\$50,000
Nottoway County	28	\$5,000	\$1,000
Prince Edward County	18	\$0	\$0
TOTAL	180	\$316,000	\$61,000

Source: National Climatic Data Center (* Approximate numbers based on NCDC records)

Significant events:

May 5, 1996 – A storm that the National Weather Service classified as a “microburst” hit **Lunenburg County** late at night. A microburst is a phenomena that has been compared to a tornado, in that it produces damaging, straight-line winds. The **Town of Kenbridge** suffered some tree damage from this event, and there were widespread power outages throughout the County, but the **Town of Victoria** took the brunt of this storm – which hit after 10:00 that evening. Due to the time of the storm, the streets in Victoria were largely empty. Thus, there were no reports of serious injuries. However, numerous buildings within the Town’s business district – which was the hardest hit area – were damaged to varying degrees.

May 22, 2000 – Widespread hail “up to nearly softball size” affected large portions of **Lunenburg County**. Specific reports from spotters and the media indicated hail measuring 2.25 to 2.5 inches in diameter fell in Victoria at 2:50 p.m., hail “up to nearly softball size” just before 3 p.m., and “hail the size of tennis balls and eggs” around 3 p.m. Numerous trees were reported downed by high winds in a swath 2 to 3 miles in width in the Double Bridges area. Many vehicle and business windows were broken by the large

HAZARD ANALYSIS (*DRAFT*)

hail, resulting in expensive repairs. Six county-owned vehicles were damaged by the storm, including one that was hit by a tree.

Tornadoes

When compared with other states, Virginia ranks 28th in the Nation in number of tornado events, 25th in tornado deaths. These rankings are based upon data collected for all states and territories for tornado events between 1950 and 2005 (Source – NCDC, NWS Storm Prediction Center). According to NCDC records, the localities in Planning District 14 experienced a total of 34 tornado events from 1950 through 2010. These events are reported to have caused no deaths, but did cause a total of two (2) injuries and approximately \$7,607,000 in property damage.

Significant events:

April-May 2000 – A string of tornadoes hit parts of the state, including counties in this region. Governor Warner declared a state of emergency, which was later amended to include **Cumberland** and **Prince Edward Counties**.

April 2011 (not included in the table on the next page) – Tornadoes hit the State, and the region, during two separate events:

- On **April 16, 2011**, a line of severe thunderstorms came through Virginia during the afternoon, spawning at least 10 tornadoes statewide. This system started in the Southern Plains of the U.S. two days earlier, spawning tornadoes from Oklahoma eastward. In Virginia, the storms were blamed for at least five deaths and Governor McDonnell declared a statewide emergency. At least one tornado struck **Lunenburg County**, near Victoria, causing significant damage to one house (which had to be condemned) and varying degrees of damage to several other homes and a couple of other buildings. Total damages were estimated at approximately \$100,000.
- Less than two weeks later, on **April 27**, a line of severe storms came through the State during the day. This system started in the same region of the country as the April 16 storm, and spawned tornadoes in several states from Texas to New York. As of May 3, 2011, the storms were blamed for more than 300 deaths across six states with hundreds more missing – making this the deadliest outbreak of tornadoes in the United States since 1932. The large majority of fatalities were in Alabama. According to National Weather Service estimates, the system touched off a total of 312 tornadoes during a 24-hour period from 8:00 a.m. on April 27 to 8:00 a.m. on April 28, a new record (the previous record was 148, recorded during the April 3-4, 1974 tornado event). At least 15 tornadoes were confirmed in Virginia from this event, killing five people. Governor McDonnell declared a statewide emergency. One confirmed tornado struck **Prince Edward** and **Cumberland Counties**, near **Farmville**. The funnel cloud was seen from parts of Farmville, including Longwood University (see photo below). In Cumberland County, six residences were damaged – resulting in the displacement of seven individuals – and some trees and fences were damaged.

HAZARD ANALYSIS (DRAFT)



Longwood University student Amelia Perry took this photo of the tornado that came through Farmville on April 27, 2011 (courtesy *The Farmville Herald*)

Table 5.6
Tornado Events in Planning District 14 (1950–2010)

