4.23 Conclusion

There are several hazards which may impact the CVPDC region and with limited budgets it is important to identify those hazards which have the most impact. Some hazards may occur more frequently but have a minor impact while other hazards may only occur less often but have a major impact. There are different ways to evaluate and compare these hazards to each other. For this Plan, the average annual loss and average annual casualties and injuries are calculated. These values are then used to help quantify impacts in a multi-criteria ranking system to identify the high-priority hazards.

The average annual loss (AAL) is calculated by taking all the losses that have occurred in an area over the timeframe in which data has been collected and dividing those losses by the number of years in that timeframe. For example, in the CVPDC region, there have been 29 tornadoes over the past 70 years resulting in $39,472,500 in total losses. To find the AAL, divide $39,472,500 by 70 years to get $563,893 of loss per year. This calculation allows for a better comparison between the hazards, but it can be difficult to calculate this value due to insufficient data. For example, fog events may not be recorded or earthquake events occurring more than one hundred years ago may not have documented damages and losses. The average annual casualties and average annual injuries will also be calculated if the data is available. Some hazards, like extreme heat, may not create large economic losses but may create social losses.

For the hazard ranking analysis, all natural hazards and select man-made and technological hazards were used. Table 4-175 provides the AAL calculations for each of the selected hazards in the CVPDC. For the earthquake, flood, and hurricane hazards, Hazus was used to model the AAL. Table 4-176 provides the average annual casualty and injury values for each hazard.

Table 4-175 Average Annual Loss for the CVPDC Region by Hazard

Hazards	Years of Data	Property Loss ($k)	Agriculture Loss ($k)	Total Loss ($k)	AAL ($k)
Drought	26	0	13,400	13,400	$515.38
Earthquake	247	0	0	0	$307.00[1]
Extreme Cold	23	0	539	539	$23.43
Extreme Heat	33	0	0	0	$0.00
Flooding	24	22,775	775	23,550	$4,373.53[1]
Fog	-	Unknown	0	Unknown	Minimal
Hailstorm	71	120	No Data	119.8	>$1.69
Hurricane	168	0	0	0	$760.00[1]
Land Subsidence/Karst	52	0	0	0	$0.00
Landslide	52	1 significant event	0	Unknown	>0
Severe Thunderstorm	62	15,091	40.5	15,131.96	$244.06
Sever Winter Storm	25	130	0	130	$5.20
Tornado	70	39,473	0	39,472.5	$563.89
Wildfire	15	0	3,777[2]	3,777[2]	$251.80
Dam Failure	35	300	0	300	$8.57

Hazards	Years of Data	Property Loss ($k)	Agriculture Loss ($k)	Total Loss ($k)	AAL ($k)
Hazmat Incident	28	2,551	0	127	$91.09
Urban Fire	11	93,573	0	93,572.629	$8,506.60

[1] Hazus was used to model the AAL instead of using the historical values.
[2] For the wildfire hazard, average timber values and volumes for each jurisdiction were used from Virginia Department of Forestry http://www.dof.virginia.gov/harvest/data/harvest-volume-name.htm.

Table 4-176 Average Annual Casualty and Injuries for the CVPDC Region by Hazard

Hazards	Years of Data	Total Casualties	Total Injuries	Average Annual Casualty	Average Annual Injuries
Drought	26	0	0	0	0
Earthquake	247	0	0	0[1]	0[1]
Extreme Cold	23	0	0	0	0
Extreme Heat	33	Few	Several	>0	>0
Flooding	24	Some	Some	>0	>0
Fog	-	0	0	0	0
Hailstorm	71	0	0	0	No Data
Hurricane	168	0	0	0	0
Land Subsidence/Karst	52	0	0	0	0
Landslide	52	Some	Some	>0	>0
Severe Thunderstorm	62	0	8	0	0.13
Sever Winter Storm	25	0	0	0	0
Tornado	70	1	31	0.01	0.44
Wildfire	15	0	0	0	0
Dam Failure	35	0	0	0	0
Hazmat Incident	28	0	0	0	0
Urban Fire	11	85	168	7.7	15.3

[1] Hazus was used to model the casualties and injuries instead of using the historical values.

Table 4-177 provides the final hazard ranking for the CVPDC. Each hazard characteristic is assigned a value between 1 (lowest value) and 4 (highest value). When the risk values were calculated, if the value was greater than 3, it was assigned as a high risk hazard. If the value was greater than 2 and less than or equal to 3, it was assigned as a moderate risk. If the value was less than or equal to 2, it was assigned as a low risk hazard. The drought, flooding, and urban fire hazards were ranked highest although it should be noted that the urban fire hazard may not be a priority for non-urban jurisdictions. The extreme temperatures, hailstorm, hurricane, severe thunderstorm, severe winter storm, tornado, wildfire, dam failure, and hazmat incident are all ranked as moderate. The earthquake, fog, land subsidence/karst, and landslide hazards are ranked as low.

Table 4-177 Final Hazard Ranking of Hazards for the CVPDC Region

Hazards	Probability	Impact	Spatial Extent	Warning Time	Duration	Value	Rank
Drought	3	3	4	1	4	3.1	High
Earthquake	1	1	4	4	1	1.9	Low
Extreme Cold	3	2	4	1	3	2.7	Mod.
Extreme Heat	4	2	4	1	3	3	Mod.
Flooding	4	4	2	4	2	3.4	High
Fog	4	1	1	2	1	2	Low
Hailstorm	4	2	4	3	1	3	Mod.
Hurricane	2	3	4	1	1	2.5	Mod.
Land Subsidence/ Karst	1	1	1	4	1	1.3	Low
Landslide	2	2	1	4	1	1.9	Low
Severe Thunderstorm	4	2	4	2	1	2.9	Mod.
Sever Winter Storm	4	2	4	1	3	3	Mod.
Tornado	3	3	1	4	1	2.5	Mod.
Wildfire	4	2	1	4	3	2.7	Mod.
Dam Failure	2	3	1	4	2	2.3	Mod.
Hazmat Incident	3	2	1	4	2	2.3	Mod.
Urban Fire	4	4	2	4	1	3.3	High