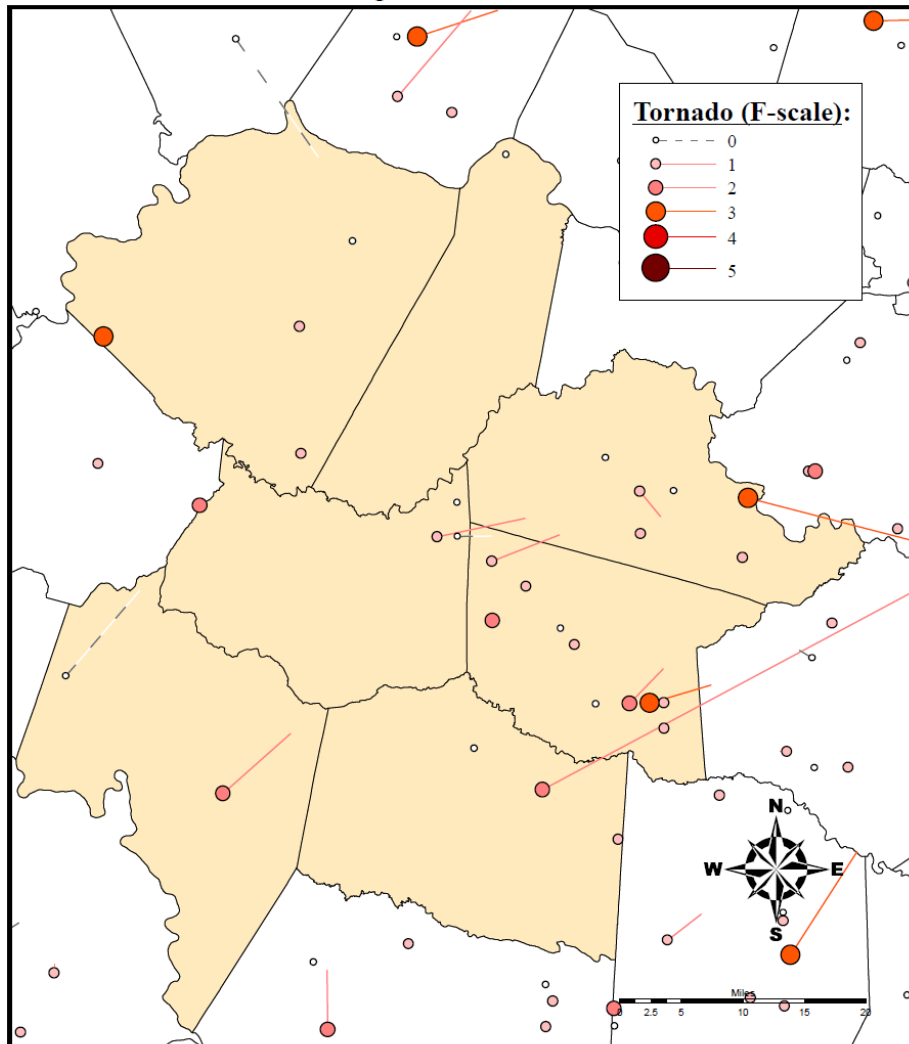
Location	Date	Time	F-Scale	Property Damage
Amelia	10/13/1983	2:50 p.m.	F1	\$250,000
Amelia	11/16/1989	7:15 a.m.	F0	\$250,000
Amelia	05/04/1990	7:45 p.m.	F3	\$2,500,000
Amelia	05/09/2003	2:35 p.m.	F1	\$25,000
Amelia	09/23/2003	4:30 a.m.	F1	\$25,000
Truxillo (Amelia Co.)	09/08/2004	4:40 p.m.	F0	\$2,000
Mannboro (Amelia Co.)	09/17/2004	3:08 p.m.	F1	\$10,000
Jetersville (Amelia Co.)	09/28/2006	4:50 p.m.	F1	\$25,000
Nottoway	11/02/1966	1:50 p.m.	F2	\$250,000
Nottoway	05/12/1974	3:00 p.m.	F2	\$25,000
Nottoway	07/10/1975	2:30 p.m.	F1	\$25,000
Nottoway	05/22/1983	4:30 p.m.	F3	\$250,000
Nottoway	10/13/1983	2:47 p.m.	F1	\$250,000
Nottoway	08/06/1986	4:00 p.m.	F1	\$25,000
Burkeville	05/02/2002	2:50 p.m.	F0	\$20,000
Burkeville	09/28/2006	4:40 p.m.	F1	\$5,000
Blackstone	08/30/2004	12:10 p.m.	F0	\$5,000
Blackstone	07/07/2005	7:53 p.m.	F1	\$5,000
Blackstone AAF	07/13/2005	5:59 p.m.	F1	\$5,000
Crewe	09/23/2003	3:45 a.m.	F0	\$5,000
Lunenburg	05/27/1957	9:15 a.m.	F1	\$25,000
Victoria	09/23/2003	3:30 a.m.	F0	\$20,000
Charlotte	07/10/1959	10:25 a.m.	F0	\$25,000
Charlotte	10/13/1983	3:45 p.m.	F2	\$250,000

HAZARD ANALYSIS (DRAFT)

Location	Date	Time	F-Scale	Property Damage
Charlotte	05/08/1984	3:15 p.m.	F2	\$2,500,000
Charlotte	10/14/1986	6:05 a.m.	F3	\$250,000
Charlotte	11/23/1992	3:00 a.m.	F1	\$25,000
Prince Edward	10/13/1983	2:45 a.m.	F1	\$250,000
Cumberland	07/12/1977	4:45 p.m.	F1	\$250,000
Buckingham	08/23/1959	3:00 p.m.	F1	\$25,000
Buckingham	09/10/1960	4:00 p.m.	F2	\$25,000
Buckingham	06/16/1966	6:45 p.m.	F3	\$2,500
Buckingham	10/02/1979	5:30 p.m.	F1	\$2,500
Gold Hill (Buckingham Co.)	09/08/2004	3:30 p.m.	F0	0
TOTAL				\$7,607,000

Source: National Climatic Data Center (* Approximate numbers based on NCDC records)

Map 5.4
Historic Tornado Touchdowns and Tracks in and around Planning District 14 – 1950-2006



DATA SOURCES:

SVRGIS
 VDEM Jurisdictional Boundaries
 ESRI State Boundaries

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.

HAZARD IDENTIFICATION:

Historic tornado touchdowns and tracks are symbolized for visual effect and are not drawn to scale. Actual tornado swath widths vary considerably, although more intense tornadoes are generally wider.

Map created by VDEM/CGIT (updated by CRC – December 2006)

HAZARD ANALYSIS (DRAFT)

Wildfire

According to the Virginia Department of Forestry (VDOF), there were 2,190 recorded wildfires in the region from 1994 through July 2010. The largest percentage of these events (37.2%) were caused by debris burning. Other causes include smoking, equipment use, children and lightning. There are no known records of any deaths or injuries attributed to a wildfire event in the region.

Table 5.7
Occurrences of Wildfire in Planning District 14 – 1994 through July 2010*

Location	Number of Wildfire Events	Total Amount of Damage
Amelia County	271	\$104,750
Buckingham County	399	\$980,925
Charlotte County	350	\$389,240
Cumberland County	149	\$264,485
Lunenburg County	314	\$925,705
Nottoway County	441	\$842,015
Prince Edward County	266	\$152,495
REGIONAL TOTALS:	2,190	\$3,659,615.00

Source: Virginia Department of Forestry (VDOF)

* According to VDOF, 1994 was the year their new database program was initiated. Therefore, data for this year may not include the entire year.

Significant Events (according to the VDOF, media reports, and VDEM incident reports):

Fall 2001, Spring/Summer 2002 – Drought conditions were blamed for busier than normal fire seasons. In 2001, more than 2,200 fires were reported across the State burning more than 19,000 acres. This prompted the VDOF to request help from the U.S. Forest Service and Florida Department of Forestry. In addition, FEMA provided wildfire funding assistance. Drought conditions continued into 2002, causing an early start to the Spring Fire Season. After a brief respite from March and April rains, drought conditions returned in the summer. For all of 2002, the VDOF managed more than 1,600 wildfires consuming more than 13,000 acres. Locally, in October 2001, a fire burned 949 acres in **Lunenburg** and **Nottoway Counties**.

February 2008 – Multiple wildfires were reported in 62 counties across the State. The fires were fueled by high winds, making them difficult to contain. As many as 300 fires were reported statewide at one point, some as large as 1,000 acres or more. The VDOF, State Police, and National Guard (among other groups) provided assistance to firefighters in many localities. Among localities in Planning District 14, fires were reported in **Buckingham, Charlotte, Lunenburg, Nottoway** and **Prince Edward Counties**. Local emergencies were declared in **Charlotte** and **Lunenburg**.

April 2008 – A wildfire in northern **Buckingham County** burned about 600 acres near Routes 622 and 676. No houses were damaged, but a significant amount of timber was lost. All five of the County's fire departments and VDOF personnel battled the blaze, which was brought under control after about nine hours. One VDOF employee was sent to the University of Virginia Medical Center with upper-body burns, and two other firefighters were treated locally for smoke inhalation.

HAZARD ANALYSIS (DRAFT)

February 2011 – Multiple wildfires were reported in more than 50 counties across the State, as abnormally dry conditions combined with high winds to spark (and spread) many blazes. Fires were reported in each county within Planning District 14, according to local reports and the Virginia Emergency Operations Center.

At **Fort Pickett**, an estimated 2,000 acres burned between February 14 and February 21. That fire was contained, and no structures were damaged. **Amelia County** reported seven fires between February 17 and 21, all grass and woodland fires. According to county officials, several structures were threatened but none burned. **Lunenburg County** reported a few fires, with one – started when a brush fire set by a local resident got out of control due to high winds – destroying a shed and damaging two other buildings. Other fires burned open land, including a 10-acre brush fire that resulted from a downed power line, but there were no other reports of building damage. Three fire departments responded to that blaze. **Charlotte County** reported a number of fires between February 14 and February 21. There was no known damage to buildings from these events, as these were field and brush fires.

Other parts of the State did not fare as well. During this period, fires in Louisa, Shenandoah, and Goochland Counties destroyed a small number of houses. Additionally, Interstate 64 in New Kent County near Interstate 295 (east of Richmond) was closed for several hours on February 19 by a brush fire that was fueled by high winds. Traffic was diverted onto U.S. 60 while firefighters battled the blaze.

Drought/Extreme Heat

From 1993 to 2009, there were 42 periods of drought recorded for the localities in Planning District 14, according to the National Climatic Data Center. This does not include the recent drought in 2010. Damage to crops was extensive and caused major hardship to farmers in the region.

Table 5.8
Occurrences of Drought in Planning District 14

Location	Number of Events	Property Damage	Span of Recorded Events (Years)	Annualized Losses
Amelia County	4	\$123,070,000	17	\$723,941
Buckingham County	13	\$8,750,000	17	\$514,706
Charlotte County	11	\$8,750,000	17	\$514,706
Cumberland County	4	\$123,070,000	17	\$723,941
Lunenburg County	1	\$500,000	17	\$29,412
Nottoway County	4	\$123,070,000	17	\$723,941
Prince Edward County	5	\$123,070,000	17	\$723,941
TOTAL	42	\$510,280,000	-----	\$3,954,588

Source: National Climatic Data Center

Significant events:

Summer 2001-Summer 2002 – A drought, caused by abnormally low rainfall, gripped much of the state. Below normal rainfall made dry conditions that started back during the late 1990s even worse, resulting in rivers and streams – as well as reservoirs – dropping to dangerously low levels. Virginia recorded the driest 12-month period on record from

HAZARD ANALYSIS (*DRAFT*)

August 2001 to August 2002. Conditions statewide prompted Governor Warner to declare a state of emergency. Locally, private well failures and disruptions to local water supplies were reported across the region. In **Farmville**, water levels on the Appomattox River dropped so low in the fall of 2002 that there was uncertainty as to whether the Town would be able to supply water for Longwood University.

Summer/Fall 2007 – Governor Kaine declared a statewide emergency and imposed a statewide burning ban due to dry conditions caused by lower than average rainfall across the state. **Amelia, Nottoway, and Prince Edward Counties** were included in federal disaster designations related to this event.

Summer 2010 – Lower than average rainfall across the State and above-normal temperatures led to abnormally dry conditions that affected water supplies and diminished agricultural production in a number of localities. All seven counties in **Planning District 14** were included in a subsequent federal disaster declaration, which made farmers in the region eligible for low-interest loans and other related assistance that might be approved by Congress.

Erosion

There is no database of historic erosion events, and no known scale to measure the extent of erosion. However, areas of steep slopes and numerous rivers, streams, and creeks that run through the region, as well as the large tracks of farmland in the region present conditions that are favorable for erosion to take place.

Earthquakes

According to data from the Virginia Department of Mines, Minerals, and Energy, more than 300 earthquakes have been reported in or near the State of Virginia since 1774 (the earliest year an earthquake was documented in the State). Less than 20 percent were strong enough to be felt. Two areas in the state known for seismic activity are Giles County (in the Western part of the state) and in central Virginia (roughly located around Richmond and Charlottesville). A small part of the region is located in the central Virginia area (see **Map 5.6**). However, the effects from the earthquakes that occur in both of these seismic areas could be felt throughout the region.

Some minor quakes have been experienced in the region over the last 10 years. A minor tremor was experienced in the region on December 9, 2003. The earthquake measured 4.5 on the Richter Scale and was centered close to Maidens, east of the region. It was felt strongly in the region. Minor damage was reported in the Town of Victoria, as some homeowners reported cracked windows and sheetrock from the quake. An earthquake was recorded less than five miles southwest of **Dillwyn** on December 16, 2009. It registered 2.2 on the Richter Scale, and no damage was reported. In July 2010, an earthquake registering 3.6 magnitude shook the Washington, DC, area causing windows to rattle but no reported damage. The quake, the strongest felt in the DC area on record, was centered northwest of DC in Rockville, MD. In this region, there were a few reports of people seeing things on their shelves rattle but no reports of damage or injuries.

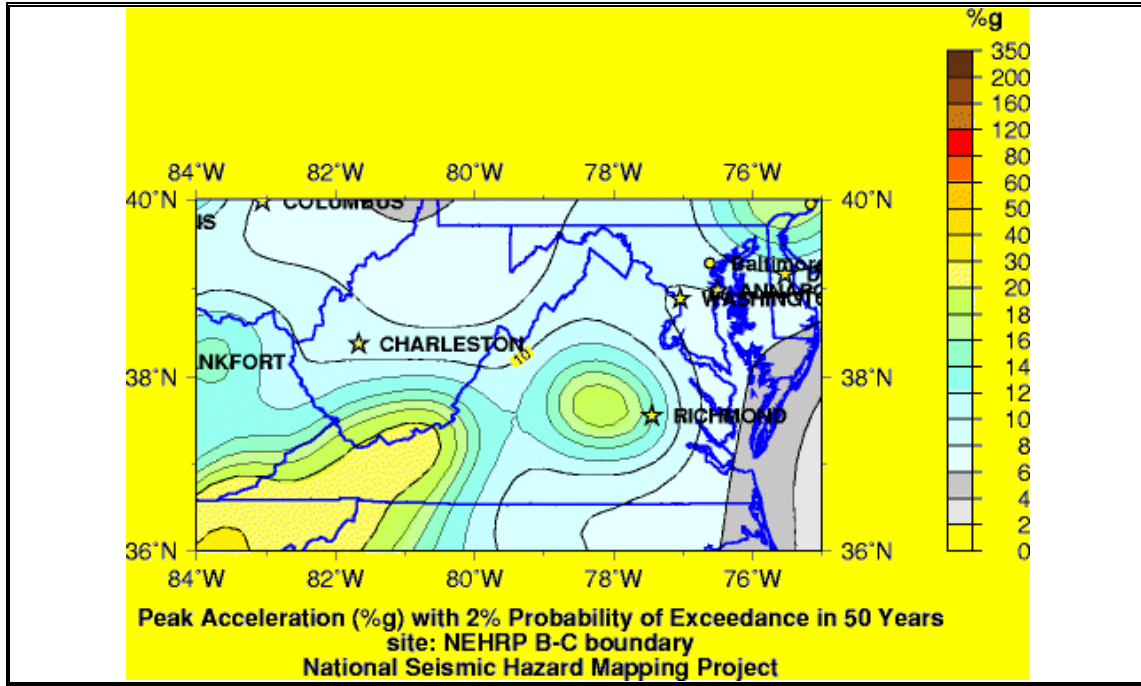
Map 5.5 shows geological and seismic information for Virginia.

Approximately two-thirds of Virginia is subject to earthquakes, with the western and central regions most vulnerable to an earthquake resulting in some damage. **Table 5.9**

HAZARD ANALYSIS (DRAFT)

lists notable earthquake events that have occurred in the region since 1875 (compiled from National Geophysical Data Center records). **Map 5.6** shows significant earthquakes in and around the region from 1568-2004.

Map 5.5
Geological and Seismic Information for Virginia



Source: USGS National Seismic Hazard Mapping Project

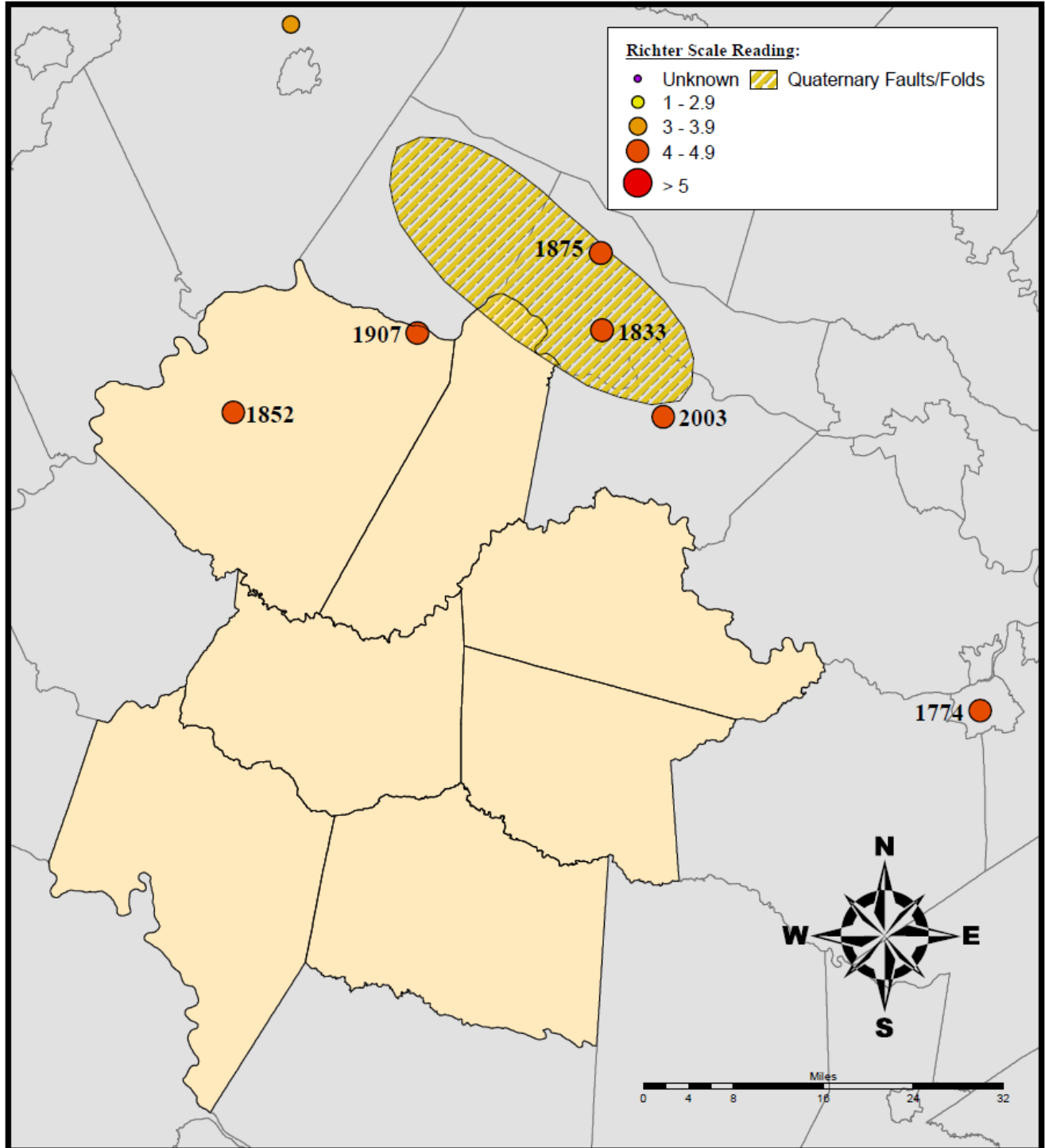
Table 5.9
Significant Seismic Events Impacting Planning District 14

Date of Occurrence	Location Recording Occurrence	Distance from Epicenter (Miles)	Modified Mercalli Intensity
08/07/1921	Dillwyn	29	Not reported
01/05/1932	Dillwyn	Not reported	Not reported
10/07/1942	Farmville	Not reported	Not reported
10/1945	Dillwyn	Not reported	Not reported—Three earthquakes reported in the month.
01/05/1948	Farmville, Dillwyn, Crewe	Not reported	Not reported—Three earthquakes reported within minutes of each other
11/26/1950	Dillwyn	Not reported	Not reported
01/17/1955	Farmville	Not reported	Not reported
05/31/1966	Farmville	47	3.1
11/20/1969	Farmville	230	4.3
02/11/1981	Farmville	46	3.4
08/17/1984	Farmville	66	4.2

Source: National Geophysical Data Center

HAZARD ANALYSIS (DRAFT)

Map 5.6
Significant Earthquakes in and around Planning District 14 – 1568-2004



DATA SOURCES:

USGS Significant Earthquakes
USGS Quaternary Faults
VGEN Jurisdictional Boundaries
ESRI State Boundaries

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.

HAZARD IDENTIFICATION:

This map layer contains the locations of significant historic earthquakes that caused deaths, property damage, and geological effects, or were otherwise experienced by populations in the United States (1568 - 2004). USGS Quaternary Faults and Folds are believed to be sources of earthquakes, greater than magnitude 6, in the past 1,600,000 years.

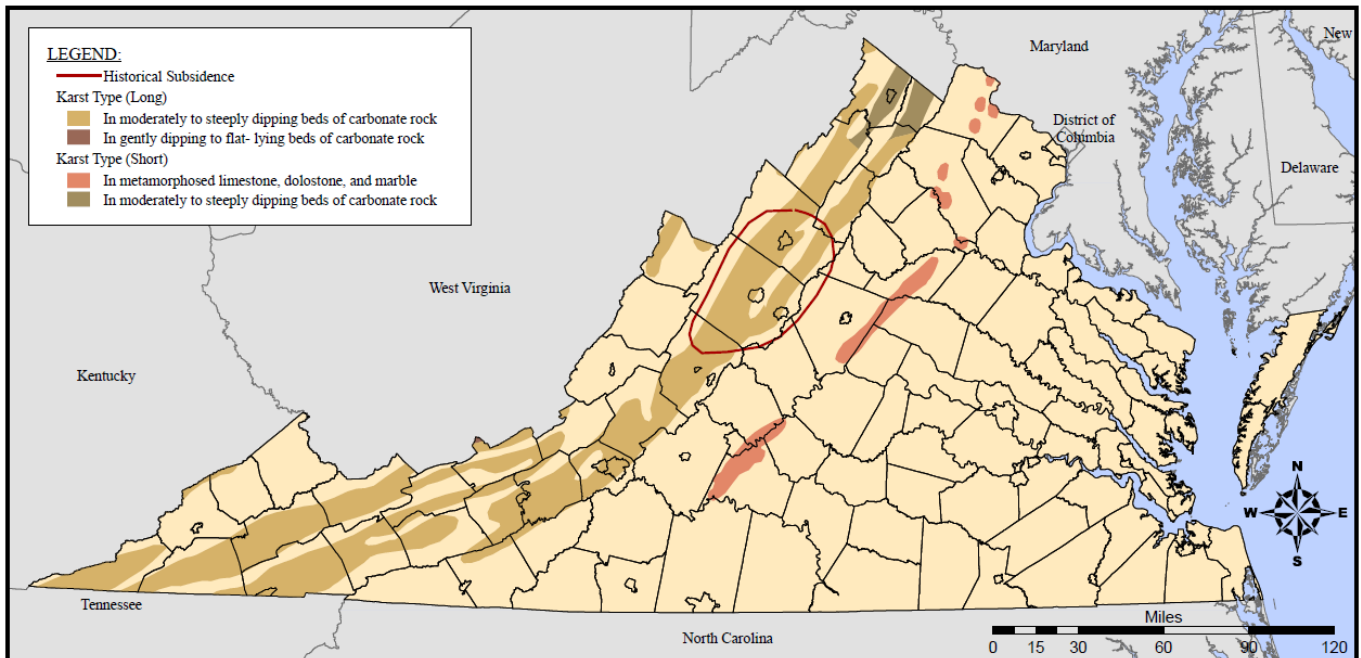
Map created by VDEM/CGIT (updated by CRC – December 2010)

HAZARD ANALYSIS (DRAFT)

Sinkholes

Sinkholes do not pose an extremely significant risk within the region. The soil types are not conducive to creating sinkholes, although there have been a few reported instances of sinkholes in the area. **Farmville** Town officials noted that they sometimes experience sinkholes for which most of the time they can determine the cause (loss of groundwater, pipe failure, etc.). However, there have been occurrences of sinkholes where the cause was undetermined and therefore the potential for naturally occurring sinkholes is possible. No maps of past occurrences are available for the sinkhole hazard due to the fact that there have been very few incidents reported within the planning area. Additionally, other than information from the State Hazard Mitigation Plan, no known sources of sinkhole probability data exist for the region at the time of this writing. **Map 5.7**, on the next page, shows known landslide (karst) regions and historical subsidence throughout the state.

Map 5.7
Karst Regions and Historical Subsidence



DATA SOURCES:

USGS Engineering Aspects of Karst
VGIN Jurisdictional Boundaries
ESRI State Boundaries

HAZARD IDENTIFICATION:

Long Karst Type: Fissures, tubes, and caves over 1,000 ft long; 50 ft to over 250 ft vertical extent
Short Karst Type: Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent

Historical subsidence represents areas of extensive sinkhole development.

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.

Map created by VDEM/CGIT (Updated by CRC – December 2010)

Landslides

Portions of Planning District 14 are susceptible to landslides. However, according to national base maps provided by the U.S. Geological Survey and maps in the State Hazard Mitigation Plan, most of the region is located in a low landslide hazard area. Portions of **Buckingham County** are located in a higher landslide hazard area and represent the only portions of the region that fall under the high landslide hazard area classification. There are no known historical occurrences of landslides in the region.

HAZARD ANALYSIS (DRAFT)

Dam/Levee Failure

According to the National Inventory of Dams and the U.S. Army Corps of Engineers, there are 176 state-regulated dams in Planning District 14. There are three high hazard dams (Briery Creek and Bush River in Prince Edward County, and Roanoke Creek Dam #31B in Charlotte County) and 16 significant hazard dams. The rest are low hazard dams. There are no known historical occurrences of dam/levee failures in the region. However, there is a private pond near one of the wells for the public water system in Amelia County (specifically, the Courthouse Village area) that required emergency maintenance in the aftermath of Hurricane Isabel to keep it from failing. Had this dam failed, it would have contaminated one of the wells for the public water supply. Since there are multiple wells feeding the system, the loss of one well would not have been a significant problem. However, had it happened without the knowledge of local officials, the contaminated well could have pushed contaminated water into the entire system.

A list of high, significant and low hazard dams for each county in Planning District 14 can be found in Section VI. High hazard dams are those dams that will probably cause the loss of at least one life in the event of a breach and economic, environmental and lifeline losses. Significant hazard dams are those dams that will also cause economic, environmental and lifeline losses, but no deaths are expected in the event of a breach.

Man-made Hazards

Hazardous materials (hazmat) spills

Hazmat substances, because of their chemical nature, can pose a danger to life, health or property if released. Hazmat spills can happen during production, storage, transportation, use or disposal of these substances. Virginia's hazardous materials officers typically receive 2,000 notifications of hazmat incidents a year, according to the Virginia Department of Emergency Management.

Significant event – July 2002: A transport tanker holding tar (liquid asphalt) spilled near the **Lunenburg/Nottoway County** Line, resulting in more than 5,000 gallons of tar flowing into the Nottoway River beneath the dam at Nottoway Falls. The tanker, delivered to a job site in advance of a road project in the area, was parked in a gravel lot near the river. During the afternoon of July 2, 2002, a motorist driving through the area noticed something flowing into the river. This individual discovered the leaking tanker, and immediately notified officials in the **Town of Victoria** – which uses the river as a source of drinking water. Even though Victoria's water system was not affected (the water intake for the Town is above the dam), the Town switched to an alternate water source for a few days as a precaution. The spill was contained before it reached the Fort Pickett Reservoir, which supplies water to the **Town of Blackstone**. Local wildlife, however, did not fare as well. Some snakes, turtles, fish, and other animals that depend on the river died from exposure to the tar. The spill is believed to be an intentional act, as the cap to the tanker's piping was found in a nearby wooded area. No arrests have been made.

Significant event – January 2011: A propane tanker, owned by Synergy Gas, overturned on Friendship Church Road near Fort Mitchell Road in the eastern part of Charlotte County. According to published media reports, the tanker was travelling toward U.S. 360 (just east of Drakes Branch) when it hit an icy patch in the road and slid into a ditch before overturning. The driver escaped without injury. A small amount of propane leaked

HAZARD ANALYSIS (DRAFT)

from the tanker, but the leak was contained by firefighters who responded to the scene and the propane was transferred to another tanker.

Accidents at fertilizer/chemical facilities

Fertilizer and chemical plants and storage facilities are prone to accidents that can have a significant impact on the facility as well as the surrounding community. Accidents at these facilities can be caused by inadequate process hazards analysis, use of inappropriate or poorly-designed equipment, inadequate indications of process condition, and other factors. For significant accidents tracked by the U.S. Environmental Protection Agency and Occupational Safety and Health Administration, issues of note include installation of emissions or pollution control equipment (occurred prior to a number of accidents, which highlight the need for stronger systems for management of change) and similar accidents, near-misses, or low-level failures occurring just before a major accident (indicating the need for more attention to lessons-learned implementation and more thorough company investigation of near-misses and low-level failures). There are no known reports of such incidents in the region.

Biological (Bio)-hazards

Bio-hazards can pose a threat to people, animals, and the environment when biological agents are accidentally or intentionally released into the air or water. Samples of bio-hazards include medical waste, samples of a [microorganism](#), [virus](#) or [toxin](#) (from a biological source). There are no known reports of such incidents in the region.

Accidents at power plants

Nuclear reactors cannot explode like a nuclear bomb, since they use different materials and structures, and nuclear power plants are designed to prevent the release of radioactive materials and include multiple protective barriers placed around reactors. However, accidents do sometimes occur at nuclear power plants that result in the release of radioactive materials into the atmosphere or nearby water sources. There are no nuclear power plants located in Planning District 14. However, there are two such facilities in the State of Virginia that are close enough to the region that an incident could affect the area. They are the North Anna Power Station, located in Louisa County; and the Surry Power Station, located in Surry County. While the Surry County Station is located in the southeastern part of the State (near Williamsburg), the North Anna Power Station is located less than 50 miles from **Buckingham** and **Cumberland Counties**.

While there are no known incidents involving either facility, there have been instances where a reactor at the facility had to be shut down. In May 2010, Unit 2 at the North Anna plant was shut down after a cooling water pump failed. This followed a problem with the reactor a couple of months before, when what was supposed to be a routine refueling outage took longer than expected (it took seven weeks to get the reactor back to full speed; normally, refueling outages last about four weeks). Back in October 2009, Unit 1 at the plant had to be shut down after leaks were detected in a water pipe at the reactor. More recently, in June 2010, Unit 1 at the Surry power plant had to be shut down after a power supply inverter failed, triggering a series of subsequent valve failures which resulted in an automatic reactor trip. It should be noted that neither of these incidents posed any danger to plant workers or the public.

HAZARD ANALYSIS (*DRAFT*)

Other types of power plants (coal fired, gas fired) and electric substations can sometimes experience accidents or malfunctions that can cause injury or death to plant workers and disrupt the flow of electricity for homes and businesses in the area. There are numerous power plants and substations across Planning District 14. There are no known reports of incidents in the region involving “conventional” power plants.

Pipeline explosions/Accidents at above-ground storage facilities

A number of pipelines, carrying gas, run through Planning District 14. Colonial Pipeline Company, Plantation Pipeline Company, and Williams Transco Pipeline own pipelines that run through the region. While pipelines are considered the safest way to move gas, petroleum, and other hazardous materials, they can sometimes malfunction and even explode. If corrosion controls fail to properly function, and/or corrosion is not repaired in a timely manner, then the pipeline could explode. An explosion can cause serious injury, even death, and significant damage to property. Storage tanks for gas, oil, and other chemicals can sometimes experience “catastrophic failure” and explode. This can occur when flammable vapors are ignited, causing a break in either the shell-to-bottom or side seam of the tank. Sometimes, workers performing maintenance or other operations can introduce an ignition source.

There are no records of pipeline explosions within Planning District 14; however, there was a recent incident in a nearby locality. On September 14, 2008, a section of gas pipeline owned by Williams Gas Company and located in eastern Appomattox County – less than 20 miles from the **Buckingham County** Line and Appomattox-Buckingham State Forest – ruptured (it was one of three pipelines running side-by-side in the area). The force of the rupture sent rocks and dirt flying through the air, and knocked a 30-foot section of pipe – 30 inches in diameter – out of the ground and across Virginia Primary Route 26. The force of the gas pouring out of the ruptured pipeline also knocked loose a nearby power line, causing it to fall to the ground. The ensuing spark ignited the gas, causing an explosion that destroyed two homes and damaged several others, injured five people, blew a crater in the ground near the accident site, and resulted in a number of area residents being displaced for several days.

Storage tanks for gas, oil, and other chemicals can sometimes experience “catastrophic failure” and explode. This can occur when flammable vapors are ignited, causing a break in either the shell-to-bottom or side seam of the tank. Sometimes, workers performing maintenance or other operations can introduce an ignition source. This type of accident can cause injury or death to workers, and release harmful chemicals into the atmosphere. Such accidents can happen anywhere, but are more of a concern in cases where the tanks were built before 1950 or tanks are poorly maintained, rarely inspected, or repaired without attention to the tank’s design. The only storage tank facilities in the region are located at the Mitchell Junction Tank Farm and Pumping Station in northern **Cumberland County** near the **Buckingham County** line (owned by Colonial Pipeline).

HAZARD ANALYSIS (DRAFT)

Data Sources

American Society of Civil Engineers (ASCE), "Facts About Windstorms."

Web site: www.windhazards.org/facts.cfm

Bureau of Reclamation, U.S. Department of the Interior

Web site: www.usbr.gov

Federal Emergency Management Agency (FEMA), Department of Homeland Security

Web site: www.fema.gov

National Climatic Data Center (NCDC), U.S. Department of Commerce, National Oceanic and Atmospheric Administration

Web site: <http://lwf.ncdc.noaa.gov/oa/ncdc.html>

Web site: <http://www.ncdc.noaa.gov/temp-and-precip/ranks.php?parameter=pcp&state=044&div=00&month=08&year=2002>

National Geophysical Data Center

Web site: <http://www.ngdc.noaa.gov/>

National Hurricane Center, National Oceanic & Atmospheric Administration (NOAA)

Web site: <http://www.nhc.noaa.gov/>

National Severe Storms Laboratory (NSSL), U.S. Department of Commerce, National Oceanic and Atmospheric Administration

Web site: www.nssl.noaa.gov

National Weather Service (NWS), U.S. Department of Commerce, National Oceanic and Atmospheric Administration

Web site: www.nws.noaa.gov

Storm Prediction Center (SPC), U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service

Web site: www.spc.noaa.gov

The Tornado Project, St. Johnsbury, Vermont

Web site: www.tornadoproject.com

United States Geological Survey (USGS), U.S. Department of the Interior

Web site: www.usgs.gov

Virginia Department of Emergency Management (VDEM)

Web site: <http://www.vaemergency.com/index.cfm>

Virginia Emergency Operations Center

Web site: <http://www.vaemergency.com/about/structure/ops/veoc.cfm>

Virginia Department of Agriculture and Consumer Services

Web site: <http://www.vdacs.virginia.gov/index.shtml>

U.S. Department of Transportation Pipeline and Hazardous Material Safety Administration

Web site: <http://www.phmsa.dot.gov/portal/site/PHMSA>

U.S. Environmental Protection Agency

Web site: <http://www.epa.gov/>

HAZARD ANALYSIS (DRAFT)

U.S. Department of Agriculture

Web site: <http://www.usda.gov/wps/portal/usda/usdahome>

U.S. Department of Agriculture, Farm Service Agency

Web site: <http://www.fsa.usda.gov/FSA/webapp?area=home&subject=landing&topic=landing>

Plant Maintenance Resource Center

Web site: <http://www.plant-maintenance.com/>

U.S. Nuclear Regulatory Commission

Web site: <http://www.nrc.gov/>

Appomattox News

Web site: <http://www.appomattoxnews.com/>

Lynchburg News & Advance

Web site: <http://www2.newsadvance.com/>

WLS Channel 10, Roanoke

Web site: <http://www2.wsls.com/>

The Southside Messenger

Web site: <http://www.southsidemessenger.com/>

The Charlotte Gazette

Web site: <http://www.thecharlottegazette.org/>

The Kenbridge-Victoria Dispatch

Web site: <http://kvdispatch.com/>

(Blackstone) Courier Record

Web site: <http://courier-record.com/>

The Farmville Herald

Web site: <http://www.farmvilleherald.com/>

The Weather Channel

Web site: <http://www.weather.com/>

The Crewe-Burkeville Journal